



Agenda

City Council Special Regular Session

Monday, May 18, 2026 - 7:00 PM
Council Chambers

I. Call to Order

II. Proclamations

- A. National Emergency Medical Services Week

III. Approve Minutes and Summaries

IV. Meeting Schedule

V. Consent Agenda

- A. Boards and Commissions Appointments/Reappointments
 - 1. Liberty Arts Commission
 - a. Reappoint Christian Vedder to a term expiring 5/15/2029
 - 2. Liberty Parks and Recreation Foundation
 - a. Reappoint Matt Sameck to a term expiring 1/1/2029
 - b. Reappoint Debbie Reames to a term expiring 1/1/2029
 - c. Reappoint Harold Phillips to a term expiring 1/1/2029
 - 3. Planning and Zoning Commission
 - a. Reappoint Ann Waterman to a term expiring 1/1/2029
 - b. Reappoint Amy Howard to a term expiring 1/1/2029
 - 4. Tourism Committee
 - a. Reappoint Shawn Garland as the Restaurant and/or Retail Downtown Representative to a term expiring 5/1/2031
 - b. Reappoint Shawn Barber as the Restaurant and/or Retail At-Large Representative to a term expiring 5/1/2031

VI. Public Hearings

- A. Adoption of the Downtown Design Guidelines (P&Z Case 26-19A) (**postpone to June 8, 2026**)
- B. Resolution of the City Council of the City of Liberty, Clay County, Missouri adopting the Leonard Lightburne Planning Sustainable Places Multimodal Study for the City (P&Z Case 26-18A)
- C. Resolution approving a special use permit to allow the temporary sale of fireworks from June 25, 2026 to July 4, 2026 on a 1.58-acre lot at 530 North Church Road in Liberty, Clay County, Missouri (P&Z Case 26-15SUP)

VII. Ordinances, Contracts and Resolutions

- A. Ordinance acknowledging vendor payments for the period of May 1, 2026 to May 8, 2026
- B. Ordinance approving an emergency contract with Veenstra & Kimm, Inc., a Kleinfelder Company, for maintenance facility repairs at 400 Suddarth Street (Project No. 26-015) in an amount not to exceed \$34,850.00

- C. Ordinance approving a contract with Kissick Construction Co. Inc. for the construction of the 24-Inch resilient water transmission main and vault project in an amount not to exceed \$1,713,967.00

VIII. Other Business

IX. Miscellaneous Matters from City Administrator

X. Miscellaneous Matters from Mayor and City Council

XI. Adjournment

Proclamation

City of Liberty, Missouri



WHEREAS, emergency medical services are a vital public service, and within the City of Liberty, these services are delivered with professionalism and compassion by the members of the Liberty Fire Department; and

WHEREAS, the firefighters, paramedics, and emergency medical technicians of the Liberty Fire Department stand ready to provide lifesaving care to our community 24 hours a day, seven days a week; and

WHEREAS, more than three-quarters of the calls for service within the City of Liberty are emergency medical in nature, highlighting the critical role EMS plays in protecting the health and well-being of our residents and visitors; and

WHEREAS, access to high-quality emergency medical care greatly improves the survival and recovery of those experiencing sudden illness or injury; and

WHEREAS, the Liberty Fire Department works in coordination with dispatchers, hospitals, law enforcement, and regional partners to ensure a seamless and effective emergency response system; and

WHEREAS, the members of the Liberty Fire Department dedicate countless hours to training, education, and skill development to ensure they provide the highest level of pre-hospital care; and

WHEREAS, the Mayor and City Council wish to recognize the dedication, professionalism, and service of the Liberty Fire Department's EMS providers and the positive impact they have on the community each day;

NOW, THEREFORE, I, Kevin Graham, Mayor Pro Tem of the City of Liberty, Clay County, Missouri, do hereby proclaim the week of May 17–23, 2026, as

EMERGENCY MEDICAL SERVICES WEEK

in the City of Liberty, Missouri, and with the theme **"Improving Outcomes, Together,"** call upon all citizens to recognize and honor the members of the Liberty Fire Department and all EMS professionals whose commitment and care help save lives and strengthen our community.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of Liberty, Clay County, Missouri this 18th day of May, 2026

Kevin Graham, Mayor Pro Tem





STAFF REPORT

Planning and Zoning Case

Staff: Joshua Martinez, Capital Project Engineer

Date: May 18, 2026

GENERAL INFORMATION

Application: **Leonard/Lightburne Planning Sustainable Places Multimodal Study**

Applicant: City of Liberty, Missouri

Public Notice: Legal Notice printed in Courier Tribune - April 22, 2026

File Date: April 3, 2026

BACKGROUND INFORMATION

Leonard/Lightburne St. (hereafter referred to as the “corridor”) was originally designed and built by the State of Missouri as part of Missouri Route 33. In 2008 the City of Liberty accepted a transfer of the corridor from the State into the City’s transportation network; it is now owned and maintained by the City of Liberty. The corridor functions as and is defined as a major arterial within the City limits connecting churches, residential neighborhoods, William Jewell, Hallmark, Downtown, MO-291, Rt-69 to the greater City.

The Leading Liberty Forward Comprehensive Plan, adopted in 2023 identified the corridor as roadway for recommended improvement with the intersection of the corridor and 291 noted as a location for recommended pedestrian crossing improvements. The Liberty Transportation Master Plan, adopted in 2025, also identified the corridor as a candidate for a Complete Street Corridor Project.

In order to align with past City planning and study efforts and better define the future intent of the corridor the City pursued a Planning Sustainable Places grant (PSP) through the Mid-America Regional Council (MARC). The PSP program provides grant funding for local planning activities that focus on helping communities establish citizen/driven plans, which can then be advanced into real, implementable projects. The City’s application was selected for award and in November of 2024 the City Council passed Ordinance No. 12005 approving a funding agreement with MARC for the development of the Leonard/Lightburne Planning Sustainable Places Multimodal Study. The Study was completed by CFS Engineers, Landworks Studio and Shockley through a contract which was held by MARC as is the standard PSP procedure. The study is now complete and is being brought forward for formal adoption as a plan.

STAFF ANALYSIS

The study development included:

- Data Collection and Existing Conditions Assessments including

- o A review of the:
 - Comprehensive Plan;
 - Downtown Infill Concept Plan;
 - Transportation Master Plan;
 - Stormwater Master Plan;
 - the Parks and Recreation Master Plan;
 - existing housing and private and public facilities along the corridor;
 - topography constraints;
 - existing stormwater concerns;
 - traffic operations and safety concerns through a formal traffic impact study and
 - existing multimodal conditions.
- Community Engagement
 - o Focus Group engagement to understand the perspective of developers and other key stakeholders.
 - o Project Website and Online Survey to gather public feedback on transportation related issues.
 - o Public Pop Up Events to meet and interact with people where they were.
 - o Public Open House Events to give residents a defined opportunity to meet and interact with project staff.
- Recommendations
 - o Pedestrian Network Enhancements
 - o Bicycle Facility Integration
 - o Traffic Calming & Speed Management
 - o Intersection Operations & Safety
 - o Streetscape && Placemaking Enhancements
 - o Access Management & Driveway Consolidation
 - o Transit Stop & Access Improvements
 - o Implementation Strategy & Phasing

STAFF RECOMMENDATION

The plan in its final form provides the City a pursuable vision for the future of the Leonard/Lightburne corridor which has community support and can be used to pursue design and future construction projects in pursuit of that vision. Staff recommends approval of the Leonard/Lightburne Planning Sustainable Places Multimodal Study.

PZ RECOMMENDATION

At its May 12, 2026 meeting, the Planning Commission voted 8-0-0 to recommend approval of P&Z Case 26-18A as presented in the staff report.

ATTACHMENTS

- Exhibit A: Minutes Excerpt from Historic District Review Commission
- Exhibit B: Minutes Excerpt from Planning & Zoning Commission meeting
- Exhibit C: Resolution

Link to document: [Leonard/Lightburne PSP Study Link](#) (This is a clickable link to the PDF document)

Leonard–Lightburne Corridor Study Discussion HDRC Summary 5.5.2026

Joshua Martinez presented an overview of the Leonard–Lightburne Corridor Study, noting the project was funded in part through the Mid-America Regional Council (MARC) Planning Sustainable Places initiative, following a grant award in 2024. The study examines the Leonard and Lightburne corridor from Highway 291 to Highway 69 and evaluates the variety of land uses and transportation conditions along the route.

Mr. Martinez explained that the study approaches the corridor holistically and divides it into five distinct subsections, each with its own character and development context. The intent is to identify improvements that better integrate the corridor with the surrounding community while establishing a long-term framework for future development and infrastructure investment.

Kara Elbert stated that the corridor extends slightly more than three miles and that the study focuses heavily on accessibility and multimodal transportation. Key considerations include ADA compliance, pedestrian safety, bicycle accommodations, shared roadway concepts, traffic calming measures, and stormwater improvements. The study also includes an implementation strategy intended to guide future projects and funding opportunities.

Ms. Sharp noted that the study evaluated existing conditions, corridor needs, and long-term priorities while recognizing that roadway widening is generally not feasible due to existing constraints. She added that any future improvements involving lighting, retaining walls, or alterations to properties within historic districts would require review by the HDRC. Because portions of the corridor may affect historic districts, staff wanted to present the study to the Commission for input early in the process.

Mr. Martinez explained that the study provides a framework and “road map” for future use and redevelopment along the corridor. He noted that the City’s transportation plan previously identified the corridor as a priority area and said the study will help guide future undeveloped tracts while establishing criteria for future grant applications and infrastructure improvements.

Commissioner Armstrong asked whether stormwater issues were addressed in the study. Mr. Martinez responded that the City’s stormwater master plan would be incorporated into future design phases, including any additional right-of-way needs. Commissioner Armstrong also asked about traffic counts, and Mr. Martinez confirmed that counts were conducted at targeted locations identified for safety concerns and right-of-way limitations.

Commission members expressed support for the study and its comprehensive approach. The Commission noted that sidewalk conditions and right-of-way improvements along the corridor have historically been inconsistent and difficult to navigate, and members appreciated the establishment of a unified long-term vision.

Commissioner Davis emphasized the need for additional pedestrian crossings and safer crosswalks, noting that the corridor is currently difficult to cross and has experienced multiple traffic accidents.

A. PZ Case 26-18A: Adoption of the Leonard Lightburne Planning Sustainable Places Multimodal Study.

Mr. Martinez gave introductory remarks and introduced the consultants to the commission.

Sabin Yanez of CFS Engineers, 10040 N. Willow Avenue, Kansas City, MO 64157, introduced himself to the commission. Mr. Yanez was accompanied by Cara Elbert of Shockey Consulting, 7944 Santa Fe Drive, Overland Park, KS 66204. Mr. Yanez presented the study to the commission, outlining its goals and analysis, and highlighting its recommendations and implementation strategies.

Chairman Rosekrans asked if the commission had any questions for staff or the consultant.

Commissioner Noland asked if this study analyzed the intersection of Doniphan and Lightburne to consider a modification of the grade in order to improve sight distance. Mr. Yanez and Ms. Elbert explained that this was discussed following the first public meeting, but due to the large expense that would require it was decided that the study would focus on making do with certain existing conditions and what could be done with the existing right-of-way, without purchasing additional right-of-way area.

Chairman Rosekrans asked if the commission had any additional questions for staff or the consultant. Seeing none, he opened the public hearing and asked if there were any persons in the audience that would like to speak for or against the proposal. Seeing no persons wishing to speak, Chairman Rosekrans closed the public hearing.

Chairman Rosekrans asked if the commission had any further questions. Seeing none, Chairman Rosekrans asked for a motion on this item.

Action: Commissioner Holt moved to approve the case as presented in the staff report, Commissioner Crawford seconded the motion.

Vote: Motion approved 8-0-0

Yes: All

No: None

Abstain: None

Chairman Rosekrans said the case would be heard in front of the City Council on Monday, May 18, 2026 at 7:00 p.m.

RESOLUTION NO. _____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LIBERTY, CLAY
COUNTY, MISSOURI ADOPTING THE LEONARD LIGHTBURNE PLANNING
SUSTAINABLE PLACES MULTIMODAL STUDY
FOR THE CITY

WHEREAS, the City of Liberty, Missouri, (herein called "City") is a Special Charter City located in Clay County, Missouri, being duly created, organized, and existing under the laws of the State of Missouri; and

WHEREAS, the Planning and Zoning Commission (herein called "Commission") has the authority and responsibility under State Statute and the Municipal Code of the City to develop and adopt a comprehensive plan and any updates or additions for the City; and

WHEREAS, the City's comprehensive plan was adopted in 2023; and

WHEREAS, the City Council, in November of 2024, passed Ordinance No. 12005 approving a funding agreement with Mid America Regional Council for the development of the Leonard Lightburne Planning Sustainable Places Multimodal Study; and

WHEREAS, the Leonard Lightburne Planning Sustainable Places Multimodal Study, with accompanying maps, charts and descriptive and explanatory matter, contains strategies and recommendations that better define the future intent of the corridor; and,

WHEREAS, the Leonard Lightburne Planning Sustainable Places Multimodal Study encourages the establishment of citizen/driven plans, which can then be advanced into real, implementable projects; and

WHEREAS, as required under law, proper notice of a public hearing before the Commission on this matter was given; and

WHEREAS, on May 12, 2026, the Commission, under authority granted to it by the Missouri Revised Statutes, after a duly called public hearing, and after considering the views of all those who came before it, voted to approve the Leonard Lightburne Planning Sustainable Places Multimodal Study by a vote of 8 Ayes to 0 Nays; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LIBERTY, MISSOURI, AS FOLLOWS:

SECTION I

The Leonard Lightburne Planning Sustainable Places Multimodal Study, including the accompanying maps, charts, and descriptive and explanatory matter, attached

RESOLUTION NO. _____ (CONT.)

hereto as Attachment A, and incorporated herein, is adopted by the Council as part of the comprehensive plan for the City.

SECTION II

The Deputy City Clerk shall make copies of the adopted Leonard Lightburne Planning Sustainable Places Multimodal Study available for public inspection as required under State Statute and the Municipal Code of the City.

SECTION III

The whereas clauses are hereby specifically incorporated herein by reference.

SECTION IV

This Resolution shall take effect after passage as provided.

PASSED by the Planning and Zoning Commission on May 12, 2026.

PASSED by the City Council this _____ day of _____, 2026.

Kevin Graham, MAYOR PRO TEM

ATTEST:

DEPUTY CITY CLERK

APPROVED by the Mayor this _____ day of _____, 2026.

Kevin Graham, MAYOR PRO TEM



STAFF REPORT

Planning and Zoning Case 26-15SUP

Staff: Michael Peterman, Assistant Director of Planning & Development

Date: May 18, 2026

GENERAL INFORMATION

Application: **Special Use Permit to allow temporary sale of fireworks at 530 N. Church Road from June 25 to July 4, 2026**

Applicant: Doug Carter
8619 NE 115th St.
Kansas City, MO 64157

Owner: Innis Prop. III LLC
PO Box 1402
Platte City, MO

Location: 530 N Church Rd., SW corner of Plumbers Way & N. Church Rd.

Site Acreage: 1 acre / Lot 1, North Haven Estates, Part of Lot 16

Parking: Public parking on site behind building (approx. 50 spaces)

Existing Land Use/Zoning: Vacant building / M-2, General Industrial

Neighboring Land Use/Zoning: **North:** Equipment Sales / M-2, "General Industrial District"
South: Concrete Plant / M-1, "Light Industrial District"
East: N Church Rd. and Interstate 35
West: Concrete Plant / M-2, "General Industrial District"

Public Notice: Legal Notice printed in Courier Tribune- April 22
Letter sent to property owners within 185 ft. on April 24
Sign Posted on site on April 24

File Date: March 31, 2026

PREVIOUS CASES

PZ Case 25-21SUP: Special Use Permit to allow temporary sale of fireworks at 530 N. Church Road from June 20 to July 4, 2025 was approved by the City council on May 19, 2025.

PZ Case 24-19SUP: Special Use Permit to allow temporary sale of fireworks at 530 N. Church Road from June 25 to July 4, 2024 was approved by the City council on June 24, 2024

DESCRIPTION OF PROPOSAL

The applicant is requesting a Special Use Permit (SUP) to allow the temporary sale of fireworks between June 25th and July 4th, 2026 within a vacant building at 530 N. Church Rd., at the southwest corner of Plumbers Way and N. Church Rd. The proposed hours of operation are 10:00 a.m. to 10:00 p.m., Sunday through Saturday. The site has off-street parking available to the rear and north of the building. Security personnel will occupy the premises 24 hours per day throughout the duration of the Special Use period. Inventory storage will be in the building and sanitary facilities will be provided in the building. Power is available to the building.

The applicant proposes a 4' x 16' sign on the wall of the building. No other temporary signage will be allowed.

With each sale, the applicant must disperse approved information (Exhibit C) outlining types of fireworks allowed within the city limits as well as time periods in which fireworks can be discharged.

PUBLIC INFRASTRUCTURE

Streets

The site has direct access to N. Church Road, a public street, which is sufficient for this temporary use.

Sanitary Sewer

Sanitary sewer service is provided by an 8" main on the west side of the property.

Water

Water service is provided via an existing 6" main along the west side of N. Church Rd. Fire hydrants are located to the north and south of the property.

Stormwater

Stormwater drains via surface runoff toward the east where it is collected by public storm sewer and ultimately discharges into the City storm water system at an acceptable rate.

STAFF ANALYSIS

In accordance with Section 30.25, Special Use Permit, of the Liberty *Unified Development Ordinance* (UDO), staff's analysis of a special use permit application is guided by Section 30-25.3, which provides six findings to which each application must conform:

1. The proposed use is consistent with the intent of the City's Comprehensive Plan.

The proposed use appears to be consistent with the intent of the Comprehensive Plan to provide economic opportunity in Liberty. This use is allowed in the UDO and is utilizing an existing vacant building.

2. The proposed use is one specifically permitted by this article or, as an exception, any previously granted special use permit may be considered for renewal.

The retail sale of fireworks is allowed by Section 30-25.5, Special use permit, uses to be considered.

3. The proposed use does not adversely impact the public health, safety, comfort or general welfare.

On-site parking is available. Staff feels this is sufficient to accommodate this temporary use. Considering the security and safety precautions mandated by the Department of Public Safety Division of Fire Safety and set in place by the applicant, staff finds the public health, safety, comfort, or general welfare should not be adversely impacted by the proposed use.

4. The proposed use conforms to all conditions and performance standards as set forth herein.

The site will be evaluated following the Special Use Period. The applicant must return the site to its pre-existing condition by July 18th, 2026 or be subject to forfeiture of deposit.

5. The proposed use does not adversely impact the public infrastructure system.

The proposed use should not adversely impact the public infrastructure system. Some traffic will be generated by the proposed use but should not adversely impact the street system.

6. The proposed use is compatible with the use, scale, orientation and setback of properties in the general vicinity.

The proposal appears to be compatible with the use, scale, orientation and setback of properties in the general vicinity. The surrounding uses include industrial and general business uses. Staff feels this is an appropriate area for a fireworks stand and the proposal satisfies all requirements of the fireworks ordinance.

STAFF RECOMMENDATION

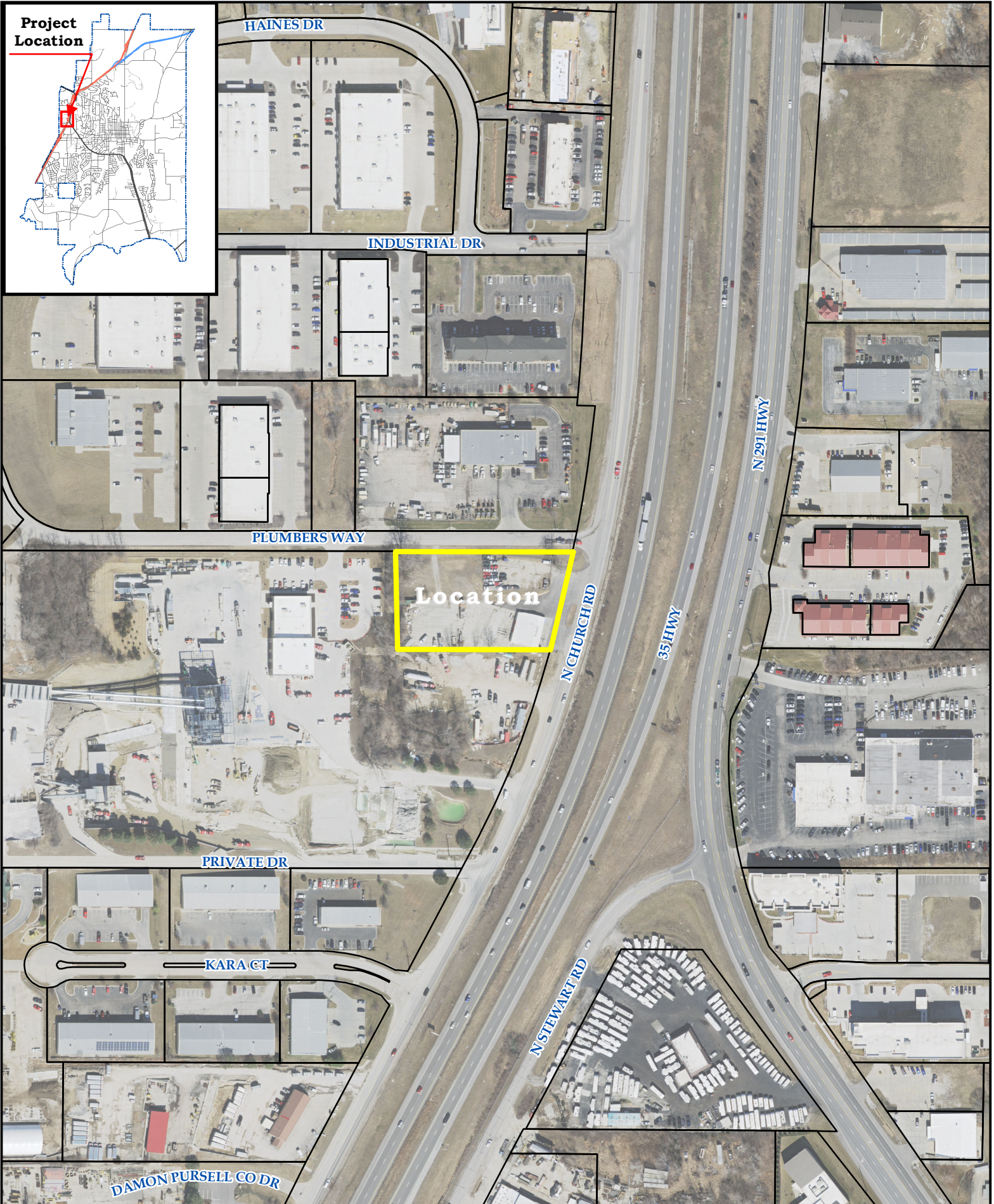
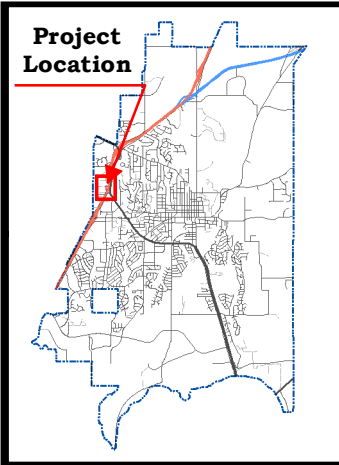
Staff finds that this application meets the standards of review for a Special Use Permit in Section 30.25 in the UDO and recommends approval of P&Z Case 26-15SUP.

PZ RECOMMENDATION

At its May 12, 2026 meeting, the Planning Commission voted 8-0-0 to recommend approval of P&Z Case 26-15SUP as presented in the staff report.

ATTACHMENTS

- Exhibit A: Vicinity Map
- Exhibit B: Applicant's Proposal
- Exhibit C: Fireworks Discharge Information
- Exhibit D: Excerpt minutes from Planning & Zoning Commission meeting
- Exhibit E: Resolution

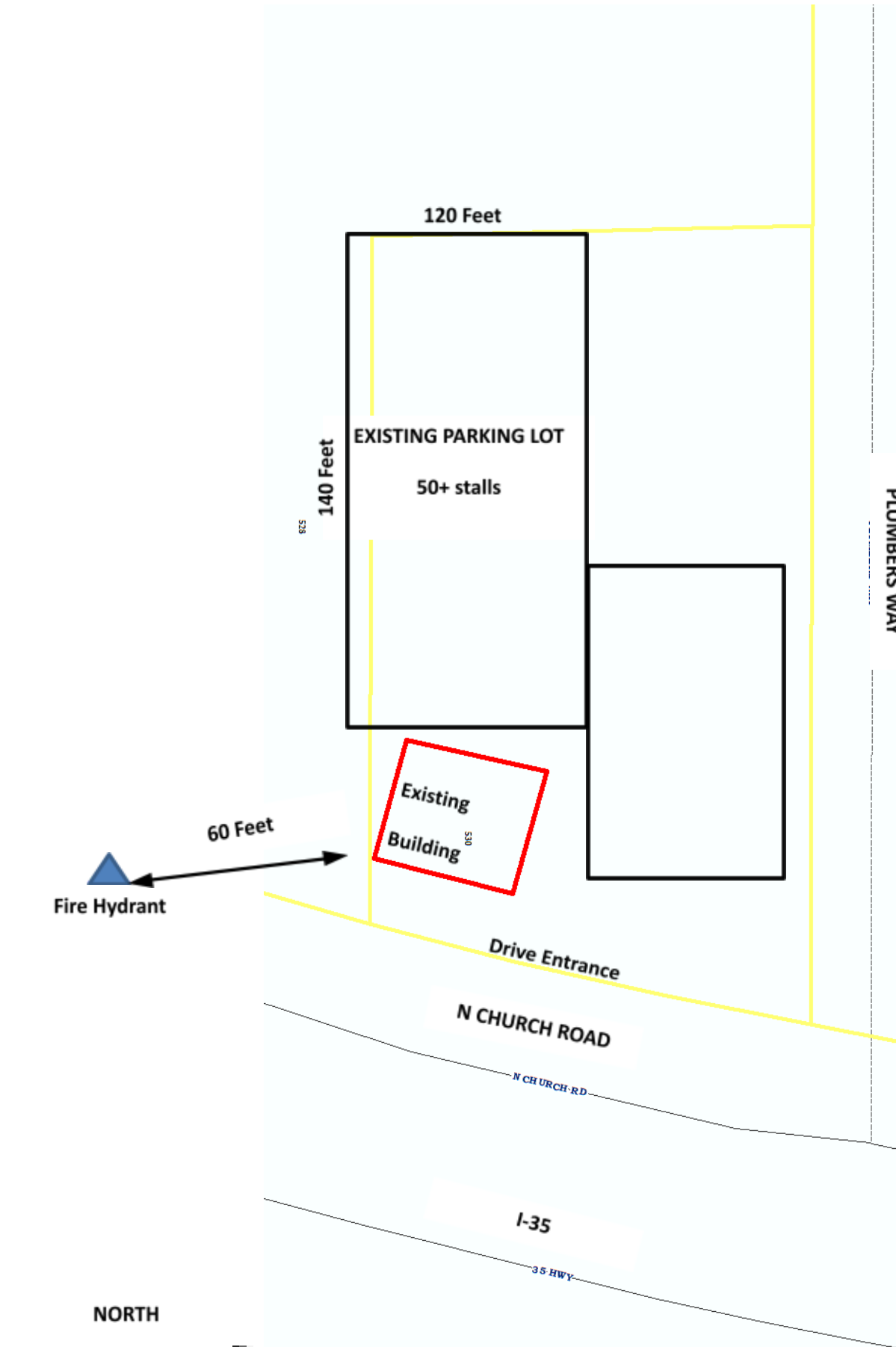


Carter Fireworks has been doing business for over 40 years. We are requesting to have temporary firework sales in the existing vacant building at 530 N. Church Rd Liberty, MO.

Owned by Doug Carter and will be managed by Doug Carter and Christian Carter a Kansas City Fireman, also Bret Snider son of Former Fire Chief Liberty, MO.

We have had locations in Liberty, KCK, Holt, Clay Co. and Mosby. Currently locations in Pleasant Valley and Clay County.

- Operating from 6/20- 7/4 2026**
- Hours of Operation - 10am - 10pm;**
- All employees will be trained use of Fire extinguishers;**
- 24 hour on site security;**
- The building is at least 300 feet from any other structure;**
- Sign – 4x16 Vinyl banner on the building;**
- No Fireworks will be discharged on the property; and**
- All state and city laws pertaining use will be followed.**



New Fireworks Policy for the City of Liberty

Fireworks may only be discharged in the City of Liberty at the following times:

4 p.m. -10 p.m. on July 3 - July 4.

For your safety, fireworks intended to go ten feet or higher (aerial) are only allowed on tracts of land three acres or larger. The sale of bottle rockets, rockets of all types and size, sky lanterns, roman candles, and any and all fireworks with an aerial trajectory having a cylinder or cartridge that is not intended to be completely consumed before landing is prohibited under all conditions within the city limits. It shall be unlawful under all conditions to transfer, discharge, ignite or make use of sky lanterns.

Any person who violates the ordinance is subject to fines starting at \$50.00.

Large public fireworks displays must be approved by the fire chief and the city administrator. Contact City Hall for more information, (816) 439-4310.

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Large public fireworks displays must be approved by the fire chief and the city administrator. Contact City Hall for more information, (816) 439-4310.

IV. Public Hearing Cases

A. PZ Case 26-15SUP: Special Use Permit for Temporary Fireworks sales in an existing building at 530 N. Church.

Mr. Peterman presented the proposal to the commission as described in the staff report.

Chairman Rosekrans asked if the commission had any questions for staff.

Commissioner Summers asked whether the security personnel referenced in the staff report would be provided via the police force or a private service. Mr. Peterman stated that he would let the applicant speak on that matter.

Chairman Rosekrans asked if the commission had any further questions for staff. Seeing none, he asked for the applicant or their representative to step forward.

Doug Carter, address 8619 NE 115th Street, Kansas City, MO 64157, introduced himself as the applicant for this item. Mr. Carter stated that he has had fireworks tents for 45 years. If approved, this would be his third year at this location and that they have not had any issues at this location in the past. Mr. Carter added that the security will be provided through a private service, which will be stationed indoors and trained to use a fire extinguisher.

Chairman Rosekrans asked if the commission had any additional questions for staff or the applicant. Seeing none, he opened the public hearing and asked if there were any persons in the audience that would like to speak for or against the proposal. Seeing no persons wishing to speak, Chairman Rosekrans closed the public hearing.

Chairman Rosekrans asked if the commission had any further questions. Seeing none, Chairman Rosekrans asked for a motion on this item.

Action: Commissioner Dilts moved to approve the case as presented in the staff report, Commissioner Summers seconded the motion.

Vote: Motion approved 8-0-0

Yes: All

No: None

Abstain: None

Chairman Rosekrans said the case would be heard in front of the City Council on Monday, May 18, 2026 at 7:00 p.m.

RESOLUTION NO. _____

A RESOLUTION APPROVING A SPECIAL USE PERMIT TO ALLOW THE
TEMPORARY SALE OF FIREWORKS FROM JUNE 25, 2026 TO JULY 4, 2026 ON A
1.58-ACRE LOT AT 530 NORTH CHURCH ROAD IN LIBERTY, CLAY COUNTY,
MISSOURI

WHEREAS, public hearings have been held by the Planning & Zoning
Commission May 12, 2026 and City Council on May 18, 2026; and

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of
Liberty, Clay County, Missouri, special use permit is hereby granted to the temporary
sale of fireworks from June 25, 2026 to July 4, 2026 on a 1.58-acre lot at 530 North
Church Road in the City of Liberty, Clay County, Missouri, according to the plan on file
in the Planning and Development Department.

BE IT FURTHER RESOLVED that any and all development within the above-
described special use permit shall comply with all other applicable standards and
requirements as set forth in the City Code of the City of Liberty, Missouri.

BE IT FURTHER RESOLVED that said permit shall be issued from the date of
adoption of this resolution.

PASSED by the City Council this _____ day of _____, 2026.

Kevin Graham, MAYOR PRO TEM

ATTEST:

DEPUTY CITY CLERK

Document No. _____

ORDINANCE NO. _____

AN ORDINANCE ACKNOWLEDGING VENDOR PAYMENTS
FOR THE PERIOD OF MAY 1, 2026 to MAY 8, 2026

BE IT ORDAINED, by the City Council of the City of Liberty, Clay County, Missouri,
as follows:

The attached lists of vendor checks as drawn by the finance director is hereby
acknowledged, in the amounts and to the persons as listed. Said report is hereby
incorporated by reference as part of this ordinance. Total disbursements by individual
fund is also hereby acknowledged as listed below:

FUND NAME	FUND NUMBER	AMOUNT
GENERAL OPERATING FUND	100	\$ 133,061.96
POLICE FUND	105	\$ 6,749.02
FIRE FUND	106	\$ 23,831.06
TRANSIENT GUEST TAX FUND	244	\$ 19,559.16
LIMITED CAPITAL FUND	350	\$ 62,764.00
CAPTIAL SALES TAX FUND	351	\$ 113,050.34
TRANSPORTATION SALES TAX FUND	352	\$ 14,000.00
PARKS FUND	460	\$ 502.63
SPORTS COMPLEX FUND	461	\$ 12,193.07
COMMUNITY CENTER FUND	465	\$ 25,470.94
WATER OPERATING FUND	590	\$ 60,449.34
WASTEWATER OPERATING FUND	591	\$ 50,649.60
WASTEWATER CAPITAL FUND	593	\$ (6,276.00)
SOLID WASTE FUND	595	\$ 230,652.45
CID-LIBERTY COMMONS	600	\$ 336.00
TOTAL APPROPRIATIONS		<u>\$ 746,993.57</u>

PASSED by the Council this 18th day of May, 2026.

ATTEST:

DEPUTY CITY CLERK

Kevin Graham - MAYOR PRO TEM

APPROVED by the Mayor this 18th day of May, 2026.

Kevin Graham - MAYOR PRO TEM

Appropriations Legend

Account Number	Fund and Departments
10	General Fund
10.10	Council
10.20	Administration
10.25	Human Resources
10.30	Finance
10.40	Police
10.50	Fire
10.60	Parks-Aging Services
10.70	Public Works
10.80	Planning and Development Services
10.90	Information Services
10.95	City Wide
11	Limited Capital Fund
14	Downtown 353
15	Residential 353
16	TIF-Liberty Commons
17	CID-Liberty Commons
18	TDD-Liberty Commons
20-21	TIF-Liberty Triangle Project
22	TIF-Liberty Triangle Series 2007
23	TIF-Roger's Plaza
24	TIF-Blue Jay Crossing
25	TIF-Triangle Project B-1
26	TIF-Triangle Project F
27	Rogers CID Sales Tax
28	Blue Jay Crossing CID Sales Tax
29	Triangle CID Sales Tax
30	South Liberty Parkway
31	TIF-South Liberty Parkway-Whitehall
32	TIF-Project E
33	TIF-Triangle Project E
35	TIF-Tiangle Project E-4
36	Liberty Corners CID
37	TIF-Triangle Project E-1
38	TIF-Triangle Project E-2
39	Healthy Living Community
40 & 41	Cemetery Trust Funds
42	F Hughes Library Trust
50	Capital Sales Tax Fund
51	PFA Construction Fund
52	Transportation Sales Tax Fund
54	Park Sales Tax Fund
55	Parks Development Fund
56	Eco/Devo Sales Tax Fund
57	Capital Const Bond Fund
58	Fire Sales Tax Fund
59	Public Safety Sales Tax Fund
60	Parks Fund
61	Sports Complex Fund
65	Community Center Fund
67	Transient Guest Tax Fund
68	Preservation & Development Fund
69	Police Training Fund
70	Cable Reserve Fund
73	Cemetery Maintenance Fund
75	Loss Control Fund
80	Debt Service Fund
81	Tax Escrow Fund
82	TIF-Triangle B-1 Debt Service (CCHC)
83	TIF Debt Service 2007 Fund
86	TIF Debt Service Fund
87	NID Debt Service Fund
88	PFA Debt Service Fund
90	Water Operating Fund
90.30	Finance-Utility Billing
90.70	Public Works
92	Wastewater Operating Fund
92.30	Finance-Utility Billing
92.70	Public Works
94	Water Capital Fund
96	Wastewater Capital Fund
97	Wastewater Treatment Facility
98	Solid Waste Fund
98.30	Finance-Utility Billing
98.70	Public Works

MAY 8, 2026

City of Liberty
AP List Checks Invoices

Check Type: All; Check Date between: 05/06/2026 and 05/08/2026;

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195550; 05/08/2026; Outstanding; null										
	10	ARBOR MASTERS TREE & LANDSCAPE	18602126	04/27/2026	TRANSIENT GUEST TAX		244-59005-119-AM250	SPECIAL EVENTS - AM250	250 Tree Watering	\$ 450.00
CHECK TOTAL FOR CHECK NUMBER 195550										\$ 450.00
195551; 05/08/2026; Outstanding; null										
	12	JOEL REINOEHL	TTSF005	05/01/2026	PARKS & RECREATION		460-55041-400-0000	CONTRACT LABOR	State Farm Banner Sponsorship	\$ 86.62
	12	JOEL REINOEHL	TTSF005	05/01/2026	PARKS & RECREATION		465-55043-420-0000	SPONSORSHIPS	State Farm Banner Sponsorship	\$ 129.94
	12	JOEL REINOEHL	TTSF005	05/01/2026	PARKS & RECREATION		461-55044-451-0000	MISCELLANEOUS FEES	State Farm Banner Sponsorship	\$ 264.69
CHECK TOTAL FOR CHECK NUMBER 195551										\$ 481.25
195552; 05/08/2026; Outstanding; null										
*Credit Applied - Check Attachments	76	HEARTLAND COCA-COLA BOTTLING C	52235546026	05/06/2026	PARKS & REC-PO		461-53005-451-0000	CONCESSION SUPPLIES	Beverage Products at CapFed Sports Complex and LCC Vending Machines	\$ (51.66)
*Credit Applied - Check Attachments	76	HEARTLAND COCA-COLA BOTTLING C	52235546026	05/06/2026	PARKS & REC-PO		461-53005-451-0000	CONCESSION SUPPLIES	Beverage Products at CapFed Sports Complex and LCC Vending Machines	\$ 2,049.48
CHECK TOTAL FOR CHECK NUMBER 195552										\$ 1,997.82
195553; 05/08/2026; Outstanding; null										
	84	QUALITY PLUMBING, INC.	191299067	04/29/2026	UTILITIES		590-57005-802-0000	WATER PLANT MAINTENANCE	WTP - HSP Building	\$ 9,280.00
	84	QUALITY PLUMBING, INC.	182161451	04/29/2026	UTILITIES		590-57005-802-0000	WATER PLANT MAINTENANCE	WTP - Pump Suction Piping Repair	\$ 1,943.24
CHECK TOTAL FOR CHECK NUMBER 195553										\$ 11,223.24

**Voided checks present and it may affect total amount calculations

City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195554; 05/08/2026; Outstanding; null										
	142	BOARD OF POLICE COMMISSIONERS	11563	05/01/2026	POLICE		105-55044-501-000000	MISCELLANEOUS FEES	Intake Processing, DNA Sample, Lab Exam	\$ 2,712.75
CHECK TOTAL FOR CHECK NUMBER 195554										\$ 2,712.75
195555; 05/08/2026; Outstanding; null										
	186	PRIDE CLEANERS MJV-A LLC	333472-043026	04/30/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	April Uniform Cleaning	\$ 387.00
CHECK TOTAL FOR CHECK NUMBER 195555										\$ 387.00
195556; 05/08/2026; Outstanding; null										
	236	CENTRALSQUARE TECHNOLOGIES LLC	463938	05/04/2026	POLICE		100-57030-512-000000	SOFTWARE MAINTENANCE	Maintenance Fee	\$ 227.42
	236	CENTRALSQUARE TECHNOLOGIES LLC	462873	04/28/2026	POLICE		100-57030-512-000000	SOFTWARE MAINTENANCE	10 E-Citation Licenses	\$ 1,237.00
CHECK TOTAL FOR CHECK NUMBER 195556										\$ 1,464.42
195557; 05/08/2026; Cleared; 05/08/2026										
	319	CLAYTON HOLDINGS, LLC	317040	05/07/2026	NONE		105-80011-501-000000	INTEREST	SRS 2021 LEASE/INT	\$ 159.07
	319	CLAYTON HOLDINGS, LLC	317040	05/07/2026	NONE		100-80011-170-000000	INTEREST	SRS 2021 LEASE/INT	\$ 754.17
CHECK TOTAL FOR CHECK NUMBER 195557										\$ 913.24
195558; 05/08/2026; Outstanding; null										
	357	NORTHLAND READY-MIX INC	213819,842	04/16/2026	UTILITIES		590-57004-801-000000	MAINS & LINES MAINTENANCE	Concrete - 2800 Riverview Rd	\$ 1,558.00
CHECK TOTAL FOR CHECK NUMBER 195558										\$ 1,558.00
195559; 05/08/2026; Outstanding; null										
	492	ALL COPY PRODUCTS, INC.	41899344	05/02/2026	PARKS & RECREATION		460-57012-400-000000	OFFICE EQUIPMENT MAINTENANCE	Monthly Payment All Copy Products	\$ 238.64
CHECK TOTAL FOR CHECK NUMBER 195559										\$ 238.64

**Voided checks present and it may affect total amount calculations

City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195560; 05/08/2026; Outstanding; null										
	515	BLISS STUDIO & GALLERY	#001	04/28/2026	TRANSIENT GUEST TAX		244-55035-119-000000	OTHER FEES	Stipend for When the Clouds Break	\$ 2,000.00
CHECK TOTAL FOR CHECK NUMBER 195560										\$ 2,000.00
195561; 05/08/2026; Outstanding; null										
	585	DINGES PARTNERS GROUP LLC	85772	05/04/2026	FIRE		106-59015-301-000000	PROTECTIVE CLOTHING	SSmith Name Plate for Bunker Coat	\$ 90.00
CHECK TOTAL FOR CHECK NUMBER 195561										\$ 90.00
195562; 05/08/2026; Outstanding; null										
	616	COLE CHRISTOPHER BRYANT	4/30/26	04/30/2026	PARKS & RECREATION		465-55058-410-000000	PRIVATE SWIMMING LESSONS		\$ 272.00
CHECK TOTAL FOR CHECK NUMBER 195562										\$ 272.00
195563; 05/08/2026; Cleared; 05/08/2026										
April Services	641	PITTMAN SUPPORT SERVICES, LLC	26-004	05/01/2026	FINANCE		100-20017-000-000000	CRIMINAL HISTORY CHECK FEE	LDP Background Chks - April	\$ 414.35
April Services	641	PITTMAN SUPPORT SERVICES, LLC	26-004	05/01/2026	FINANCE		100-55041-111-000000	CONTRACT LABOR	Admin Support	\$ 67.50
April Services	641	PITTMAN SUPPORT SERVICES, LLC	26-004	05/01/2026	FINANCE		100-55041-130-000000	CONTRACT LABOR	Business License/ LDP Support Serv	\$ 6,390.00
CHECK TOTAL FOR CHECK NUMBER 195563										\$ 6,871.85
195564; 05/08/2026; Outstanding; null										
	669	MYRICK MECHANICAL	3679	04/28/2026	FIRE		106-57019-300-000000	BUILDING MAINTENANCE	Station A/C PM's	\$ 835.00
	669	MYRICK MECHANICAL	3678	04/28/2026	PARKS & REC-PO		100-57019-160-000000	BUILDING MAINTENANCE	2026 HVAC PM, on-call repair services	\$ 622.50
CHECK TOTAL FOR CHECK NUMBER 195564										\$ 1,457.50

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City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195565; 05/08/2026; Outstanding; null										
	713	KOHL WHOLESALE INC	1612849	05/06/2026	PARKS & REC-PO		461-53005-451-000000	CONCESSION SUPPLIES	Food products and serving items for concessions at CapFed Sports Complex	\$ 3,187.01
CHECK TOTAL FOR CHECK NUMBER 195565										\$ 3,187.01
195566; 05/08/2026; Outstanding; null										
	726	AGC ENGINEERS INC	04-2026-04	04/30/2026	PUB WRKS-PO		351-70018-201-000000	CONSTRUCTION ENGINEERING	Belmont Street Storm Sewer	\$ 8,778.00
CHECK TOTAL FOR CHECK NUMBER 195566										\$ 8,778.00
195567; 05/08/2026; Outstanding; null										
	728	CHERRYROAD MEDIA INC	329271	04/22/2026	TRANSIENT GUEST TAX		244-53026-119-000000	MAKE MUSIC DAY-SUPPLIES	Digital and print ads with the Courier Tribune for Make Music Liberty	\$ 510.00
City of Liberty Subscript	728	CHERRYROAD MEDIA INC	APRIL 2026	04/30/2026	MULTI		100-53000-130-000000	GENERAL SUPPLIES	Weekly Tribune	\$ 63.75
CHECK TOTAL FOR CHECK NUMBER 195567										\$ 573.75
195568; 05/08/2026; Outstanding; null										
	759	MARTHA LAFITE THOMPSON NATURE	MAY2026	05/05/2026	TRANSIENT GUEST TAX		244-59005-119-AM250	SPECIAL EVENTS - AM250	AM250 Tweets Across America Project at MLTNS	\$ 4,435.86
CHECK TOTAL FOR CHECK NUMBER 195568										\$ 4,435.86
195569; 05/08/2026; Outstanding; null										
	781	TEKLAB, INC.	345799	05/06/2026	UTILITIES-PO		591-55020-902-000000	LAB FEES	2026 Teklabs Services for WWTP	\$ 376.70
CHECK TOTAL FOR CHECK NUMBER 195569										\$ 376.70
195570; 05/08/2026; Outstanding; null										
	813	SAVANNAH STIFF	5/18-5/22 MACA	05/08/2026	FINANCE	Hold for p/u	100-54000-116-000000	TRAINING TRAVEL	2026 Maca Conference	\$ 496.95
CHECK TOTAL FOR CHECK NUMBER 195570										\$ 496.95

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City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195571; 05/08/2026; Outstanding; null										
	840	MAX10 MO LLC	00185167	05/01/2026	PUB WRKS-PO		100-55041-202-000000	CONTRACT LABOR	Monthly Janitorial Services for City Facilities	\$ 6,434.00
CHECK TOTAL FOR CHECK NUMBER 195571										\$ 6,434.00
195572; 05/08/2026; Outstanding; null										
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-30945	03/25/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	203 Oil Change	\$ 47.97
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-30451	03/10/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	204 Oil Change	\$ 47.97
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-31988	04/28/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	202 Oil Change	\$ 47.97
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-31977	04/28/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	211 Oil Change	\$ 41.97
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-31938	04/27/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	231 Oil Change	\$ 47.97
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-31929	04/26/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	203 Oil Change	\$ 47.97
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-31431	04/09/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	Oil Change	\$ 91.95
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-30988	03/26/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	220 Oil Change	\$ 71.96
	875	STRICKLAND BROTHERS 10 MIN OIL	00589-31487	04/11/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	204 Oil Change	\$ 47.97
CHECK TOTAL FOR CHECK NUMBER 195572										\$ 493.70
195573; 05/08/2026; Outstanding; null										
	885	COURTNEY RIDGE RDF LANDFILL	4138-000033489	04/30/2026	UTILITIES-PO		591-55026-902-000000	FEES-LIME SLUDGE DISPOSAL	Landfill/Landfilling Biosolids for WWTP	\$ 16,546.31
CHECK TOTAL FOR CHECK NUMBER 195573										\$ 16,546.31

**Voided checks present and it may affect total amount calculations

City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195574; 05/08/2026; Outstanding; null										
	953	HAWKINS INC	7411557	05/04/2026	UTILITIES		590-53009-802-0000 00	CHEMICALS	WTP - Liquid Ammonium Sulfate	\$ 4,232.26
CHECK TOTAL FOR CHECK NUMBER 195574										\$ 4,232.26
195575; 05/08/2026; Outstanding; null										
	963	T-MOBILE USA INC.	APRIL 2026	04/21/2026	POLICE		100-57030-512-0000 00	SOFTWARE MAINTENANCE	Phone Services	\$ 3,262.06
CHECK TOTAL FOR CHECK NUMBER 195575										\$ 3,262.06
195576; 05/08/2026; Outstanding; null										
	964	CHICK-FIL-A LIBERTY FSU	9335805	05/02/2026	PARKS & RECREATION		461-53005-451-0000 00	CONCESSION SUPPLIES	Chick-Fil-A Sandwiches	\$ 270.00
CHECK TOTAL FOR CHECK NUMBER 195576										\$ 270.00
195577; 05/08/2026; Outstanding; null										
	985	HERITAGE PEST CONTROL LLC	742026	05/02/2026	TRANSIENT GUEST TAX		244-59006-119-0000 00	LIBERTY FEST	Mosquito Spray for Liberty Fest on 7/3/2026	\$ 1,500.00
CHECK TOTAL FOR CHECK NUMBER 195577										\$ 1,500.00
195578; 05/08/2026; Outstanding; null										
	995	KC MEDIA LLC	7743	05/01/2026	TRANSIENT GUEST TAX		244-55028-119-0000 00	ADVERTISING	May IN KC Magazine Ad	\$ 1,000.00
CHECK TOTAL FOR CHECK NUMBER 195578										\$ 1,000.00
195579; 05/08/2026; Outstanding; null										
	996	EMILY SEYMOUR	4/30/26	04/30/2026	PARKS & RECREATION		465-55054-410-0000 00	SWIM TEAM BASICS		\$ 50.00
	996	EMILY SEYMOUR	4/30/26	04/30/2026	PARKS & RECREATION		465-55058-410-0000 00	PRIVATE SWIMMING LESSONS		\$ 32.00
CHECK TOTAL FOR CHECK NUMBER 195579										\$ 82.00

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City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195580; 05/08/2026; Outstanding; null										
	997	PENNY LEWIS	4/30/26	04/30/2026	PARKS & RECREATION		465-55060-410-000000	SPECIALTY SWIM PROGRAMS		\$ 50.00
	997	PENNY LEWIS	4/30/26	04/30/2026	PARKS & RECREATION		465-55056-410-000000	SEMI-PRIVATE SWIM LESSONS		\$ 52.00
	997	PENNY LEWIS	4/30/26	04/30/2026	PARKS & RECREATION		465-55058-410-000000	PRIVATE SWIMMING LESSONS		\$ 20.00
	997	PENNY LEWIS	4/30/26	04/30/2026	PARKS & RECREATION		465-55060-410-000000	SPECIALTY SWIM PROGRAMS		\$ 200.00
	997	PENNY LEWIS	4/30/26	04/30/2026	PARKS & RECREATION		465-55054-410-000000	SWIM TEAM BASICS		\$ 50.00
	997	PENNY LEWIS	4/30/26	04/30/2026	PARKS & RECREATION		465-55061-410-000000	STARTS AND TURNS		\$ 25.00
CHECK TOTAL FOR CHECK NUMBER 195580										\$ 397.00
195581; 05/08/2026; Outstanding; null										
	1001	CAN PLAY	R-2026004	05/04/2026	PARKS & RECREATION		461-53003-451-000000	RECREATION SUPPLIES	Yearly Agreement	\$ 1,000.00
CHECK TOTAL FOR CHECK NUMBER 195581										\$ 1,000.00
195582; 05/08/2026; Outstanding; null										
	1009	LILLIAN BRYANT	4/30/26	04/30/2026	PARKS & RECREATION		465-55058-410-000000	PRIVATE SWIMMING LESSONS		\$ 256.00
CHECK TOTAL FOR CHECK NUMBER 195582										\$ 256.00
195583; 05/08/2026; Outstanding; null										
	1041	ALPHA-LIT KC, LLC	5012	03/17/2026	TRANSIENT GUEST TAX		244-59005-119-AM250	SPECIAL EVENTS - AM250	Light up marquee letters for Poolside Palooza for America 250	\$ 624.00
CHECK TOTAL FOR CHECK NUMBER 195583										\$ 624.00

**Voided checks present and it may affect total amount calculations

City of Liberty
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SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195584; 05/08/2026; Outstanding; null										
	1059	CLAY CO RECORDER	20260011240	05/04/2026	PLANNING & DVLP		100-55016-150-000000	RECORDING FEES	Recording of Hosanna Lutheran Annexation	\$ 39.00
CHECK TOTAL FOR CHECK NUMBER 195584										\$ 39.00
195585; 05/08/2026; Outstanding; null										
	1069	GEST MISSOURI HOLDINGS LLC	1029	03/20/2026	ECO/DEVO SALES TAX		352-55044-160-000000	IRIS TRANSPORTATION (ZTRIP)	GEST Monthly Invoice	\$ 14,000.00
CHECK TOTAL FOR CHECK NUMBER 195585										\$ 14,000.00
195586; 05/08/2026; Cleared; 05/08/2026										
	1074	NETSPEND HOLDINGS, INC	2944936	05/04/2026	NONE		100-59026-140-000000	MISCELLANEOUS EXPENSES	2026 GIFT CARDS-2ND HALF OF YEAR	\$ 3,258.49
CHECK TOTAL FOR CHECK NUMBER 195586										\$ 3,258.49
195587; 05/08/2026; Outstanding; null										
	1077	CAITLYN MCCARTHY	4/30/26	04/30/2026	PARKS & RECREATION		465-55060-410-000000	SPECIALTY SWIM PROGRAMS		\$ 50.00
CHECK TOTAL FOR CHECK NUMBER 195587										\$ 50.00
195588; 05/08/2026; Outstanding; null										
	1086	VERTEXONE SOFTWARE, LLC	038-FI000004215	04/13/2026	FINANCE		591-57030-901-000000	SOFTWARE MAINTENANCE	March Fees	\$ 63.73
	1086	VERTEXONE SOFTWARE, LLC	038-FI000004215	04/13/2026	FINANCE		590-57030-801-000000	SOFTWARE MAINTENANCE	March Fees	\$ 31.41
CHECK TOTAL FOR CHECK NUMBER 195588										\$ 95.14

**Voided checks present and it may affect total amount calculations

City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195589; 05/08/2026; Outstanding; null										
	1088	JEO CONSULTING GROUP, INC	172689	03/27/2026	PUB WRKS-PO		351-70018-201-00000	CONSTRUCTION ENGINEERING	Purchase Order for new Contract with JEO Consulting Group	\$ 41,451.67
	1088	JEO CONSULTING GROUP, INC	173433	04/27/2026	PUB WRKS-PO		351-70018-201-00000	CONSTRUCTION ENGINEERING	Purchase Order for new Contract with JEO Consulting Group	\$ 39,582.70
CHECK TOTAL FOR CHECK NUMBER 195589										\$ 81,034.37
195590; 05/08/2026; Outstanding; null										
	1144	GFT INFRASTRUCTURE, INC	000005003499	03/16/2026	PUB WRKS-PO		351-70018-201-00000	CONSTRUCTION ENGINEERING	Purchase Order for Project I Phase II Contract with GFT	\$ 6,806.27
CHECK TOTAL FOR CHECK NUMBER 195590										\$ 6,806.27
195591; 05/08/2026; Outstanding; null										
	1154	BULLDOG DEMOLITION & CONST SVC	26-135-01	04/30/2026	UTILITIES		591-57005-902-00000	WATER PLANT MAINTENANCE	WWTP - Demo of Elevated Sidewalk	\$ 5,200.00
CHECK TOTAL FOR CHECK NUMBER 195591										\$ 5,200.00
195592; 05/08/2026; Outstanding; null										
	1156	HILLS OF OAKWOOD HOMEOWNERS	HOA-NE-001	03/16/2026	PLANNING & DVLP		100-59005-160-00000	SPECIAL EVENTS	Neighborhood Enhancement Grant	\$ 6,129.00
CHECK TOTAL FOR CHECK NUMBER 195592										\$ 6,129.00
195593; 05/08/2026; Outstanding; null										
	1159	SCHOWENGERDT INSCRIPTIONS, LLC	001	05/02/2026	TRANSIENT GUEST TAX		244-59024-119-00000	SITE WAYFINDING	Downtown Street Marker Refurbishment	\$ 5,400.00
CHECK TOTAL FOR CHECK NUMBER 195593										\$ 5,400.00
195594; 05/08/2026; Outstanding; null										
	1184	MO STATE HIGHWAY PATROL	812HP037038510	04/01/2026	POLICE		100-55039-512-00000	REGIONAL ALERT SYSTEM	Mules Apr-June 26	\$ 285.00
CHECK TOTAL FOR CHECK NUMBER 195594										\$ 285.00

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City of Liberty
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SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195595; 05/08/2026; Outstanding; null										
	1216	CONSTRUCTION MATERIAL TRUCKING	5302628	04/29/2026	UTILITIES		591-55026-902-000000	FEES-LIME SLUDGE DISPOSAL	WWTP - Biosolids Removal	\$ 2,240.00
CHECK TOTAL FOR CHECK NUMBER 195595										\$ 2,240.00
195596; 05/08/2026; Outstanding; null										
	1431	CRAFCO INC	9403703505	04/23/2026	PUBLIC WORKS		351-57031-201-000000	ASPHALT-STREET REPAIRS	Polyflex Type 2	\$ 2,772.00
	1431	CRAFCO INC	9403700179	04/20/2026	PUBLIC WORKS		351-57031-201-000000	ASPHALT-STREET REPAIRS	Polyflex Type 2	\$ 1,386.00
CHECK TOTAL FOR CHECK NUMBER 195596										\$ 4,158.00
195597; 05/08/2026; Outstanding; null										
	1659	INLAND TRUCK PARTS CO	IN-1989364	05/06/2026	FIRE		106-57009-301-000000	VEHICLE MAINTENANCE	T1 compressor and 611 Brakes	\$ 16,529.31
CHECK TOTAL FOR CHECK NUMBER 195597										\$ 16,529.31
195598; 05/08/2026; Outstanding; null										
	2103	K C WINNELSON INC	161905-01	04/29/2026	UTILITIES		590-57004-801-000000	MAINS & LINES MAINTENANCE	Storz Wrench	\$ 264.08
CHECK TOTAL FOR CHECK NUMBER 195598										\$ 264.08
195599; 05/08/2026; Outstanding; null										
	2300	BOUND TREE MEDICAL LLC	86183937	04/27/2026	FIRE		106-53001-302-000000	MEDICAL SUPPLIES	medical supplies	\$ 1,588.96
CHECK TOTAL FOR CHECK NUMBER 195599										\$ 1,588.96
195600; 05/08/2026; Outstanding; null										
	2456	PVS DX INC	817000817-26	04/28/2026	UTILITIES-PO		590-53009-802-000000	CHEMICALS	Sodium Hypochlorite	\$ 8,413.77
CHECK TOTAL FOR CHECK NUMBER 195600										\$ 8,413.77

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City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195601; 05/08/2026; Outstanding; null										
	2545	KNAPHEIDE TRUCK EQUIPMENT CO	INV43268042101	04/15/2026	PUBLIC WORKS		100-57040-203-000000	SUPPLIES-SNOW REMOVAL	Plow Module	\$ 240.00
	2545	KNAPHEIDE TRUCK EQUIPMENT CO	INV43267349901	04/15/2026	PUBLIC WORKS		100-57009-203-000000	VEHICLE MAINTENANCE	Vehicle Maintenance	\$ 39.00
CHECK TOTAL FOR CHECK NUMBER 195601										\$ 279.00
195602; 05/08/2026; Outstanding; null										
	2767	K C WINWATER WORKS CO	362515-01	04/30/2026	UTILITIES		590-13001-000-000000	INVENTORY-MATERIALS/SUPPLIES	Inventory Part - #301	\$ 3,566.00
	2767	K C WINWATER WORKS CO	362372-01	04/30/2026	UTILITIES		590-57004-801-000000	MAINS & LINES MAINTENANCE	Misc Inventory	\$ 1,100.00
CHECK TOTAL FOR CHECK NUMBER 195602										\$ 4,666.00
195603; 05/08/2026; Outstanding; null										
	2825	UNIFIRST CORPORATION	3281395364	05/04/2026	PARKS & RECREATION		465-57018-420-000000	MISC EQUIPMENT MAINT	Facility Mats 5.4.26	\$ 146.88
CHECK TOTAL FOR CHECK NUMBER 195603										\$ 146.88
195604; 05/08/2026; Outstanding; null										
	2879	L-L TOWING CO	89636	01/09/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	213 Start	\$ 40.00
CHECK TOTAL FOR CHECK NUMBER 195604										\$ 40.00
195605; 05/08/2026; Outstanding; null										
	3134	MEALS ON WHEELS	042026	05/01/2026	PARKS & RECREATION		100-53025-480-000000	MEALS ON WHEELS	MARC April Meals	\$ 2,271.25
CHECK TOTAL FOR CHECK NUMBER 195605										\$ 2,271.25

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195606; 05/08/2026; Outstanding; null										
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		460-54000-400-000000	TRAINING TRAVEL	Tom Garland March Mileage	\$ 120.40
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		465-53038-420-000000	RSVP GRANT	Erika Brant RSVP Expenses	\$ 41.44
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		465-20010-000-000000	REFUNDS PAYABLE	Membership fees for disgruntled member cancelled same night signed up	\$ 143.75
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		461-59026-451-000000	MISCELLANEOUS EXPENSES	Brittany Johnston March Mileage	\$ 74.67
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		461-59026-451-000000	MISCELLANEOUS EXPENSES	Paula Ruf March Mileage	\$ 45.65
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		100-53035-483-000000	PROGRAM SUPPLIES	Silver Center April Birthday Party	\$ 100.00
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		100-59026-480-000000	MISCELLANEOUS EXPENSES	Hailey Kellerstrass Mileage Jan-March	\$ 132.02
	3524	LIBERTY PETTY CASH	05042026	05/04/2026	PARKS & RECREATION		465-53038-420-000000	RSVP GRANT	Chery Nowell Food Handlers-RSVP	\$ 25.99
CHECK TOTAL FOR CHECK NUMBER 195606										\$ 683.92
195607; 05/08/2026; Outstanding; null										
Acct #527657-32065	3552	K C MO WATER SERVICES	KC APR-26	04/30/2026	FINANCE		591-55040-902-000000	SEWAGE TREATMENT SERVICES	WW Chgs Acct 128-0993500-002	\$ 2,718.12
	3552	K C MO WATER SERVICES	KC SEPT-25	10/09/2025	FINANCE		591-55040-902-000000	SEWAGE TREATMENT SERVICES	K C Wastewater Services	\$ 3,557.59
CHECK TOTAL FOR CHECK NUMBER 195607										\$ 6,275.71
195608; 05/08/2026; Outstanding; null										
	3684	CONRAD FIRE EQUIPMENT INC	593242	04/29/2026	FIRE		106-57009-301-000000	VEHICLE MAINTENANCE	Truck 1 Ladder	\$ 1,165.20
	3684	CONRAD FIRE EQUIPMENT INC	593349	05/01/2026	FIRE		106-57018-301-000000	MISC EQUIPMENT MAINT	Intake Rebuild Kits	\$ 566.62
CHECK TOTAL FOR CHECK NUMBER 195608										\$ 1,731.82

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195609; 05/08/2026; Outstanding; null										
	3845	TRUCK TRAILER & HITCH CENTERS	220000034426	04/27/2026	PUBLIC WORKS	Please hold check at Finance window for pick up	100-70001-202-000000	CAPITAL EQUIPMENT	TRAILER PURCHASE	\$ 3,995.00
CHECK TOTAL FOR CHECK NUMBER 195609										\$ 3,995.00
195610; 05/08/2026; Outstanding; null										
	4117	GREEN PRO SOLUTIONS	28535	03/31/2026	PUBLIC WORKS		100-57042-203-000000	CHEMICALS-STORM DRAIN REPAIR	2998.50	\$ 3,143.58
CHECK TOTAL FOR CHECK NUMBER 195610										\$ 3,143.58
195611; 05/08/2026; Outstanding; null										
	4393	MO ONE CALL SYSTEM INC	6040220	04/30/2026	UTILITIES		590-55002-801-000000	MISSOURI ONE CALL FEE	Locates - April 2026	\$ 386.10
	4393	MO ONE CALL SYSTEM INC	6040220	04/30/2026	UTILITIES		591-55002-901-000000	MISSOURI ONE CALL FEE	Locates - April 2026	\$ 386.10
CHECK TOTAL FOR CHECK NUMBER 195611										\$ 772.20
195612; 05/08/2026; Outstanding; null										
	4445	CLAIRE GINETTE JACKSON	4/30/26	04/30/2026	PARKS & RECREATION		465-55058-410-000000	PRIVATE SWIMMING LESSONS		\$ 304.00
CHECK TOTAL FOR CHECK NUMBER 195612										\$ 304.00
195613; 05/08/2026; Outstanding; null										
	4460	JEFF ELLIS & ASSOC INC	20133573	04/29/2026	PARKS & RECREATION		465-55059-410-000000	LIFEGUARD TRAINING	New and original certifications	\$ 445.00
CHECK TOTAL FOR CHECK NUMBER 195613										\$ 445.00
195614; 05/08/2026; Outstanding; null										
	4477	GENES TIRE & SERVICE CENTER	103430	04/27/2026	POLICE		105-57009-501-000000	VEHICLE MAINTENANCE	218 Flat Repair	\$ 28.69
CHECK TOTAL FOR CHECK NUMBER 195614										\$ 28.69

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195615; 05/08/2026; Outstanding; null										
	4528	HISTORIC DOWNTOWN LIBERTY INC	MAY 2026	05/05/2026	TRANS SLS TX-PO		244-59018-119-00000	HDLI CONTRACT	HDLI Contract	\$ 3,333.33
CHECK TOTAL FOR CHECK NUMBER 195615										\$ 3,333.33
195616; 05/08/2026; Outstanding; null										
	4580	NATURAL BUILD FITNESS LLC	2739152	05/06/2026	PARKS & RECREATION		465-20006-000-0000	RECTRAC REFUNDS NOW	Return of remaining Security balance	\$ 1,155.00
CHECK TOTAL FOR CHECK NUMBER 195616										\$ 1,155.00
195617; 05/08/2026; Outstanding; null										
	4763	PRINTING UNLIMITED	74672	05/05/2026	CITY COUNCIL		100-53032-100-0000	OUTSIDE PRINTING		\$ 76.86
CHECK TOTAL FOR CHECK NUMBER 195617										\$ 76.86

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195618; 05/08/2026; Outstanding; null										
	4817	VETERINARY CENTER OF LIBERTY	548191	05/04/2026	ANIMAL CONTROL		100-24006-000-000000	RESERVE-ANIMAL SHELTER	medicine	\$ 41.68
	4817	VETERINARY CENTER OF LIBERTY	24979	05/02/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	sterilization	\$ 60.00
	4817	VETERINARY CENTER OF LIBERTY	24963	04/27/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	Feline neuter	\$ 60.00
	4817	VETERINARY CENTER OF LIBERTY	24962	04/27/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	Feline neuter	\$ 60.00
	4817	VETERINARY CENTER OF LIBERTY	24995	04/27/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	Feline neuter	\$ 60.00
	4817	VETERINARY CENTER OF LIBERTY	24945	04/28/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	Canine neuter	\$ 80.00
	4817	VETERINARY CENTER OF LIBERTY	25033	05/03/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	sterilization	\$ 80.00
	4817	VETERINARY CENTER OF LIBERTY	24952	05/01/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	sterilization	\$ 95.00
	4817	VETERINARY CENTER OF LIBERTY	24987	04/28/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	sterilization	\$ 60.00
	4817	VETERINARY CENTER OF LIBERTY	24986	04/28/2026	ANIMAL CONTROL		100-55015-165-000000	VETERINARY SERVICES	sterilization	\$ 60.00
	4817	VETERINARY CENTER OF LIBERTY	548191	05/04/2026	ANIMAL CONTROL		100-24006-000-000000	RESERVE-ANIMAL SHELTER	rabies vaccination	\$ 20.55
	4817	VETERINARY CENTER OF LIBERTY	548191	05/04/2026	ANIMAL CONTROL		100-24006-000-000000	RESERVE-ANIMAL SHELTER	rabies vaccination	\$ 20.55
	4817	VETERINARY CENTER OF LIBERTY	548191	05/04/2026	ANIMAL CONTROL		100-24006-000-000000	RESERVE-ANIMAL SHELTER	dental with extractions	\$ 300.00
CHECK TOTAL FOR CHECK NUMBER 195618										\$ 997.78
195619; 05/08/2026; Outstanding; null										
	4908	AMERICAN DIGITAL SECURITY LLC	INV0051139	05/01/2026	ANIMAL CONTROL		100-57015-165-000000	FACILITIES SECURITY MAINT	cyber security	\$ 48.95
CHECK TOTAL FOR CHECK NUMBER 195619										\$ 48.95

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195620; 05/08/2026; Outstanding; null										
	5043	AMY BLAKE	5/14-5/16/2026	02/18/2026	FINANCE	Hold for P/U	100-54000-140-00000	TRAINING TRAVEL	PSHRA Exec. Board Mtng	\$ 181.00
CHECK TOTAL FOR CHECK NUMBER 195620										\$ 181.00
195621; 05/08/2026; Outstanding; null										
	5144	CULLUM & BROWN	3074730	04/24/2026	UTILITIES		591-57005-902-00000	WATER PLANT MAINTENANCE	WWTP - Blowers Bi-Yearly Maintenance	\$ 5,260.00
CHECK TOTAL FOR CHECK NUMBER 195621										\$ 5,260.00
195622; 05/08/2026; Outstanding; null										
	5257	NATHAN JONES	4/30/26	04/30/2026	PARKS & RECREATION		465-55058-410-00000	PRIVATE SWIMMING LESSONS		\$ 38.00
CHECK TOTAL FOR CHECK NUMBER 195622										\$ 38.00
195623; 05/08/2026; Outstanding; null										
	5333	ED M FELD EQUIPMENT CO INC	INV27812	04/23/2026	FIRE		106-59015-301-000000	PROTECTIVE CLOTHING	601 Helmet	\$ 464.00
CHECK TOTAL FOR CHECK NUMBER 195623										\$ 464.00
195624; 05/08/2026; Outstanding; null										
	5386	AAA TIME CLOCKS	7100	04/30/2026	PARKS & RECREATION		465-53000-420-00000	GENERAL SUPPLIES	Timecards	\$ 70.00
CHECK TOTAL FOR CHECK NUMBER 195624										\$ 70.00
195625; 05/08/2026; Outstanding; null										
	5391	KANSAS CITY INDUSTRIAL CONTROL	260228	05/04/2026	UTILITIES		590-57004-801-000000	MAINS & LINES MAINTENANCE	Water Fill Station Troubleshoot	\$ 150.00
CHECK TOTAL FOR CHECK NUMBER 195625										\$ 150.00

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195626; 05/08/2026; Outstanding; null										
	5394	GALL'S INC	034817667	04/22/2026	FIRE		106-59014-301-000000	CLOTHING EXPENSES	Fire uniforms	\$ 374.44
	5394	GALL'S INC	034946410	05/04/2026	FIRE		106-59014-301-000000	CLOTHING EXPENSES	Fire uniforms	\$ 57.26
	5394	GALL'S INC	034825522	04/22/2026	FIRE		106-59014-301-000000	CLOTHING EXPENSES	Fire uniforms	\$ 207.90
	5394	GALL'S INC	034820001	04/22/2026	FIRE		106-59014-301-000000	CLOTHING EXPENSES	Fire uniforms	\$ 104.66
	5394	GALL'S INC	034818070	04/22/2026	FIRE		106-59014-301-000000	CLOTHING EXPENSES	Fire uniforms	\$ 128.78
	5394	GALL'S INC	034924112	05/01/2026	FIRE		106-59014-301-000000	CLOTHING EXPENSES	Fire uniforms	\$ 188.88
	5394	GALL'S INC	034735709	04/14/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Patch Application	\$ 10.56
	5394	GALL'S INC	034690570	04/09/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Prindle Shirt	\$ 97.68
	5394	GALL'S INC	034662754	04/07/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Belt Keepers	\$ 224.85
CHECK TOTAL FOR CHECK NUMBER 195626										\$ 1,395.01
195627; 05/08/2026; Outstanding; null										
	5482	ALTERATIONS & CUSTOM SEWING ST	3289	04/29/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	McCurry Shirts	\$ 191.78
	5482	ALTERATIONS & CUSTOM SEWING ST	3288	04/29/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Kolek Shirt	\$ 96.99
	5482	ALTERATIONS & CUSTOM SEWING ST	3282	04/28/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Badges	\$ 464.00
	5482	ALTERATIONS & CUSTOM SEWING ST	3281	04/28/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Siefker Pants	\$ 26.00
CHECK TOTAL FOR CHECK NUMBER 195627										\$ 778.77

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195628; 05/08/2026; Outstanding; null										
	5575	TW CUSTOM BRANDING	63320	04/07/2026	PARKS & RECREATION		460-59014-400-0000 00	CLOTHING EXPENSES	Spring apparel order - Park Admin	\$ 56.97
	5575	TW CUSTOM BRANDING	63320	04/07/2026	PARKS & RECREATION		465-59014-420-0000 00	CLOTHING EXPENSES	Spring apparel order - LCC	\$ 69.97
	5575	TW CUSTOM BRANDING	63487	04/16/2026	PARKS & REC-PO		461-53003-451-0000 00	RECREATION SUPPLIES	Adult Softball Apparel	\$ 170.82
CHECK TOTAL FOR CHECK NUMBER 195628										\$ 297.76
195629; 05/08/2026; Outstanding; null										
	5626	WEX BANK	112219527	04/30/2026	NONE		100-12023-000-0000 00	INVENTORY-GASOLINE	WEX APRIL	\$ 42,032.35
CHECK TOTAL FOR CHECK NUMBER 195629										\$ 42,032.35
195630; 05/08/2026; Outstanding; null										
	5670	CLAYTON PAPER & DISTRIBUTION	015626	04/07/2026	PARKS & RECREATION		100-53000-480-0000 00	GENERAL SUPPLIES	Paper order 4.6.26 Aging Services	\$ 124.88
	5670	CLAYTON PAPER & DISTRIBUTION	015626	04/07/2026	PARKS & RECREATION		465-53000-420-0000 00	GENERAL SUPPLIES	Paper order 4.6.26 LCC	\$ 124.87
	5670	CLAYTON PAPER & DISTRIBUTION	015626	04/07/2026	PARKS & RECREATION		461-53000-451-0000 00	GENERAL SUPPLIES	Paper order 4.6.26 Sports Complex	\$ 49.95
CHECK TOTAL FOR CHECK NUMBER 195630										\$ 299.70
195631; 05/08/2026; Outstanding; null										
	5761	MISSISSIPPI LIME CO INC	CD198327	05/04/2026	UTILITIES-PO		590-53009-802-0000 00	CHEMICALS	Hydrated Lime, truck delivery charges, fuel surcharge	\$ 10,493.20
	5761	MISSISSIPPI LIME CO INC	CD197493	04/30/2026	UTILITIES-PO		590-53009-802-0000 00	CHEMICALS	Hydrated Lime, truck delivery charges, fuel surcharge	\$ 10,372.48
CHECK TOTAL FOR CHECK NUMBER 195631										\$ 20,865.68

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195632; 05/08/2026; Outstanding; null										
	5902	STREETWISE INC	29061	04/20/2026	PUB WRKS-PO		351-70023-201-000000	PROJECT CONTINGENCIES	2026 PAVEMENT MARKING PROJECT	\$ 10,267.40
CHECK TOTAL FOR CHECK NUMBER 195632										\$ 10,267.40
195633; 05/08/2026; Outstanding; null										
	5904	DR BRADFORD V HOFFMAN	MAY 2026	04/27/2026	FIRE-PO		106-55014-302-000000	MEDICAL FEES	Medical Director 2026	\$ 1,000.00
CHECK TOTAL FOR CHECK NUMBER 195633										\$ 1,000.00
195634; 05/08/2026; Outstanding; null										
	5952	T & W TIRE LLC	3040143757	02/12/2026	UTILITIES		590-57009-801-000000	VEHICLE MAINTENANCE	Repaired Tire - #193	\$ 85.25
	5952	T & W TIRE LLC	3040143757	02/12/2026	UTILITIES		591-57009-901-000000	VEHICLE MAINTENANCE	Repaired Tire - #193	\$ 85.25
CHECK TOTAL FOR CHECK NUMBER 195634										\$ 170.50
195635; 05/08/2026; Outstanding; null										
	6123	GT DISTRIBUTORS INC	INV1084034	04/24/2026	POLICE		105-59014-501-000000	CLOTHING EXPENSES	Radio Pouches	\$ 225.95
CHECK TOTAL FOR CHECK NUMBER 195635										\$ 225.95
195636; 05/08/2026; Outstanding; null										
	6189	CALDWELL COUNTY DETENTION CTR	APRIL 2026	05/04/2026	POLICE		105-55030-511-000000	PRISONER HOUSING EXPENSE	April 2026 Prisoner Housing	\$ 640.00
CHECK TOTAL FOR CHECK NUMBER 195636										\$ 640.00
195637; 05/08/2026; Outstanding; null										
	6296	INDEPENDENT DOOR & GATE OF MO	518961	04/30/2026	UTILITIES		591-57005-902-000000	WATER PLANT MAINTENANCE	WWTP - Gate Repair	\$ 518.00
CHECK TOTAL FOR CHECK NUMBER 195637										\$ 518.00

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195638; 05/08/2026; Outstanding; null										
	6305	HELGET GAS PRODUCTS	0003140093	05/04/2026	FIRE		106-53009-302-000000	CHEMICALS	Fire oxygen	\$ 46.99
	6305	HELGET GAS PRODUCTS	0002513984	04/30/2026	FIRE		106-53009-302-000000	CHEMICALS	Fire oxygen	\$ 48.06
CHECK TOTAL FOR CHECK NUMBER 195638										\$ 95.05
195639; 05/08/2026; Outstanding; null										
	6333	PROFESSIONAL PEST SOLUTIONS	15324	04/30/2026	FIRE		106-55025-300-000000	PEST CONTROL/MOPS	Fire pest control	\$ 30.00
	6333	PROFESSIONAL PEST SOLUTIONS	15325	04/30/2026	FIRE		106-55025-300-000000	PEST CONTROL/MOPS	Fire pest control	\$ 30.00
	6333	PROFESSIONAL PEST SOLUTIONS	15326	04/30/2026	FIRE		106-55025-300-000000	PEST CONTROL/MOPS	Fire pest control	\$ 30.00
	6333	PROFESSIONAL PEST SOLUTIONS	15327	04/30/2026	PUBLIC WORKS		100-57019-203-000000	BUILDING MAINTENANCE	Monthly Pest Control Service - April 2026	\$ 43.00
	6333	PROFESSIONAL PEST SOLUTIONS	15321	04/30/2026	PARKS & RECREATION		465-57019-420-000000	BUILDING MAINTENANCE	Pest Control May - June 2026	\$ 141.00
	6333	PROFESSIONAL PEST SOLUTIONS	15330	04/30/2026	UTILITIES		591-57019-901-000000	BUILDING MAINTENANCE	Pest Control - April 2026	\$ 47.50
	6333	PROFESSIONAL PEST SOLUTIONS	15330	04/30/2026	UTILITIES		590-57019-801-000000	BUILDING MAINTENANCE	Pest Control - April 2026	\$ 47.50
CHECK TOTAL FOR CHECK NUMBER 195639										\$ 369.00
195640; 05/08/2026; Outstanding; null										
	6411	VICTORY SIGN CO INC	15113	05/05/2026	TRANSIENT GUEST TAX		244-59024-119-000000	SITE WAYFINDING	Downtown Business Kiosk Maps	\$ 229.82
CHECK TOTAL FOR CHECK NUMBER 195640										\$ 229.82
195641; 05/08/2026; Outstanding; null										
	6424	BLACK & MCDONALD ELECTRIC LLC	76-1925836	03/31/2026	PUBLIC WORKS		100-57017-201-000000	STREET/TRAFFIC LIGHTS MAINT	Street Light Maintenance @ W Mill & Liberty Dr	\$ 271.37
CHECK TOTAL FOR CHECK NUMBER 195641										\$ 271.37

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195642; 05/08/2026; Outstanding; null										
	6438	NATL FIRE SUPPRESSION	NAT056886	04/30/2026	UTILITIES		591-57019-902-000000	BUILDING MAINTENANCE	Battery Replacement	\$ 165.00
	6438	NATL FIRE SUPPRESSION	NAT056886	04/30/2026	UTILITIES		590-57019-801-000000	BUILDING MAINTENANCE	Battery Replacement	\$ 165.00
	6438	NATL FIRE SUPPRESSION	NAT056886	04/30/2026	UTILITIES		591-57019-901-000000	BUILDING MAINTENANCE	Battery Replacement	\$ 165.00
CHECK TOTAL FOR CHECK NUMBER 195642										\$ 495.00
195643; 05/08/2026; Outstanding; null										
	6471	JCI INDUSTRIES INC	8293394	04/28/2026	UTILITIES		590-57005-802-000000	WATER PLANT MAINTENANCE	WTP - Solids Pump Inspection	\$ 1,025.72
CHECK TOTAL FOR CHECK NUMBER 195643										\$ 1,025.72
195644; 05/08/2026; Outstanding; null										
	6525	FLOTTWEG SEPARATION TECHNOLOGY	82453	04/15/2026	UTILITIES		591-57005-902-000000	WATER PLANT MAINTENANCE	WWTP - Rebuild Kit for Centrifuge	\$ 12,275.59
CHECK TOTAL FOR CHECK NUMBER 195644										\$ 12,275.59
195645; 05/08/2026; Outstanding; null										
	6591	SGI	5	04/30/2026	UTILITIES-PO		593-20003-000-000000	RETAINAGE PAYABLE	Retainage	\$ (6,276.00)
	6591	SGI	5	04/30/2026	UTILITIES-PO		350-70016-901-000000	BUILDING IMPROVEMENTS	Renovation of Utilities Storage Building	\$ 62,764.00
CHECK TOTAL FOR CHECK NUMBER 195645										\$ 56,488.00
195646; 05/08/2026; Outstanding; null										
	6668	CUSTOM GRAPHICS LLC	3127	04/13/2026	PARKS & REC-PO		461-53003-451-000000	RECREATION SUPPLIES	Youth Sports Apparel Youth Baseball/ Softball Jerseys, Baseball Caps, Basketball Jerseys	\$ 2,250.50
CHECK TOTAL FOR CHECK NUMBER 195646										\$ 2,250.50

**Voided checks present and it may affect total amount calculations

City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195647; 05/08/2026; Outstanding; null										
	6669	SHANNON MILLS	5/18-5/22 MACA	05/08/2026	FINANCE	Hold for p/u	100-54000-116-0000 00	TRAINING TRAVEL	2026 Maca Conference	\$ 496.95
CHECK TOTAL FOR CHECK NUMBER 195647										\$ 496.95
195648; 05/08/2026; Outstanding; null										
	6683	STEPHEN G TAYLOR	05052026	05/05/2026	PROSECUTOR		100-55005-115-00000 0	LEGAL FEES	Legal Fees	\$ 750.00
CHECK TOTAL FOR CHECK NUMBER 195648										\$ 750.00
195649; 05/08/2026; Outstanding; null										
	6703	LIBERTY SOLAR, LLC	82	05/01/2026	NONE		461-56000-451-0000 00	ELECTRIC	SOLAR SERVICES	\$ 2,881.96
	6703	LIBERTY SOLAR, LLC	82	05/01/2026	NONE		591-56000-902-0000 00	ELECTRIC	SOLAR SERVICES	\$ 819.71
	6703	LIBERTY SOLAR, LLC	82	05/01/2026	NONE		590-56000-802-0000 00	ELECTRIC	SOLAR SERVICES	\$ 7,335.33
CHECK TOTAL FOR CHECK NUMBER 195649										\$ 11,037.00
195650; 05/08/2026; Outstanding; null										
	7509	KAPKE & WILLERTH LLC	70008	05/06/2026	FINANCE		591-55005-131-00000 0	LEGAL FEES	Legal Fees	\$ 225.00
	7509	KAPKE & WILLERTH LLC	70008	05/06/2026	FINANCE		100-55005-111-00000 0	LEGAL FEES	Legal Fees	\$ 5,473.75
CHECK TOTAL FOR CHECK NUMBER 195650										\$ 5,698.75
195651; 05/08/2026; Outstanding; null										
	7669	PUBLIC AGENCY TRAINING COUNCIL	16060	04/20/2026	POLICE		105-54001-501-0000 00	REGISTRATION FEES	M. Smith/Serna Training	\$ 950.00
CHECK TOTAL FOR CHECK NUMBER 195651										\$ 950.00

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CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195652; 05/08/2026; Outstanding; null										
includes prepaid - 100-14001-000-0000	7675	ESRI INC	900240471	04/22/2026	TECH & LOGISTICS		100-14001-000-0000	OTHER PREPAYMENTS	ESRI Annual Maint - prepaid	\$ 17,583.00
includes prepaid - 100-14001-000-0000	7675	ESRI INC	900240471	04/22/2026	TECH & LOGISTICS		100-57030-170-0000	SOFTWARE MAINTENANCE	ESRI Annual Maint	\$ 24,617.00
CHECK TOTAL FOR CHECK NUMBER 195652										\$ 42,200.00
195653; 05/08/2026; Outstanding; null										
	7683	RICOH USA, INC	109988095	04/22/2026	POLICE		100-53031-512-00000	COPIER LEASE & USAGE	Records Lease - May	\$ 153.81
CHECK TOTAL FOR CHECK NUMBER 195653										\$ 153.81
195654; 05/08/2026; Outstanding; null										
	8355	CENTRAL JACKSON CO FPD	TC26-064	03/03/2026	FIRE		106-53017-303-0000	CPR TRAINING SUPPLIES	Fire CPR cards	\$ 335.00
	8355	CENTRAL JACKSON CO FPD	TC26-042	01/13/2026	FIRE		106-53017-303-0000	CPR TRAINING SUPPLIES	Fire CPR cards	\$ 10.00
CHECK TOTAL FOR CHECK NUMBER 195654										\$ 345.00
195655; 05/08/2026; Outstanding; null										
Acct # 3-0468-0011069	8397	REPUBLIC SERVICES #468	APR 2026	04/30/2026	NONE		595-55032-205-0000	REFUSE COLLECTION FEES	Solid Waste	\$ 142,784.85
Acct # 3-0468-0011069	8397	REPUBLIC SERVICES #468	APR 2026	04/30/2026	NONE		595-55032-205-0000	REFUSE COLLECTION FEES	Recycling	\$ 87,867.60
CHECK TOTAL FOR CHECK NUMBER 195655										\$ 230,652.45
195656; 05/08/2026; Outstanding; null										
	8612	MIDWEST OFFICE TECHNOLOGY INC	INST501105	04/28/2026	ADMINISTRATI ON		100-53031-110-00000	COPIER LEASE & USAGE		\$ 203.42
CHECK TOTAL FOR CHECK NUMBER 195656										\$ 203.42

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City of Liberty
AP List Checks Invoices

SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195657; 05/08/2026; Outstanding; null										
	8621	ADVANCED EXERCISE EQUIPMENT	54036	05/01/2026	PARKS & REC-PO		465-60000-420-000000	MINOR EQUIPMENT	Delivery and Installation	\$ 1,450.00
	8621	ADVANCED EXERCISE EQUIPMENT	54036	05/01/2026	PARKS & REC-PO		465-60000-420-000000	MINOR EQUIPMENT	Life Fitness Fitness Integrity+ Treadmills with 16-inch SE4 console	\$ 18,744.60
CHECK TOTAL FOR CHECK NUMBER 195657										\$ 20,194.60
195658; 05/08/2026; Outstanding; null										
	8654	CUNNINGHAM, VOGEL & ROST PC	71471	03/31/2026	FINANCE		600-55005-616-000000	LEGAL FEES	CID Legal Fees	\$ 144.00
	8654	CUNNINGHAM, VOGEL & ROST PC	71559	05/07/2026	FINANCE		600-55005-616-000000	LEGAL FEES	CID Legal Fees	\$ 192.00
CHECK TOTAL FOR CHECK NUMBER 195658										\$ 336.00
195659; 05/08/2026; Outstanding; null										
	8901	THE WORK ZONE INC	75543	03/12/2026	PUBLIC WORKS		351-57036-201-000000	STREET SIGNS	ST SIGN MATERIALS	\$ 138.00
	8901	THE WORK ZONE INC	75476	03/11/2026	PUBLIC WORKS		351-57036-201-000000	STREET SIGNS	ST SIGN MATERIALS	\$ 931.50
	8901	THE WORK ZONE INC	75732	03/30/2026	PUBLIC WORKS		351-57036-201-000000	STREET SIGNS	ST Sign - Solar LED Light	\$ 294.00
	8901	THE WORK ZONE INC	75726	03/31/2026	PUBLIC WORKS		351-57036-201-000000	STREET SIGNS	ST SIGN MATERIALS	\$ 53.75
	8901	THE WORK ZONE INC	75782	04/13/2026	PUBLIC WORKS		351-57036-201-000000	STREET SIGNS	ST SIGN MATERIALS	\$ 589.05
CHECK TOTAL FOR CHECK NUMBER 195659										\$ 2,006.30
195660; 05/08/2026; Outstanding; null										
	999999	Sandra Zarins	2733911	04/29/2026	PARKS & RECREATION		465-20010-000-000000	REFUNDS PAYABLE	Moved & unable to use	\$ 201.00
CHECK TOTAL FOR CHECK NUMBER 195660										\$ 201.00

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SPECIAL INFORMATION	VENDOR NUMBER	VENDOR NAME	INVOICE NUMBER	INVOICE DATE	APPROVAL DEPARTMENT	INVOICE DESCRIPTION	ACCOUNT NUMBER	ACCOUNT DESCRIPTION	LINE ITEM DESCRIPTION	LINE ITEM VALUE
CHECK NUMBER; CHECK DATE; CHECK STATUS; CHECK CLEARED DATE										
195661; 05/08/2026; Outstanding; null										
	999999	Jessy Horton	2734944	04/30/2026	PARKS & RECREATION		465-20010-000-000000	REFUNDS PAYABLE	Refund credit balance on account..original credit from Volleyball	\$ 32.50
CHECK TOTAL FOR CHECK NUMBER 195661										\$ 32.50
195662; 05/08/2026; Outstanding; null										
	999999	Anita Da Costa	2738559	05/05/2026	PARKS & RECREATION		465-20010-000-000000	REFUNDS PAYABLE	Swim Team Refund	\$ 150.00
CHECK TOTAL FOR CHECK NUMBER 195662										\$ 150.00
195663; 05/08/2026; Outstanding; null										
	999999	J Brandon Meyer	2739160	05/06/2026	PARKS & RECREATION		465-20006-000-000000	RECTRAC REFUNDS NOW	Return of remaining Security balance	\$ 1,000.00
CHECK TOTAL FOR CHECK NUMBER 195663										\$ 1,000.00
195664; 05/08/2026; Outstanding; null										
	999999	Nathan Wyman	NAW-2026-009	05/04/2026	TRANSIENT GUEST TAX		244-53026-119-000000	MAKE MUSIC DAY-SUPPLIES	Reimburse for Reception at Stocksdales Gallery	\$ 76.15
CHECK TOTAL FOR CHECK NUMBER 195664										\$ 76.15
195665; 05/08/2026; Outstanding; null										
	980	DOUGLAS WILSON	5/19-5/22 MMACJ	05/08/2026	FINANCE	Hold for p/u	100-54000-116-000000	TRAINING TRAVEL	2026 MMACJA Conf	\$ 405.80
CHECK TOTAL FOR CHECK NUMBER 195665										\$ 405.80
Grand Total:										\$ 746,993.57

Notes :

- (a) Negative numbers are displayed in parentheses.
- (b) The filter parameters selected at the time of report submission are printed in the header section.
- (c) **Voided checks present and it may affect total amount calculations.

**Voided checks present and it may affect total amount calculations



CITY COUNCIL ACTION REPORT

Meeting Date: May 18, 2026

A/R No.: 2026-197

Department: Public Works

Submitted By: Joshua Martinez, Capital
Projects Engineer

Subject: Ordinance approving an emergency contract with Veenstra & Kimm, Inc., a Kleinfelder Company, for maintenance facility repairs at 400 Suddarth Street (Project No. 26-015) in an amount not to exceed \$34,850.00

Summary:

- Council action affirming staff authorization for the emergency authorization of a contract for design related to necessary maintenance facility repairs at 400 Suddarth St.

Background:

400 Suddarth St. is home to the Public Works Street Maintenance Department and is composed of multiple buildings which house equipment, staff and supplies. The northernmost building has sustained damage to a main structural column which requires a professionally engineered structural analysis, design and recommendation of repairs. The extent of the damage necessitated immediate action. Staff solicited a site visit from Veenstra & Kimm, which is a firm pre-qualified with the City of Liberty for Facility Design/Retrofit services, to develop a scope of work for immediate execution to allow analysis to begin. Staff were provided a scope of work on May 7, 2026, and authorized the agreement so as to not delay commencement of work.



This action recommends that Council affirm the contract entered into by staff with Veenstra & Kimm, Inc. a Kleinfelder Company for the design of emergency maintenance facility repairs at 400 Suddarth St., Project No 26-015 in an amount not to exceed \$34,850.00.

Previous Action (if applicable):

NA

Policy/Committee Review:

Citizen Sales Tax Oversight Committee	Completed/Recommended:
Public Safety Sales Tax Oversight Committee	Completed/Recommended:
Budget Committee	Completed/Recommended:
Other:	Completed/Recommended:

Financial Considerations:

Budgeted:	Line Item: 100-57019-203-000000	Amount: \$34,850.00
	Line Item:	Amount:
	Revenue Line (if applicable):	Amount:
Non-Budgeted	Line Item:	Amount:
	Line Item:	
	Funding Source:	Amount:

Attachments:

1. 2026-197 Approve Contract with V&K for 400 Suddarth - ORD
2. 400 Suddarth _ Contract Signed

Document No. _____

ORDINANCE NO. _____

ORDINANCE APPROVING AN EMERGENCY CONTRACT WITH VEENSTRA &
KIMM, INC., A KLEINFELDER COMPANY, FOR MAINTENANCE FACILITY REPAIRS
AT 400 SUDDARTH STREET (PROJECT NO. 26-015) IN AN AMOUNT NOT TO
EXCEED \$34,850.00

BE IT ORDAINED, by the City Council of the City of Liberty, Clay County, Missouri,
as follows:

SECTION I

The City Council of the City of Liberty, Clay County, Missouri, hereby approves an ordinance approving a contract by and between the City of Liberty, Clay County, Missouri and Veenstra & Kimm, Inc., 9788 N. Ash Ave., Kansas City, MO, 64157, for professional engineering services for the design and construction of the Liberty Drive and Conistor Street water line replacement in the amount not to exceed ONE HUNDRED FOURTEEN THOUSAND SEVEN HUNDRED DOLLARS and 00/100 (\$114,700.00) a copy of said contract being incorporated by reference herein and available for review as required by law.

SECTION II

The City Council hereby authorizes the Mayor Pro Tem to sign the agreement for services as described in Section 1 of this ordinance.

SECTION III

This ordinance shall be in full force and effect from and after its passage by the City Council and approval by the Mayor Pro Tem according to law.

PASSED by Council this _____ day of _____, 2026.

KEVIN GRAHAM, MAYOR PRO TEM

ATTEST:

DEPUTY CITY CLERK

Approved by the Mayor this _____ day of _____, 2026.

KEVIN GRAHAM, MAYOR PRO TEM

CONTRACT FOR PROFESSIONAL ENGINEERING SERVICES
LIBERTY, MISSOURI

THIS IS AN AGREEMENT made as of May ____, 2026 between Mayor, City Council, and the Citizens of the City of Liberty, Missouri, a municipal corporation (OWNER) and Veenstra & Kimm, Inc. a Kleinfelder Company (ENGINEER) for the Maintenance Facility Repairs – 400 Suddarth, Project Number 26-015

OWNER and ENGINEER in consideration of their mutual covenants herein agree in respect of the performance or furnishing of professional engineering services by ENGINEER with respect to the Project and the payment for those services by OWNER as set forth below. Execution of this Agreement by ENGINEER and OWNER constitutes OWNER's written authorization to ENGINEER to proceed on the date first above written with the first phase of the Basic Services described in Section 2 below and as further set forth in Exhibit A, "Scope of Services and Related Matters" ("Exhibit A") and in the other exhibits listed in Section 9 below. This Agreement will become effective on the date first above written.

Notwithstanding the foregoing, this Agreement shall not become effective, nor shall ENGINEER proceed with the performance of any services hereunder until the City Council of Owner has duly approved this Agreement by Ordinance adopted as provided by law.

ENGINEER represents and warrants that ENGINEER is registered as a professional engineer and authorized to otherwise do business in accordance with the laws of the State of Missouri.

SECTION 1 GENERAL

1.1. Standard of Care.

ENGINEER shall perform for or furnish to OWNER professional engineering and related services in all phases of the Project to which this Agreement applies as herein-after provided. ENGINEER shall serve as OWNER's prime design professional and engineering representative for the Project providing professional engineering consultation and advice with respect thereto. ENGINEER may employ such ENGINEER's Consultants as OWNER approves in advance in writing to assist in the performance or furnishing of professional engineering and related services hereunder. ENGINEER shall not be required to employ any ENGINEER'S Consultant unacceptable to ENGINEER. The standard of care for all professional engineering and related services performed or furnished by ENGINEER under this Agreement will be the care and skill ordinarily used by members of ENGINEER's profession practicing under similar conditions at the same time and in the same locality. ENGINEER makes no warranties, express or implied under this Agreement or otherwise, in connection with ENGINEER's

services.

1.2. Coordination with Other Documents.

Not used.

1.3. Definitions.

Wherever used in this Agreement the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

1.3.1. Additional Services. Additional Services means the services to be performed for or furnished to OWNER by ENGINEER described in Section 3 of this Agreement.

1.3.2. Agreement. Agreement means this Contract for Professional Engineering Services between OWNER and ENGINEER including those exhibits listed in Section 9 of this Agreement.

1.3.3. Basic Services. Basic Services means the services to be performed for or furnished to OWNER by ENGINEER described in Section 2 of this Agreement.

1.3.4. Construction Cost. Construction Cost means the total cost to OWNER of those portions of the entire Project designed or specified by ENGINEER. Construction Cost does not include ENGINEER's compensation and expenses, the cost of land, rights-of-way, or compensation for or damages to properties, or OWNER's legal, accounting, insurance counseling or auditing services, or interest and financing charges incurred in connection with the Project or the cost of other services to be provided by others to OWNER pursuant to Section 4 of this Agreement.
Construction Cost is one of the items comprising Total Project Costs.

1.3.5. Contractor. Contractor means the person or entity with whom OWNER enters into a written agreement covering construction work to be performed or furnished with respect to the Project.

1.3.6. ENGINEER's Consultant. ENGINEER's Consultant means a person or entity having a contract with ENGINEER to perform or furnish Basic or Additional Services as ENGINEER's independent professional associate or consultant engaged directly on the Project.

1.3.7. Defective. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

- a. does not conform to the Contract Documents; or
- b. does not meet the requirements of any applicable review or reference

standard

1.3.8. Total Project Costs. Total Project Costs means the sum of the Construction Cost, allowances for contingencies, the total costs of design professional and related services provided by ENGINEER and (on the basis of information furnished by OWNER) allowances for such other items as charges for all other professional and consultants, for the cost of land and rights-of-way, for compensation for or damages to properties and for other services to be provided by others to the OWNER.

SECTION 2 BASIC SERVICES OF ENGINEER

Upon execution of this Agreement by OWNER, the ENGINEER shall perform for OWNER professional engineering services in all phases of the Project as provided in Exhibit A. Those services set forth in Exhibit A will comprise the "Scope of Services".

Except as otherwise provided herein, the Engineer shall not furnish any services with respect to the removal, encapsulation or containment of any hazardous waste or asbestos. Should any such material be encountered during the course of design or construction, work on that part of the project shall be suspended pending arrangements by the Owner for such removal, encapsulation, or containment.

SECTION 3 ADDITIONAL SERVICES OF ENGINEER

If authorized in writing by OWNER, ENGINEER shall furnish or obtain from others Additional Services of the types described in the appropriate section of Exhibit A. These services are not included as part of Basic Services, except to the extent otherwise provided in Exhibit A. These services will be paid for by OWNER as indicated in Section 6.

SECTION 4 OWNER'S RESPONSIBILITIES

Except as otherwise provided in Exhibit A, OWNER shall do the following in a timely manner so as not to delay the services of ENGINEER and shall bear all costs incident thereto:

4.1. Designate in writing a person to act as OWNER's representative with respect to the services to be performed or furnished by ENGINEER under this Agreement. Such person will have complete authority to transmit instructions, receive information, interpret and define OWNER's policies and decisions with respect to ENGINEER's services for the Project.

4.2. Provide all criteria and full information as to OWNER's requirements for the Project, including design objectives and constraints, space, capacity and performance requirements, flexibility and expendability, and any budgetary limitations; and furnish copies of all available design and construction standards which OWNER will require to be included in the Drawings and Specifications.

4.3 Assist ENGINEER by placing at ENGINEER'S disposal all available information pertinent to the Project including previous reports and any other data relative to design or construction of the project.

4.3.1 ENGINEER may not rely upon or make any claim against OWNER with respect to the following:

4.3.1.1 The completeness of such reports and drawings for ENGINEER'S purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures to be employed by ENGINEER and safety programs incident thereto, or

4.3.1.2 Data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or

4.3.1.3 Any ENGINEER interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions or information.

4.4. Arrange for access to and make all provisions for ENGINEER to enter upon public property as required for ENGINEER to perform services under this Agreement.

4.5. Examine all alternate solutions, studies, reports, sketches, Drawings, Specifications, proposals and other documents presented by ENGINEER (including obtaining advice of an attorney, insurance counselor and other consultants as OWNER deems appropriate with respect to such examination) and render in writing decisions pertaining thereto.

4.6. Provide, as may be required for the Project:

4.6.1 accounting, bond and financial advisory, and insurance counseling services;

4.6.2. such legal services as OWNER may require or ENGINEER may reasonably request with regard to legal issues pertaining to the Project, including any that may be raised by Contractor; and

4.6.3. such auditing services as OWNER may require to ascertain how or for what purpose Contractor has used the moneys paid on account of the Contract Price.

4.7. Provide such inspection or monitoring services by an individual or entity other than ENGINEER as OWNER may desire to verify:

4.7.1. that Contractor is complying with any law, rule, regulation, ordinance, code or order applicable to Contractor's performing and furnishing the work.

ENGINEER does not undertake in this Agreement to perform the services referred to in 4.7.1. The identity of any individual or entity employed to perform such services and the

scope of such services will be disclosed to ENGINEER.

4.8. Advise ENGINEER of the identity and scope of services of any independent consultants employed by OWNER to perform or furnish services in regard to the Project, including, but not limited to, Construction Management, Cost Estimating, Project Peer Review, Value Engineering and Constructability Review. If OWNER designates a person or entity other than, or in addition to, ENGINEER to represent OWNER at the site, OWNER shall define and set forth in an exhibit that is to be mutually agreed upon and attached to and made a part of this Agreement before such services begin, the duties, responsibilities and limitations of authority of such other party and the relation thereof to the duties, responsibilities and authority of ENGINEER.

4.9. Attend the pre-bid conference, bid opening, pre-construction conferences, construction progress and other job related meetings and Substantial Completion and final payment inspections.

4.10. Give prompt notice in writing or by electronic means that are permanently preserved to ENGINEER whenever OWNER observes or otherwise becomes aware of any development that affects the scope or time of performance or furnishing of ENGINEER's services, or any defect or nonconformance in ENGINEER's services.

4.11. Furnish, or direct ENGINEER to provide, Additional Services as stipulated in paragraph 3.1 of this Agreement or other services as required.

4.12. Provide Engineer with a fully executed City Ordinance awarding the Contract to the Engineer.

SECTION 5 TIMES FOR RENDERING SERVICES

5.1. ENGINEER's services and compensation under this Agreement have been agreed to in anticipation of the orderly and continuous progress of the Project through completion of the Construction Phase. Unless specific periods of time or specific dates for providing services are specified in this Agreement, ENGINEER's obligation to render services hereunder will extend for a period which may reasonably be required for the design, award of construction contracts, construction and initial operation of the Project including extra work and required extensions thereto.

5.1.1 ENGINEER and OWNER shall make every effort possible to comply with the following schedule of Project milestones:

Notice-to-Proceed

Bid Ready Plans and Specifications to OWNER

6 weeks from NTP

5.2. If in this Agreement specific periods of time for rendering services are set forth or specific dates by which services are to be completed are provided and if such periods of time or dates are changed through no fault of ENGINEER, the rates and amounts of

compensation provided for herein shall be subject to equitable adjustment. If OWNER has requested changes in the scope, extent or character of the Project, the time of performance of ENGINEER's services shall be adjusted equitably.

5.3. If ENGINEER's services for design or during construction of the Project are delayed or suspended in whole or in part by OWNER:

5.3.1. for more than three months through no fault of ENGINEER, ENGINEER shall be entitled to equitable adjustment of rates and amounts of compensation provided for elsewhere in this Agreement to reflect, among other things, reasonable costs incurred by ENGINEER in connection with such delay or suspension and reactivation and the fact that the time for performance under this Agreement has been revised; or

5.3.2. for more than one year through no fault of ENGINEER, or if ENGINEER for any reason is required to render Construction Phase services more than one year after Substantial Completion is achieved, the rates and amounts of compensation provided for elsewhere in this Agreement will be subject to equitable adjustment to reflect, among other things, changes in the various elements that comprise such rates of compensation.

5.4. In the event that the work designed or specified by ENGINEER is to be performed or furnished under more than one prime contract, or if ENGINEER's services are to be separately sequenced with the work of one or more prime contractors (such as in the case of fast-tracking), OWNER and ENGINEER shall, prior to commencement of the Final Design Phase, develop a schedule for performance of ENGINEER's services during the Final Design, Bidding or Negotiating and Construction Phases in order to sequence and coordinate properly such services as are applicable to the work under such separate prime contracts. This schedule is to be prepared and included in Exhibit A whether or not the work under such contracts is to proceed concurrently.

SECTION 6 PAYMENTS TO ENGINEER FOR SERVICES AND REIMBURSABLE EXPENSES

6.1 Methods of Payment for Services and Expenses of ENGINEER.

6.1.1. For Basic Services. OWNER shall pay ENGINEER \$34,850.00 for Basic Services performed or furnished under Section 2 on the basis set forth in Exhibit B.

6.1.2. For Additional Services. OWNER shall pay ENGINEER for Additional Services performed or furnished under Section 3 on the basis set forth in Exhibit B.

6.2 Other Provisions Concerning Payments.

6.2.1. Preparation of Invoices. Invoices for Basic and Additional Services will be prepared in accordance with ENGINEER's standard invoicing practices and will be submitted to OWNER by ENGINEER at least monthly. The amount billed for Basic

Services and Additional Services in each invoice will be calculated on the basis set forth in Exhibit B. Invoices are due and payable on receipt.

6.2.2. Unpaid Invoices. If OWNER fails to make any payment due ENGINEER for services and expenses within thirty days after receipt of ENGINEER's invoice therefore, the amounts due ENGINEER will be increased at the rate of 1.5% per month (or the maximum rate of interest permitted by law, if less) from said thirtieth day. Payments will be credited first to interest and then to principal. In the event of a disputed or contested billing, only that portion so contested together with such sums as may be necessary to correct defective work and pay liquidated damages (if applicable) may be withheld from payment, and the undisputed portion will be paid.

6.2.3. Payments Upon Termination.

6.2.3.1. Termination by OWNER for Cause. In the event of termination by OWNER for cause under paragraph 8.1.1:

6.2.3.1.1. Upon the completion of any phase of Basic Services, progress payments due ENGINEER in accordance with this Agreement for all such services performed or furnished by ENGINEER and ENGINEER's Consultants through the completion of such phase will constitute total payment for such services. ENGINEER also will be paid for all unpaid Additional Services.

6.2.3.1.2. During any phase of the Basic Services, ENGINEER also will be paid for such services performed or furnished in accordance with this Agreement by ENGINEER during that phase through the date of termination on the basis specified in Exhibit B. ENGINEER also will be paid for the charges of ENGINEER's Consultants employed to perform or furnish Basic Services to the extent such services have been performed or furnished in accordance with this Agreement through the effective date of the termination. ENGINEER also will be paid for all unpaid Additional Services.

6.2.3.2. Termination by OWNER for Convenience. In the event of termination by OWNER under paragraph 8.1.2:

6.2.3.2.1. Upon the completion of any phase of Basic Services, progress payments due ENGINEER in accordance with this Agreement for all such services performed or furnished by ENGINEER and ENGINEER's Consultants through the completion of such phase will constitute total payment for such services. ENGINEER also will be paid for all unpaid Additional Services, and for termination expenses under subparagraph 6.2.3.2.3 below.

6.2.3.2.2. During any phase of Basic Services, ENGINEER also will be paid for such services performed or furnished by ENGINEER during that phase through the date of termination on the basis specified in Exhibit B. In addition, ENGINEER will be paid for the charges of ENGINEER's Consultants employed to perform or furnish Basic Services through the effective date of the termination. ENGINEER also will be paid for all unpaid

Additional Services and for termination expenses under sub-paragraph 6.2.3.2.3 below.

6.2.3.2.3. In the event of termination by OWNER for convenience during or at completion of any phase of Basic Services, OWNER shall pay ENGINEER's reasonable expenses directly attributable to termination in accordance with rates applicable to the various categories of Additional Services measured from the date of termination. Notwithstanding any other provision of this agreement, under no circumstances shall ENGINEER be paid on the basis of anticipated profits in the event of termination for any reason, including but not limited to termination for default which was later determined to be unjustified.

6.2.3.3. Termination By ENGINEER for Cause. In the event of termination by ENGINEER for cause under paragraph 8.1.1, ENGINEER shall be entitled to receive compensation calculated as set forth in paragraph 6.2.3.2.

6.2.4. Records of ENGINEER's Costs. Records of ENGINEER's costs pertinent to ENGINEER's compensation under this Agreement will be kept in accordance with generally accepted accounting practices. Copies will be made available to OWNER at cost on request prior to final payment for ENGINEER's services.

SECTION 7 OPINIONS OF COST

7.1. Opinions of Probable Construction Cost. ENGINEER's opinions of probable Construction Cost provided for herein are to be made on the basis of ENGINEER's experience and qualifications and represent ENGINEER's best judgment as an experienced and qualified professional engineer generally familiar with the construction industry. However, since ENGINEER has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, ENGINEER cannot and does not guarantee that proposals, bids or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by ENGINEER. If OWNER wishes greater assurance as to probable Construction Cost, OWNER shall employ an independent cost estimator.

7.2. Opinions of Total Project Costs. ENGINEER assumes no responsibility for the accuracy of opinions of Total Project Costs provided for in Section 2.

SECTION 8 GENERAL CONSIDERATIONS

8.1. Termination. The obligation to provide further services under this Agreement may be terminated:

8.1.1. For cause,

8.1.1.1. by either party upon thirty days' written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof through no fault of the

terminating party.

8.1.1.2. by ENGINEER:

8.1.1.2.1. upon seven days' written notice if ENGINEER believes that ENGINEER is being requested by OWNER to furnish or perform services contrary to ENGINEER's responsibilities as a licensed design professional; or

8.1.1.2.2. upon seven days' written notice if the ENGINEER's services for design or during the construction of the Project are delayed or suspended for more than ninety days for reasons beyond ENGINEER's control.

8.1.1.2.3 In the case of termination under this paragraph 8.1.1.2, ENGINEER shall have no liability to OWNER on account of such termination.

8.1.2. For convenience, by OWNER effective upon the receipt of notice by ENGINEER.

8.2. Reuse of Documents. All documents including Drawings and Specifications provided or furnished by ENGINEER (or ENGINEER'S consultants) pursuant to this Agreement are and shall remain the property of the OWNER, whether the project for which they are prepared are executed or not. The ENGINEER shall be permitted to retain copies, including reproducible copies, of Drawings and Specifications for information and reference in connection with the project. The Drawings and Specifications may be used by the OWNER only for completion of this project, or if the ENGINEER is adjudged to be in default under this Agreement, for completion of this project by others without further compensation of the ENGINEER.

8.3. Insurance.

8.3.1. ENGINEER shall procure and maintain professional liability insurance to protect the ENGINEER against the negligent acts, errors or omissions of the ENGINEER and those for whom it is legally responsible, arising out of the performance of professional services under this Agreement. The ENGINEER's insurance coverage shall not be for less than \$2,000,000, each claim and in the annual aggregate.

8.3.2. ENGINEER shall also procure and maintain the following insurance.

8.3.2.1 General Liability Insurance, with a combined single limit of \$3,370,137 per occurrence and \$3,370,137 annual aggregate.

8.3.2.2. Automobile Liability Insurance, with a combined single limit of \$2,000,000 for each person and \$2,000,000 for each accident.

8.3.2.3. Worker's Compensation Insurance in accordance with statutory requirements and Employer's Liability Insurance, with a limit of \$500,000 for each occurrence.

8.4. Controlling Law. This Agreement is to be governed by the law of the State of

Missouri.

8.5. Successors and Assigns.

8.5.1. OWNER and ENGINEER each is hereby bound and the partners, successors, executors, administrators and legal representatives of OWNER and ENGINEER (and to the extent permitted by paragraph 8.5.2 the assigns of OWNER and ENGINEER) are hereby bound to the other party to this Agreement and to the partners, successors, executors, administrators and legal representatives (and said assigns) of such other party, in respect of all covenants, agreements and obligations of this Agreement.

8.5.2. Neither OWNER nor ENGINEER may assign, sublet or transfer any rights under or interest (including, but without limitation, moneys that may become due or moneys that are due) in this Agreement without the written consent of the other, except to the extent that any assignment, subletting or transfer is mandated by law or the effect of this limitation may be restricted by law. Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under this Agreement.

8.5.3. Unless expressly provided otherwise in this Agreement:

8.5.3.1. Nothing in this Agreement shall be construed to create, impose or give rise to any duty owed by ENGINEER to any Contractor, Subcontractor, Supplier, other person or entity, or to any surety for or employee of any of them, or give any rights in or benefits under this Agreement to anyone other than OWNER and ENGINEER.

8.5.3.2. All duties and responsibilities undertaken pursuant to this Agreement will be for the sole and exclusive benefit of OWNER and ENGINEER and not for the benefit of any other party. The OWNER agrees that the substance of the provisions of this paragraph shall appear in the Contract Documents.

8.6. Allocation of Risks--Indemnification.

8.6.1. To the fullest extent permitted by law, ENGINEER shall indemnify and hold harmless OWNER, OWNER's officers, directors, partners, employees and agents from and against any and all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) to the extent caused by the negligent acts or omissions of ENGINEER or ENGINEER's officers, directors, partners, employees, agents and ENGINEER's Consultants in the performance and furnishing of ENGINEER's services under this Agreement.

8.7. Notices.

Any notice required under this Agreement will be in writing, addressed to the appropriate party at the address which appears on the signature page of this Agreement

(as modified in writing from time to time by such party) and given personally, by registered mail, return receipt requested or by a nationally recognized overnight courier service, provided, however, that in the case of OWNER, a copy of such notice must also be mailed by first class mail to GEORGE E. KAPKE, KAPKE & WILLERTH, L.L.C, 3304 NE Ralph Powell Road, Lee's Summit, Missouri 64064. All notices shall be effective on the date of receipt, if given personally, and on the third day following placing of such notice in the U.S. Mail or the delivery of such notice to a nationally recognized overnight courier service.

8.8. Survival. All express representations, indemnifications or limitations of liability made in or given in this Agreement will survive the completion of all services of ENGINEER under this Agreement or the termination of this Agreement for any reason.

8.9. Severability. Any provision or part of the Agreement held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and ENGINEER, who agree that the Agreement shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

8.10. Attorney's Fees. Should any litigation be commenced between the parties hereto concerning the subject of this Agreement, the party prevailing in such litigation shall be entitled, in addition to such other relief as may be granted, to a reasonable sum as and for its attorney's fees in such litigation which shall be determined by the Court in such litigation or in a separate action brought for that purpose.

SECTION 9 EXHIBITS AND SPECIAL PROVISIONS

9.1. This Agreement is subject to the provisions of the following Exhibits which are attached to and made a part of the Agreement:

9.1.1. Exhibit A, "Scope of Services", consisting of 1 page.

9.1.2. Exhibit B, "Payments to Engineer for Services", consisting of 2 pages.

9.2. This Agreement and the Exhibits identified above constitutes the entire agreement between OWNER and ENGINEER and supersedes all prior written or oral understandings. This agreement may only be amended, supplemented, modified or canceled by a duly executed written instrument.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement to be effective as of the date first above written.

OWNER

ENGINEER

City of Liberty

Veenstra & Kimm, Inc. A Kleinfelder Company

By: _____
Greg Canuteson, Mayor

By: *Scott M. McDonald*

[Corporate Seal]

Attest: _____
Deputy City Clerk

Attest: *David A. McDonald*

Address for giving notices
City Engineer
101 E. Kansas
Liberty, Missouri, 64068

Address for giving notices
9788 N. Ash Avenue
Kansas City, MO 64157

Exhibit A

EXHIBIT A - Scope of Services

City of Liberty, Missouri Maintenance Facility Repairs

Professional Design Services for the Maintenance Facility Repairs are anticipated to include the following services:

1. Meet with City Staff to discuss approach and schedule inspection.
2. Collect and review existing information.
3. Complete field inspection and measurements. Take photographs and develop field sketches of areas of concern.
4. Complete structural analysis for Original Condition.
5. Complete structural analysis for Impact Damaged Column. This will include design of column incorporating the suggested structural repairs.
6. Complete structural analysis for Deteriorated Columns. This will include design of columns incorporating the suggested structural repairs.
7. Prepare structural repair details.
8. Prepare miscellaneous repair details.
9. Prepare project specifications and documents.
10. Develop probable cost of construction estimates for the proposed repairs.
11. Assist City with bidding of the Contract Documents.
12. Attend Coordination Meetings with City Staff.

Professional Services not included in the Scope of Services include:

1. Full time or part time construction observation.

Project Deliverables will include:

1. Paper copy (11" x 17") of the Final Plans (maximum five (5) copies) and/or Adobe PDF or TIF digital copies.
2. Paper copy and/or Word DOC or Adobe PDF digital copy of the applicable specifications.

Exhibit B

VEENSTRA & KIMM, INC. COST PROPOSAL**MAINTENANCE FACILITY REPAIRS****LIBERTY, MISSOURI**

PROJECT HOURS ESTIMATE		Project Hours							
		Engineer I-B	Engineer III-A	Engineer VIII	Engineer X	Surveyor I	Tech IB	Clerical IV	Total
Item Description									
1	Collect and review existing information	2	2	2					6
2									0
3	Complete Field Review & Measurements	2	12	12					26
4									0
5	Structural Analysis for Original Condition	2	4	8	12				26
6									0
7	Structural Analysis for Impact Damaged Column	2	2	12	8				24
8									0
9	Structural Analysis for Deteriorated Column	2	2	6	6				16
10									0
11	Prepare Structural Repair Details	2	6	10	8		16		42
12									0
13	Miscellaneous Repair Details	2	2	4	4		4		16
14									0
15	Prepare Specifications	1	2	4	4			2	13
16									0
17	Provide Probable Costs of Construction	4	4					2	10
18									0
19	General Project Management	12							12
20									0
21	Miscellaneous and Unknowns	2	2	4	2		2		12
22									0
23	Coordination Meetings	4	4						8
24									0
TOTAL ESTIMATE		37	42	62	44	0	22	4	211

**VEENSTRA & KIMM, INC. COST PROPOSAL
MAINTENANCE FACILITY REPAIRS
LIBERTY, MISSOURI
DESIGN COST ESTIMATE**

DIRECT LABOR

<u>Discipline</u>	<u>Total Hours</u>	<u>Rate</u>	<u>Total</u>	
Engineer I-B	37	\$246.00	9102	
Engineer III-A	42	\$195.00	8190	
Engineer VIII	62	\$143.00	8866	
Engineer X	44	\$118.00	5192	
Surveyor I	0	\$179.00	0	
Tech IB	22	\$139.00	3058	
Clerical IV	4	\$86.00	344	
TOTAL DIRECT LABOR	211			\$34,752
TOTAL ESTIMATED LABOR COST				\$34,752

DIRECT EXPENSES**Subconsultants:**

Total Subconsultant Cost **\$0**

Mileage	\$50
Printing & Reproduction	\$25
Lodging	\$0
Meals	\$0
Engineering Supplies	\$23

TOTAL ESTIMATED DIRECT EXPENSES **\$98**

TOTAL ESTIMATED COSTS **\$34,850**

MAXIMUM AMOUNT PAYABLE **\$34,850**



CITY COUNCIL ACTION REPORT

Meeting Date: May 18, 2026

A/R No.: 2026-198

Department: Utilities

Submitted By: Andy Noll, Director Utilities

Subject: Ordinance approving a contract with Kissick Construction Co. Inc. for the construction of the 24-Inch resilient water transmission main and vault project in an amount not to exceed \$1,713,967.00

Summary:

An Ordinance approving a contract with Kissick Construction Co., Inc. for the construction of the 24-inch resilient water transmission main and vault (Project UT-26-001) in an amount not to exceed \$1,713,967.00. Kissick Construction Co., Inc was the low bidder of two bids for the project. The consultant engineer, HDR Engineering, reviewed both bids and contacted the references of recent construction projects by Kissick Construction Co., Inc. and received exceptional positive feedback and therefore recommended the project be awarded to Kissick Construction Co., Inc. and staff concurs with the recommendation.

Background:

The 24-Inch resilient water transmission main and vault project will address a critical single point of failure in the water distribution system as it leaves the water treatment plant and provide system redundancy to rebuild or rehabilitate a critical 24-inch water transmission main. The project will add another 24-inch discharge pipe from the high service pumps of the water treatment plant to the distribution system, thereby providing redundancy to the existing discharge line that was constructed approximately 55 years ago. The redundant water transmission main will connect to a 16-inch transmission main that was recently completed along South Liberty Parkway and along the west side of MO 291 Highway and will provide an alternate path to distribute water to the community if isolation of the existing 24-inch transmission main is necessary.

The project bid was listed for bid for a month and staff received significant interest and ultimately received two bids for the project; one bid from Kissick Construction Co., Inc. and one from Mega KC Corporation. The bids received were as follows:

Kissick Construction Co., Inc. — \$1,713,967.00

MEGA KC Corporation — \$2,149,705.00

Engineers Estimate — \$2,197,000.00

The consultant engineer reviewed the references provided by Kissick Construction Co., Inc. and received overwhelming positive feedback on projects that were of similar scope and complexity. Please see the attached recommendation letter from HDR Engineering. Staff concurs with the recommendation to award the project to Kissick Construction Co, Inc. The project is scheduled to be completed at the end of 2026.

Previous Action (if applicable):

July 22, 2024 - Ordinance 11497 approving an agreement for engineering design

June 23, 2025 - Ordinance 12120 approving an amendment for engineering design

Policy/Committee Review:

Citizen Sales Tax Oversight Committee	Completed/Recommended:
Public Safety Sales Tax Oversight Committee	Completed/Recommended:
Budget Committee	Completed/Recommended:
Other:	Completed/Recommended:

Financial Considerations:

Budgeted:	Line Item: 592-70020-802-000000	Amount: \$1,713,967.00
	Line Item:	Amount:
	Revenue Line (if applicable):	Amount:
Non-Budgeted	Line Item:	Amount:
	Line Item:	
	Funding Source:	Amount:

Attachments:

1. Kissick Construction Co Inc 24-inch Transmission Ord
2. Kissick Signed Contract - 24-Inch Resilient Water Transmission Main and Vault
3. Liberty Resilient Watermain_Recommendation of Award Letter_2026-04-20

Document No. _____

ORDINANCE NO. _____

ORDINANCE APPROVING A CONTRACT WITH KISSICK CONSTRUCTION
CO. INC. FOR THE CONSTRUCTION OF THE 24-INCH RESILIENT WATER
TRANSMISSION MAIN AND VAULT PROJECT IN AN AMOUNT NOT TO EXCEED
\$1,713,967.00

BE IT ORDAINED by the City Council of the City of Liberty, Clay County, Missouri,
as follows:

SECTION I

The City Council of the City of Liberty, Clay County, Missouri, hereby approves an ordinance approving a contract by and between the City of Liberty, Clay County, Missouri and Kissick Construction Co., Inc in an amount not to exceed ONE MILLION SEVEN HUNDRED THIRTEEN THOUSAND NINE HUNDRED SIXTY-SEVEN AND 00/100 DOLLARS (\$1,713,967.00), a copy of said contract being incorporated by reference herein and available for review as required by law.

SECTION II

The City Council hereby authorizes the Mayor Pro Tem to sign the contract as described in Section I of this Ordinance.

SECTION III

This Ordinance shall be in full force and effect from and after its passage by the City Council and approval by the Mayor according to law.

PASSED by the City Council this ____ day of _____, 2026.

KEVIN GRAHAM, MAYOR PRO TEM

ATTEST:

DEPUTY CITY CLERK

APPROVED by the Mayor this ____ day of _____, 2026.

KEVIN GRAHAM, MAYOR PRO TEM

The City of



24-Inch Resilient Water
Transmission Main and
Vault

Project No. 26-UT-001

C
O
N
T
R
A
C
T

City of Liberty
101 East Kansas Street
Liberty, MO 64068
816-439-4500

TABLE OF CONTENTS

- 1) Prevailing Wage (Section C-470, inclusive)
- 2) MO Annual Wage Order No. 32 (Section C-471, Inclusive)
- 3) Agreement Between Owner and Contractor For Construction Contract, Stipulated Price
- 4) Performance and Maintenance Bond (Section C-610, Inclusive)
- 5) Payment Bond (Section C-615, Inclusive)
- 6) General Conditions (Section C-700, Inclusive)
- 7) Supplementary Conditions (Section C-800, Inclusive)
- 8) Job Special Conditions (Section C-810, Inclusive)
- 9) Specifications as listed in the table of contents of the Project Specifications
- 10) Addenda, number 1 and 2.
- 11) Exhibits to this Agreement
 - a) Exhibit A – Anti Discrimination Against Israel Certification
 - b) Contractor Bid Form
- 12) Construction Contract Drawings Titled 24” Resilient Water Main and Meter Vault; City Project No 26-UT-001; HDR Project No. 10411916 Inclusive of all sheets listed in Sheet Index

PREVAILING WAGE

ARTICLE 1 – PREVAILING WAGE REQUIREMENTS

- 1.01 Not less than the prevailing hourly rate of wages, as set out in the wage order attached to and made part of the specification for work under the contract, shall be paid to all workers performing work under the contract.
- 1.02 The hourly rate of wages shall not be less than the wages stated in:

Missouri Division of Labor Standards

Annual Wage Order No. 32

Section 024

Clay County

A copy of which is attached to this form.

ARTICLE 2 – REQUIRED SUBMITTALS

- 2.01 Contractor shall submit weekly payroll records with each monthly payment application.
- 2.02 The Contractor and all subcontractors must file an Affidavit of Compliance before final payment can be made for the project. An Affidavit of Compliance is attached to this form.
- 2.03 Contractor must report to the City of Liberty if a wage subsidy, bid supplement, or rebate was provided. The amount and date of such subsidy, supplement or rebate must be reported to the City of Liberty within 30 days of receipt of payment.

ARTICLE 3 – ENFORCEMENT

- 3.01 The Contractor must maintain a legible list of prevailing wage rates posted in a prominent and easily accessible place at the worksite during the full time any worker is employed on the project.
- 3.02 The contractor will forfeit a penalty to the City of Liberty of \$100 per day (or portion of a day) for each worker that is paid less than the prevailing rate for any work done under the contract by the contractor or by any subcontractor.

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION



MIKE KEHOE, Governor

Annual Wage Order No. 32

Section 024
CLAY COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by _____

Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: _____ **March 10, 2025**

Last Date Objections May Be Filed: **April 9, 2025**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$74.08
Boilermaker	\$36.40*
Bricklayer-Stone Mason	\$64.33
Carpenter	\$66.73
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$56.22
Plasterer	
Communication Technician	\$63.19
Electrician (Inside Wireman)	\$72.26
Electrician Outside Lineman	\$93.51
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$36.40*
Glazier	\$59.01
Ironworker	\$72.20
Laborer	\$51.19
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$57.19
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$66.56
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$36.40*
Plumber	\$81.51
Pipe Fitter	
Roofer	\$60.78
Sheet Metal Worker	\$78.40
Sprinkler Fitter	\$70.79
Truck Driver	\$59.41
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.

Heavy Construction Rates for
CLAY County

Section 024

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$67.05
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$93.51
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$52.71
General Laborer	
Skilled Laborer	
Operating Engineer	\$54.48
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$52.62
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

OVERTIME and HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, "**overtime work**" shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

**AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)**

THIS AGREEMENT is by and between Mayor, City Council and the Citizens of the City of Liberty, Missouri, a Municipal Corporation ("Owner") and Kissick Construction Co., Inc. ("Contractor"). Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:
- A. Construction of 850 LF of 24-inch watermain from the Water Treatment Plant (WTP) to Southview Drive. Includes a total of two (2) trenchless road and highway crossings and one (1) stream crossing.
 - B. Construction of one (1) meter and valve vault located at the WTP near the High Service Pump Station. Bid alternate includes bypass pumping of an existing 36-inch sanitary sewer located downstream of the new meter vault. Meter data is not available for the gravity sewer.

ARTICLE 2 – THE PROJECT

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Install redundant 24-inch water main and meter vault from the Water Treatment Plant (WTP) to the water distribution system at Southview Dr. Meter vault to be located at the WTP.

ARTICLE 3 – ENGINEER

- 3.01 The part of the Project that pertains to the Work has been designed by:
HDR Engineering, Inc.
10450 Holmes Rd., Suite 600
Kansas City, MO 64131.
- 3.02 The Owner has retained HDR Engineering, Inc. ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

- 4.01 *Time of the Essence*
- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 *Contract Times: Days*

- A. Contractor shall complete the work in accordance with the contract documents between the dates of NTP and December 31, 2026. City shall be notified of the start date a minimum of two weeks prior to the start date of construction.
- B. Earliest Construction Start Date: NTP
- C. Latest Substantial Completion: 11/30/2026
- D. Latest Final Completion Date: 12/31/2026

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
 - 1. Substantial Completion: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
 - 2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500 for each day that expires after such time until the Work is completed and ready for final payment.
 - 3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 5 – CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Work other than Unit Price Work, a lump sum of: \$1,713,967.00.

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

- B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item): \$ N/A.

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

- C. Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) \$1,713,967.00.
- D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 1st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. 95 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of 0 percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

- B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all, if any,: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, if any, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.
- K. Contractor currently possesses the in-house capability, or will have the in-house capability prior to the commencement of Work hereunder, to perform not less than thirty five percent (35%) of all Work required to be performed on the project by Contractor by and through employees in the direct employ of Contractor without any reliance upon or utilization of subcontractors by Contractor from the time of commencement of Work hereunder and at all such times thereafter, Contractor shall continue to maintain such in-house capability to perform the above-stated percentage of the Work without any reliance upon or utilization of subcontractors.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:
 - 1. Prevailing Wage (section C-470, inclusive).
 - 2. MO Annual Wage Order No. 32 (section C-471, inclusive).
 - 3. This Agreement (section C-520, inclusive).
 - 4. Performance and Maintenance bond (section C-610, inclusive).
 - 5. Payment bond (section C-615, inclusive).
 - 6. General Conditions (section C-700, inclusive).
 - 7. Supplementary Conditions (section C-800, inclusive).
 - 8. Job Special Conditions (section C-810, inclusive).
 - 9. Specifications as listed in the table of contents of the Project Manual.
 - 10. Addenda (numbers 1-2, inclusive).
 - 11. Exhibits to this Agreement (enumerated as follows):
 - a. Exhibit A – Anti Discrimination Against Israel Certification
 - 12. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - 13. Drawings as listed in the sheet index of the Plans.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned

without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 *General Conditions*

- A. Owner stipulates that the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

10.07 *Indemnification*

- A. The Contractor hereby expressly binds himself, herself, or itself to indemnify and save harmless the City and its officers and employees for any and all expenses, including reasonable attorney's fees, and against all damages, losses, claims, suites or actions of

every kind and nature asserted, brought or which may be brought, asserted, incurred or sustained by any person, firm, or corporation, or persons, firms or corporations, in connection with or on account of the Contractor's work or in consequence of any negligence in connection with same, or on account of any poor workmanship, or on account of any act of commission or omission of the Contractor or his, her, its, or their subcontractors, agents or employees, or in connection with or on account of any other cause arising during the course of and related to construction, irrespective of the responsibility of third parties therefore.

- B. The Contractor shall further indemnify the City of Liberty for any and all expenses, including reasonable attorney's fees, incurred in the City's pursuing any remedial action required to correct deficiencies in the work on account of poor workmanship, the negligence or any act of omission of the Contractor or his, her, its, or their subcontracts, agents or employees.
- C. The City may retain from any payment due or to become due the Contractor such sums as are deemed necessary to protect its interests until all such claims or suits have been settled or disposed of and suitable evidence to that effect furnished to the City.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER: **City of Liberty, Missouri**

CONTRACTOR: **Kissick Construction Co., Inc.**

By: _____

Title: _____

By: 

Title: Vice President

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Title: _____

Attest: 

Title: Project Administrator

Address for giving notices:

Address for giving notices:

8131 Indiana Ave

Kansas City, MO 64132

License No.: F00405424
(where applicable)

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)



PERFORMANCE AND MAINTENANCE BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

(seal)

Contractor's Name and Corporate Seal

By: _____

Signature

Print Name

Title

Attest: _____

Signature

Title

(seal)

Surety's Name and Corporate Seal

By: _____

Signature *(attach power of attorney)*

Print Name

Title

Attest: _____

Signature

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the said Contractor shall construct or cause to be constructed and completed the entire improvement in accordance with specifications used by the City of Liberty for like improvements, and to the lines and grades shown on the plans, all to be done subject to the approval and acceptance of the Engineer for the said City of Liberty, and shall construct said with such materials in such manner that same shall endure without need of any repairs for the period of two (2) years from and after the completion of said improvement and acceptance thereof; and if said improvement shall endure without the need of repairs for the period of two (2) years from and after completion and acceptance thereof as aforesaid, then the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3; otherwise to be in full force and effect.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR (name and address):

SURETY (name and address of principal place of business):

OWNER (name and address):

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (name and location):

BOND

Bond Number:

Date (not earlier than the Effective Date of the Agreement of the Construction Contract):

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 19

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

_____(seal)
Contractor’s Name and Corporate Seal

_____(seal)
Surety’s Name and Corporate Seal

By: _____
Signature

By: _____
Signature (attach power of attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and

shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. It is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 50 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment," wherever used in this BOND and whether referring to the BOND or the Contract shall include any alteration, addition, extension or modification of any character whatsoever.
19. Modifications to this Bond are as follows:

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision

regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and

submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the

result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
2. a preliminary Schedule of Submittals; and
3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other

submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract

Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or

requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. abnormal weather conditions;
 - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 - 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility

that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

- A. *Limitation on Use of Site and Other Areas:*
 - 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise;

(b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and

procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
2. is of such a nature as to require a change in the Drawings or Specifications; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Possible Price and Times Adjustments:*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or

decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

- c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection

with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition

created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until two years after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 - 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
 - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 - 2. claims for damages insured by reasonably available personal injury liability coverage.
 - 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
 - 1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 - 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 - 3. Broad form property damage coverage.
 - 4. Severability of interest.
 - 5. Underground, explosion, and collapse coverage.
 - 6. Personal injury coverage.
 - 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, “Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.
- D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer’s liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor’s pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds*: The Contractor’s commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor’s professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available

under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
 5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will

provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

- E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of

payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

- 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
- b. Contractor certifies that, if approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

- a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not

identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times

resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone

employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

- A. *Shop Drawing and Sample Submittal Requirements:*
 - 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

- d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
1. *Shop Drawings:*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.
 2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors,

members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal;
 - 6. the issuance of a notice of acceptability by Engineer;
 - 7. any inspection, test, or approval by others; or
 - 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to

perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by

Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to

an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
 - 3. *Field Orders:* Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change

involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
 - 1. a mutually acceptable fixed fee; or
 - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and

11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

- d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
 - 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction,

the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

- G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
 - 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:* Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.

- C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
 - 1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 - 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the

Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

- c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction

imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor

may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer

(less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with

respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs,

losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the

Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of

them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 2 – PRELIMINARY MATTERS

SC-2.07 Add the following new paragraph immediately after Paragraph 2.06:

“Owner is a municipality and Owner and Contractor acknowledge and agree that this Agreement constitutes a “Public Works Contract” as defined in Section 34.058 R.S.Mo. Notwithstanding anything else herein to the contrary, Owner and Contractor agree that the provisions contained in this Contract are subject to and superseded by the provisions of Section 34.058 R.S.Mo. Owner and Contractor both agree to conform to the legal requirements set forth in Section 34.057 R.S.Mo., which requirements shall supersede any provisions herein to the contrary.”

ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.05.C.2 Add the following language at the end of paragraph 4.05.C.2:

“Inclement weather is not considered as abnormal weather or an act of God. Extensions in Contract Time for abnormal weather shall be judged on the National Oceanic and Atmospheric Administration (NOAA) Local Climatological Data records for the area in which the project is being constructed. NOAA averages will be considered normal weather. Contractor shall be responsible for obtaining, preparing and presenting the appropriate weather data to support and substantiate Contractor’s request for an extension in Contract Time for abnormal weather.”

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.B:

- A. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:
 - 1. Geotechnical Data Report, Waterline Extension, 291 Hwy & Ruth Ewing Rd., Liberty, Missouri, Alpha-Omega Geotech, Inc., May 2, 2025.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

- 1. Contractor may obtain worker’s compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker’s compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. **Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:**

State:	<u>Statutory</u>
Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>

Employer's Liability:

Bodily injury, each accident	\$ <u>505,520</u>
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2. **Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:**

General Aggregate	\$ <u>3,370,137</u>
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Products - Completed Operations Aggregate	\$ <u>3,370,137</u>
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Personal and Advertising Injury With employment exclusion deleted	\$ <u>3,370,137</u>
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Each Occurrence (Bodily Injury and Property Damage)	\$ <u>3,370,137</u>
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3. **Automobile Liability under Paragraph 6.03.D. of the General Conditions:**

Combined Single Limit of	\$ <u>3,370,137</u>
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4. **Excess or Umbrella Liability:**

Per Occurrence	\$ <u>3,370,137</u>
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General Aggregate	\$ <u>3,370,137</u>
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5. **Contractor's Pollution Liability:**

Each Occurrence	\$ <u>Not Applicable</u>
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General Aggregate	\$ <u>Not Applicable</u>
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If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. **Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: None.**

7. **Contractor's Professional Liability:**

Each Claim	\$ <u>3,370,137</u>
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Annual Aggregate	\$ <u>3,370,137</u>
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ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES

SC-7.01.C. Add the following new subparagraphs immediately after Paragraph 7.01.B:

The Contractor shall be responsible for the conduct of Contractor’s employees and the employees of Subcontractors and suppliers on the Work site. The Contractor shall take immediate steps to remedy any activity which may be construed as discriminatory or which creates a hostile Work environment. Activities covered by this provision include, but shall not be limited to, signs or language that is vulgar, profane, or racially or sexually derogatory.

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Regular working hours will be 7:00 AM to 5:00 PM
2. Owner's legal holidays are:
 - a) New Year’s Day
 - b) Martin Luther King Jr. Day
 - c) President’s Day
 - d) Memorial Day
 - e) Juneteenth
 - f) Independence Day
 - g) Labor Day
 - h) Veterans’ Day
 - i) Thanksgiving Day
 - j) Day after Thanksgiving
 - k) Christmas Day

SC-7.02.B. Append Paragraph 7.02.B to state “No Sunday work shall be allowed.”

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Missouri and of cities and counties thereof on all materials to be incorporated into the Work.**
1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 2. Owner’s exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**

1. **General:** RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
2. **Schedules:** Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. **Conferences and Meetings:** Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
4. **Liaison:**
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. **Interpretation of Contract Documents:** Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. **Shop Drawings and Samples:**
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. **Modifications:** Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. **Review of Work and Rejection of Defective Work:**
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents,

or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

13. **Certificates, Operation and Maintenance Manuals:** During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
 14. **Completion:**
 - a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.
- C. The RPR shall not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
 8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC 13.01.B.5.c Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

- c. **Construction Equipment and Machinery:**
 - 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly,

dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

- 2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rental Rate Blue Book, FHWA Hourly Rate. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.

ARTICLE 15 – PAYMENT TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

SC-15.01.C.1 Amend the first sentence of Paragraph 15.08.A by replacing the words “10 days” with the words “20 days”.

SC-15.08.A Amend the first sentence of Paragraph 15.08.A by replacing the words “one year” with the words “two years”.

SC-15.08.D Amend the first sentence of Paragraph 15.08.D by replacing the words “one year” with the words “two years”.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

SC-16.02.D Add the following new sub-paragraph immediately after Paragraph 16.02.D.

SC-16.02.D.1 Contractor shall be deemed to have persistently failed to perform the Work in accordance with the Contract Documents, if Contractor has twice not timely cured failures of performance by Contractor which have been brought to the attention of Contractor by written notices of the Owner within the time specified in such notices and Owner gives a third notice to the Contractor of any such failure to perform.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

SC-17.02 Attorneys’ Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys’ fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties’ initial demand or defense positions in comparison with the final result.

ARTICLE 19 – ADDITIONAL STATE OF MISSOURI CONTRACT REQUIREMENTS

SC-19.01 The following paragraph shall be added as Paragraph 19.01.

SC-19.01 Excessive Unemployment pursuant to 290.580 RSMo: Except as otherwise required by law, during a period of excessive unemployment in the State of Missouri,

the Contractor shall employ only Missouri laborers from nonrestrictive states on the project, as provided in Sections 290.55 to 290.580 RSMo.

SC-19.02 The following paragraph shall be added as Paragraph 19.02.

SC-19.02 Anti Discrimination Certification RSMo 34.600: Pursuant to RSMo 34.600 the contractor shall be required to complete Exhibit A “Anti-Discrimination Against Israel Act Certification”.

SC-19.03 The following paragraph shall be added as Paragraph 19.03.

SC-19.03 Proof of Lawful Presence for Eligibility for Temporary Public Benefits: Pursuant to 208.009 RSMo the applicant shall provide affirmative proof that the applicant is a citizen of a permanent resident of the United States or is lawfully present in the United States. This may be verified by the presentation of the signing applicants current valid driver’s license.

SPECIAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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SPC-1.01 Scope of Work

The work provided for in these specifications shall consist of furnishing all labor, materials, equipment and performing all work necessary to accomplish all work as explicitly defined within the Contract documents along with other incidental and related work as set forth in these specifications and the detail drawings and as directed by the Engineer to make a complete and finished job. More specifically the streets are:

24-INCH RESILIENT WATER TRANSMISSION MAIN AND VAULT

Bid	Location	Work Involved
Base	Water Treatment Plant (refer to Drawings)	• Watermain Extension • Road Boring • Highway Boring • Stream Crossing • Meter and Valve Vault
Add Alt 1	Water Treatment Plant (refer to Drawings)	• Bypass Pumping

SPC-1.02 Add Alternates

- A. This contract requires bidders to bid on additional contract work that will be considered for award. The award of this project does not guarantee work for all add alternate sections.
1. **Consideration of Bids.** The contractor shall submit a bid for each add alternate section. The City reserves the right to award, to the lowest responsible bidder, the combination of base plus add alternate sections that will allow the most work to be completed within the City's budget. If the City chooses to exercise this right, the award of add alternate sections will be selected in accordance with the following priorities:
 - a. Base + Add Alt 1
 - b. Base
 2. The City reserves the right to award the combination of highest priority add alternate sections over the City's budget as long as the low bidder does not change and the award of the combination of highest priority alternate sections does not exceed more than ten percent of the City's budget.
 3. The City's budget is the basis for award of add alternates but not the basis for award of the base section. The base section of the contract will be awarded or based on lowest cost bid proposal.
 4. The awarded bidder will be notified, via email, of the City's selection of the combination of add alternate sections to be awarded the day of the City's meeting.
- B. **Bid Bond Requirements.** The contractor shall be required to obtain a bid bond for 5% of the total bid amount for the base bid and all add alternates. This bid bond will be considered applicable to the proposed work for any option.
- C. **Basis of Payment.** The accepted quantities of the chosen combination of base plus add alternate sections will be paid for by the contract unit bid price for item numbers found within the schedule of items for each section.

SPC-2.01 Contract Special Conditions

The work shall conform to these special conditions and to the Liberty Technical Specifications as referenced herein. The Liberty Technical Specifications (Latest Edition) will govern as though it were repeated verbatim herein, except as modified or superseded by these special provisions.

SPC-3.01 Contractor Furnished Staking

- D. The Contractor shall furnish stakes, and surveys, and other materials as may be required for the proper staking and laying out of the work, and in making measurements and surveys and in establishing temporary or permanent reference marks in connection with said work in order to achieve ADA compliance.
- E. All survey and staking work performed under this contract shall be subsidiary to the contract. No direct payment for this work will be made to the Contractor.
- F. Any work done without being properly located and established by base lines, offset stakes, bench marks, or other basic reference points may be ordered removed and replaced at the Contractor's cost and expense.
- G. The Contractor shall be responsible for all monuments, property corners, bench marks, reference points and stakes, and in case of willful or careless destruction of same, will be charged with the resulting expense of replacement, and he/she shall be responsible for any mistakes or loss of time that may be caused by their unnecessary loss or disturbance. In the event that the loss of stakes causes a delay in the work, the Contractor shall have no claim for damages or extensions of time. In the case of any permanent monuments, property corners, or bench marks that have been moved or destroyed, the Contractor will be charged with the resulting expense of replacement.

SPC-4.01 Traffic Control and Routing

All costs for traffic control shall be considered incidental to the work and no direct payment shall be allowed.

- A. Construction operations shall be coordinated to result in the least practicable delay to pedestrians and traffic. Traffic shall be carried through construction with a minimum of one lane open in each direction at all times. Pedestrians shall be routed safely around construction areas and sidewalks shall be closed appropriately with proper traffic control barricades, cones, sidewalk closure signage, and temporary fencing as needed for safety. Access to adjoining businesses and residences will be maintained at all times.
- B. The Contractor shall furnish adequate signs, barricades, warning lights, and all other equipment necessary to direct and reroute traffic and shall furnish all flagmen and other personnel necessary to provide the required traffic control. All signs and barricades used on the project shall conform to the latest edition of the Manual on Uniform Traffic Control Devices pertaining to traffic controls for street and highway construction.
- C. When construction requires machinery or men to be in an intersection or roadway, barricades shall be placed and a flagman shall control the intersection or roadway traffic as indicated in the typical traffic control detail for intersection or roadway construction. Barricades shall be moved back out of the intersection or roadway as shown in the same detail after the construction operation is complete.
- D. Barricades and/or signs shall not be removed from poured concrete until said concrete has cured such that marks will not occur in the concrete once it is opened to traffic. Such determination will be made by the Engineer or his representative in the field.
- E. The Project Inspector and Contractor's representative on this project will make inspections of the traffic control devices installed as part of this contract and maintain record of any maintenance

required and the date on which it was completed. These records will be maintained for the duration of the project and be incorporated as part of the final records.

- F. The Contractor will be required at the time of the preconstruction conference to provide a schedule regarding the proposed location, length and approximate timing of traffic lane and/or sidewalk closures for construction activities and to designate a specific employee to be responsible for the maintenance of the traffic control devices and establish a method of contacting this person during both working and non-working hours. This information will be provided to the City Engineer for review and approval.
- G. The Contractor shall be responsible for contacting the City Engineer, local police, fire, ambulance and other emergency services of the proposed closures a minimum of 48 hours prior to commencing such closure.
- H. The City of Liberty, Missouri reserves the right to make adjustments or revisions in traffic handling requirements which may become necessary after construction on the project has started. These changes will be determined on the basis of periodic inspections throughout the duration of the project. Notice of such change will be transmitted to the Contractor and it will be his responsibility to make the necessary changes as soon as practicable after receipt of the notification.

SPC-5.01 Fees for Construction Permits

The City agrees to waive all fees for construction permits associated with the work to be done under this contract. Fees for occupation license, as required by the City, will be the responsibility of the Contractor and subcontractors to secure prior to the start of work and shall be subsidiary to the Contract.

All permits necessary for work adjacent to or within State and/or Rail Road Right of way shall be subsidiary to the contract and no direct payment will be made to the Contractor. Such permits shall be secured by the Contractor prior to the start of work.

SPC-6.01 Restoration of Yards

There shall be no direct payment made for the restoration of yards disrupted in conjunction with this project (unless otherwise specified in these Special Conditions). The Contractor shall contain all construction activities to within the public right-of-way and easement lines. All yards and ROW damaged shall be restored to at least equal to current condition as approved by the Engineer. Such work shall include grading, preparation of topsoil, and placement of seed, fertilizer, and mulch to repair lawn damaged by the Contractor's construction operations. No direct payment will be made to the Contractor for restoration of yards beyond the limits of the work as shown on the plans except as otherwise approved by the Engineer. Restoration shall occur within fourteen (14) calendar days of disruption.

SPC-7.01 Asphalt Pavement – Material and Placement Requirements

- A. Asphalt surface materials and placement shall be based upon **Type 5-01** in accordance with KC Metro Chapter APWA Section 2205 Asphaltic Concrete Surface and Base.

SPC-8.01 Surface Structures Affected by Construction

All pavement, surfaces, driveways, curbs, walks, buildings, traffic signs, utility poles, guy wires and other surface structures affected by construction operations in connection with the performance of the contract, together with all sod and shrubs in yards, parks and parking, shall be maintained and if removed or otherwise damaged, shall be restored to the original condition thereof, as determined and approved by the Engineer. All replacement of such surface structures or parts thereof shall be made with new materials conforming to the requirements of these specifications or, if not specified, as approved by the Engineer, at the Contractor's own cost and expense, unless otherwise provided by the contract.

SPC-9.01 Safety of the Public

The Contractor shall provide temporary walks, fencing, barricades and other protective measures as necessary to insure the safety of the public traversing the construction site. Equipment storage areas and material stockpiles shall be located on sites provided by the Contractor with due regard to location, appearance, and hazard potential to the traveling public. All work necessary shall be subsidiary to the contract and no direct payment will be made to the Contractor.

- A. Public Notification: The Contractor shall place door hangar notifications on all residences and businesses adjacent to work at least 48 hours prior to start of intended work at said locations. Door hangar notifications shall be supplied and placed by the Contractor. Engineer shall review and approve proposed door hangars prior to printing and placement.

Emergency No Parking Signage (Temp.): Contractor may supply and place emergency no parking signage as needed adjacent to work at least 48 hours prior to start of intended work. Cars that are parked in the way of construction shall be tagged with a non-stick notice under the driver side windshield wiper a minimum of 48 hours prior to start of intended work, vehicles that have been tagged will be towed at the owner's expense by the contractor. The contractor shall notify the City project inspector for final approval prior to towing. Towing shall only be a last resort after all other means of contacting the owner are exhausted.

Sec. 20-143. - No parking for construction activities.

Pursuant to section 20-121, parking is prohibited at all times, when temporarily posted as such, to facilitate public construction activities. Any vehicle parked within the posted temporary No Parking areas will be towed at the owner's expense.

Ord. No. 6696, § 6, 11-8-93

- B. Emergency Services Notification: The Contractor shall coordinate construction activities with the City project inspector so they may notify City emergency dispatch, City public relations, postal service, school district, trash collection, etc. as necessary.

SPC-10.01 Not used

SPC-11.01 Pavement Markings

Any pavement markings damaged during construction shall be replaced per the pre-existing pattern. Pavement markings shall be thermoplastic type pavement markings in accordance with the City of Liberty Technical Specifications on newly patched asphalt surface. MMA (Methyl Methacrylate) type pavement markings shall be used on pre-existing asphalt and pre-existing and/or new concrete pavement. All pavement marking symbols shall conform to the (MUTCD). This work shall include all labor, materials and equipment necessary to complete the work.

SPC-12.01 Not used

SPC-13.01 Not used

SPC-14.01 Not used

SPC-15.01 Not used

SPC-16.01 Staging and Stockpile Locations

1. CONTRACTOR shall be required to obtain permission from the OWNER on location and size of material and equipment staging areas and material stockpile locations. Usage of staging and/or stockpile locations without prior permission shall result in application of daily Liquidated Damages in the amount of \$100.00 until such time as material and equipment's are removed or approval is granted.

SPC-17.01 Measurement and Payment**A. General:**

1. It is the intention of this section of the specifications to set forth the method of measurement and payment for that part of the work on the contract documents that will be directly paid for at the price bid per unit of measure.
2. All the work to be performed under this contract will be paid for at the lump sum or unit prices stated in the proposal of the accepted bidder. Unit price payments will be based upon the measurement of installed items. Unit prices and lump sums shall constitute full compensation for all labor, materials, tools, equipment and incidentals required to complete the work, as described in accordance with the contract documents. Any material, equipment or operation not specifically mentioned, however, required for proper completion of the work shall be considered to be incidental to the unit price item to which it pertains.

- B. Quantities listed in the bid are not guaranteed and are indicated only for convenience in comparing bids. Payment will be made for actual quantities constructed or installed, be they more or less than those listed unless otherwise indicated; said quantities being measured and determined as follows:

TECHNICAL SPECIFICATIONS

ARTICLE 1 – TECHNICAL SPECIFICATIONS

- 1.01 The specifications that shall govern the materials furnished and work performed in the construction of the project covered by this contract shall be the latest revision of Technical Specifications for Public Improvement Projects, City of Liberty, Missouri as though fully set forth herein.
- 1.02 No attempt has been made in the above designated specifications to segregate work to be performed by any trade, contract or proposal item under any one specification section. Any segregation between trade or craft jurisdiction limits and the establishment of subcontract limits will be solely a matter of agreement between the Contractor and his employees and his subcontractors. The specifications will govern the construction of the entire work and the provisions thereof will govern each item of the work to which such provisions apply.
- 1.03 The aforementioned Technical Specifications are available online at:
<https://www.libertymissouri.gov/208/Design-Criteria-Technical-Specifications>. Questions concerning specifications may be directed to the City Engineer's Office, Third Floor, Liberty City Hall, 101 E. Kansas, Liberty, Missouri, 816-439-4500.

ARTICLE 2 – JOB SPECIFIC TECHNICAL SPECIFICATIONS

- 2.01 Job specific technical specifications shall take precedent over the Technical Specifications for Public Improvement Projects, City of Liberty, Missouri only in the subject matter presented in the job specific technical specifications.
- 2.02 If no job specific technical specifications are listed in the project manual the Technical Specifications for Public Improvement Projects, City of Liberty, Missouri shall govern all work proposed.



DIVISION 00

PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 07
SEALS AND SIGNATURES

Owner Name: City of Liberty, Missouri
Facility or Site Name: Water Treatment Plant and Distribution System
Project Name: 24-Inch Resilient Water Transmission Main and Vault
Project or Contract Designation: 10411916
Engineer: HDR

Caleb Dady, PE License No. 2022006802 	The seal and signature to the left applies to the following Specifications divisions and sections of this project manual: • Division 10 • Division 26
Eric Farrow, PE License No. 2017018965 	The seal and signature to the left applies to the following Specifications divisions and sections of this project manual: • Division 00 • Division 01 • Division 02 • Section 31 10 00 • Division 40
David Wiseman, PE License No. 025507 	The seal and signature to the left applies to the following Specifications divisions and sections of this project manual: • Section 01 73 20 • Division 03 • Division 05 • Division 08 • Division 09 • Section 31 23 00 • Section 31 23 16.43

Engineer's seal and signature does not apply to the documents that comprise Division 00, Bidding and Contracting Requirements.

It is a violation of applicable laws and regulations governing professional licensing and registration for any person, unless acting under the direction of the licensed and registered design professional(s) indicated above, to alter in any way the Specifications in this project manual.

END OF SEALS AND SIGNATURES

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APPENDIX A

CITY TECHNICAL SPECIFICATIONS

SECTION 5000 MATERIALS, CONSTRUCTION AND TESTING - WATER LINES

5001 GENERAL. The purpose of this specification is to govern the furnishing of all materials, labor, equipment, tools, superintendence, and other services necessary to construct water mains, complete with appurtenances including extensions and relocations at the locations shown on the plans.

5002 MATERIALS.

A. Scope. This section governs materials for water mains having diameter of four inches and larger.

B. Pipe and Fittings.

1. Ductile-Iron Pipe. Unless indicated otherwise on the construction plans or directed by the Engineer, all 6 inch pipes and larger shall be Class 50 ductile iron, all 4 inch pipes shall be Class 51 Ductile iron complete with all accessories and conforming to ANSI A21.51, AWWA C151, ASTM A536, and Grade 60-42-10.

The outside coating used under normal conditions shall be an asphaltic coating approximately 1 mil thick. The coating shall be applied to the outside of all pipes, unless otherwise specified. The finished coating shall be continuous and smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the pipe.

The lining for use under normal conditions shall be a cement-mortar lining in accordance with ANSI/AWWA C104/A21.4, unless otherwise specified.

Joints, unless otherwise specified, shall be of the push-on type conforming to ANSI A21.11/AWWA C111, except gaskets shall be synthetic rubber. Natural rubber will not be acceptable.

Restrained joints (if required) shall be Loc-Tite, Meg-a-Lug, or approved equal.

2. Ductile-Iron Fittings. Ductile-iron fittings shall be complete with all accessories and shall be ASTM A536, Grade 70-50-05, conforming to ANSI A21.10/AWWA C110, ANSI A21.53/AWWA C153, 350 psi pressure rating. Joints shall be of the standard mechanical joint type conforming to ANSI A21.11/AWWA C104 and shall be coated inside and out with a bituminous coating. Fittings shall have distinctly cast upon them the pressure rating and letters "DI" or "DUCTILE".
3. PVC Pipe. The non-restrained PVC pipe will be push-on joints. PVC pipe will be DR14 C-900/DR18 C-905 DIPS or C-909 PC150 DIPS. Restrained joints will be Certainteed Certa-lok C-900 Restrained Joint Pipe, EBAA bell restrained harnesses, or Diamond Plastic Bulldog Restraint Joint System.

Bends may either be Certa-lok sweeps or MJ ductile iron bends. Tees and valves will be ductile iron mechanical joints. For changes in alignment less than 11-1/4 degrees but more than the allowable joint deflection, then Certainteed High Deflection Couplings shall be used. Romac Grip Rings or EBAA Iron Mega-Lugs designed for PVC for MJ fittings and valves shall be used.

4. HDPE Pipe. HDPE will be AWWA C906 with a working pressure rating of PC 160 (Diameter Ratio, DR11), nominal Ductile Iron Pipe Size (DIPS).
 - A. Butt Fusion Fittings – All butt fusion fittings will be AWWA C906 and have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.
 - B. Electrofusion Fittings – All electrofusion fittings will be PE3408 HDPE. Electrofusion fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the working pressure rating (WPR) of the fitting.
 - C. Mechanical Joint Adapters – Mechanical joint adapters shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D3261. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

C. Valves and Valve Boxes.

1. Gate Valves. Generally, and unless otherwise directed by the Engineer, gate valves shall be used on all water mains, 12 inches nominal diameter and smaller. The type, size and location of valves shall be as shown on the Plans. Except as modified or provided herein all gate valves in pipelines shall be 250 psi, ductile iron body, gate valves with non-rising stems. Gate valves shall be resilient-seated conforming to all applicable requirements of ANSI/AWWA C509 and shall be epoxy coated inside and outside conforming to ANSI/AWWA C550. All exposed valve bolts and nuts shall be stainless steel. Acceptable resilient wedge gate valve manufacturers are as follows:

Clow Model 2639
Kennedy Model KS-RW
American Series 2500
American Series 2500 with ALPHA restrained joint ends
EJ FlowMaster Resilient Wedge

2. Butterfly Valves. Butterfly valves shall be used for water line valves larger than twelve (12) inches in diameter otherwise directed by the City Engineer. Butterfly valves shall be of the rubber-seat, tight-closing type.

Valve discs shall seat at 90 deg. with the pipe axis. Mechanical joint end valves shall be of the short body type. Packing shall be O-ring cartridge designed for permanent duty in underground service.

All butterfly valves and operators shall conform to AWWA C504. Metal mating seat surfaces shall be 18-8 stainless steel or more. Each valve shall be provided with an operator with a torque rating at least equal to the torques listed in AWWA C504, Table 1. Butterfly valves shall be epoxy coated inside and outside conforming to ANSI/AWWA C550. All exposed valve bolts and nuts shall be stainless steel. Acceptable Butterfly valve manufacturers are as follows:

Clow Style 4500
Kennedy 4500
Mueller Lineseal Series

3. Valve Ends. Valve ends shall be of the mechanical joint type, conforming to ANSI A21.11/AWWA C111 except where flange ends are required on the plans.

The end flanges of flange gate valves shall conform in dimensions and drilling to ANSI B16.1 for cast-iron flanges and flange fittings, Class 125, unless explicitly provided otherwise on the plans and Special Provisions. The laying lengths of the flange valves shall conform to the dimensions of ANSI B16.10.

4. Bonnet Thrust Plates. The bonnet shall have a removable thrust plate to permit the removal and replacement of the valve stem and "O" ring seal while the valve is in service. All bolts and nuts in bonnet shall be stainless steel.
5. Tapping Valves and Sleeves. The size and location of the tapping valves, shall be as shown on the plans. The valves shall be 200 psi, iron body, resilient-seated gate valves with non rising stems conforming with all applicable requirements of ANSI/AWWA C509, except that the outlet end shall be standard mechanical joint end conforming to ANSI A21.11/AWWA C111 and the inlet end shall have an inlet flange conforming to ANSI B16.1 for cast iron flanges, Class 125.

Tapping sleeves shall have a body of 18-8 Type 304 Stainless Steel. The flange shall be CF8 cast Stainless Steel - equivalent to 18-8 Type 304 Stainless Steel. ANSI 150 lb. Drilling, recessed for tapping valve per MMSS-SP 60. Bolts shall be Stainless Steel, Type 304. The Branch Outlet shall be heavy Stainless Steel Pipe. The body shall be provided with anti-extrusion rings welded to each end of the sleeve body. The gasket shall be full circumferential compounded for use with water, salt solutions, mild acids, bases and sewage.

6. Stem Seals and Coatings. All valves shall be provided with stem seals of the "O" ring type. Two "O" rings shall be used with at least one "O" ring inserted above the thrust collar. The packing plate shall be attached to the

valve bonnet by not less than three (3) bolts and one "O" ring below the thrust collar.

7. Valve Operation. All valves shall be equipped with a 2 inch square wrench nut and the direction of rotation to open the valve shall be to the left (counterclockwise). Each valve body or operator shall have cast thereon the word "Open" and an arrow indicating the direction to open.
8. Extension Stems. Extension stems and stem guides shall be provided where shown, specified, or required for proper operation. Extension stems shall be fabricated from solid steel shafting not smaller in diameter than the stem of the valve or from galvanized steel piping having an ID not smaller than the OD of the valve stem. Extension stems shall be connected to the valve by a flexible, socket-type coupling. All connections shall be pinned, keyed, or socket type. Pipe couplings will not be acceptable.

Extension stems shall be provided for buried valves when the operating nut is more than three feet below finished grade. Each extension stem for a buried valve shall extend to between three (3) feet and three (3) feet six (6) inches of the ground surface, NO EXCEPTIONS WILL BE ALLOWED, and shall be provided with spacers, which will center the stem in the valve box, and shall be equipped with a wrench nut.

9. Valve boxes, Bases, Lids and Covers.
 - a. All buried valves shall be provided with valve boxes. Valve boxes shall be of cast iron, extension sleeve screw type, suitable for the depth of cover required by the drawings. Valve boxes shall be Clay & Bailey No. P-1108 or approved equal. Valve boxes outside of the traveled roadway may be 6 inch, PVC Class 150 pipe.
 - b. All parts of valve boxes, bases, and covers shall be coated by dipping in bituminous varnish.

Valves and valve boxes shall be set plumb. Each valve box shall be placed directly over the valve it serves, with the top of the box brought flush with the finished grade. Each valve box shall be fitted with a debris plug equipped with a handle for easy removal. CKR, Infactory or approved equal shall be used. After being placed in proper position, earth shall be filled in around each valve box and thoroughly tamped on each side of the box. An 18" square reinforced (#4 steel rebar), concrete collar, 6 inches thick shall be placed around the valve box flush with the surface.

- D. Fire Hydrants. Fire hydrants shall be furnished with a six (6)-inch auxiliary gate valve. The fire hydrants shall be pressure rated at 150 psi. working pressure and 300 psi. test pressure. Hydrants shall be traffic model with breakaway flange or coupling. Fire hydrants shall conform to AWWA C502 with

information required as follows:

Type of Shutoff	Compression
Size of Hydrant	5 1/4 inches
Inlet Connection	6 inches
Outlet Nozzles	2-2 1/2 inch hose and 1-4 1/2 inch pumper
Outlet Nozzle Threads	ANSI B-26
Direction to Open	Counterclockwise (left)
Stem Seals	O-ring
Outlet Nozzle Cap Chains	Required
Drain Outlet	Required
Finish Paint	Factory or field painted above the ground line with yellow enameled paint. Sherwin Williams industrial yellow No. B54 Y37.
Operating Nut	Pentagon shaped
Weather Cap on Operating Nut	Required
Oil Reservoir	Required
Boot Connection	4" M.J. boot

Acceptable Fire Hydrant manufacturers are as follows:

Clow Medallion
Kennedy Guardian K-81D
American Darling B-84-B5
EJ 5CD250

Hydrants shall be furnished with all joint glands, gaskets, bolts, and nuts required for installation. Hydrants shall be set so that at least the minimum pipe cover is provided for the branch supply line. Each hydrant shall be set on a concrete foundation at least eighteen (18) inches square and 6 inches thick. Each hydrant shall be suitably anchored.

Hydrant drainage shall be provided by installing around the hydrant, and below the top of the hydrant supply pipe, at least one-half (1/2) cubic yard of three-fourths (3/4)-inch rock.

Fire hydrant installations shall conform to the Standard Detail. All hydrants shall stand plumb. The Engineer shall determine the exact direction the nozzles will be facing.

An 18" square, reinforced (#4 steel rebar), concrete collar, 6 inches thick shall be placed around the valve box flush with the surface.

- E. Flushing Assembly. The flushing assembly shall include a line valve, straddle block, adequate piping to reach the surface, and concrete collar as shown in detail drawing D50-6.

F. Specials:

1. General. Air release, meter, and pressure-reducing valve vaults shall be precast concrete conforming to ASTM C478. Access lid castings shall be as noted in the Special Provisions or as shown on the plans.

Vaults, which, by their special nature, must be cast in place, shall conform to the plans and concrete specifications in Section 2000 "Concrete".

2. Pressure-Reducing Valves. Pressure-reducing valves shall be designed to provide tight shutoff under conditions of no flow and shall not "hunt" under ordinary flow conditions. Pressure-reducing valves shall be as noted in the Special Provisions, selected and sized as recommended by the valve manufacturer. Pressure-reducing valves shall be suitable for operation under the pressure and flow conditions as shown on the plans.
3. Combination Air Valves. Combination air-release and vacuum-relief valves shall be installed at the locations indicated on the plans. Each valve assembly shall be installed complete with appropriate piping and valves as shown on the plans. All piping and isolation valves shall be brass except for the air outlet from the valve, which shall be brass or copper tubing.

Air releases for mains 12 inches in diameter or smaller shall have 1 inch combination air-release valves, APCO No. 143C or approved equal.

- G. Bedding Aggregate. All materials used for pipe bedding shall be one half (1/2) to three-quarter (3/4) inch clean/screened rock and conform to the requirements of MCIB Section 4 – Materials for Coarse Aggregate – Table 2, Column III, modified to meet the following gradations:

<u>Sieve Size Gradations</u>	<u>Percentage Passing</u>
3/8"	20-35
No. 4	0-5
No. 8	0-2

Bedding aggregate shall fully encase the pipe from six (6) inches below bottom of pipe to six (6) inches above top of pipe, trench wall to trench wall.

5003 CONSTRUCTION REQUIREMENTS.

A. Grading and Excavation.

1. Scope. Excavation and trenching work shall include the necessary clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation and trenching as required; the handling, storage, transportation and disposal of all excavated material; all necessary sheeting, shoring and protection work; preparation of sub-grades; pumping

and dewatering as necessary or required; protection of adjacent property; and other appurtenant work.

2. General. Excavation and trenching work shall be performed in a safe and proper manner with suitable precautions being taken against all hazards.

The Contractor shall explore and expose any and all obstructions in advance of excavation so that minor changes in grade and alignment may be made.

In paralleling existing water, sewer, and gas mains, the Contractor shall protect all service connections and shall arrange to furnish service to the consumers with minimum interruption.

All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage.

3. Classification of Excavated Material. No classification of excavated materials will be made unless otherwise indicated on the contract drawings. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work regardless of the type, character, composition, or condition thereof.
4. Unauthorized Excavation. Any part of the trench excavated below grade shall be corrected with material approved by the Engineer placed and compacted by the Contractor.
5. Removal of Water. The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and groundwater entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry during sub grade preparation and continually thereafter until the structure is built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation or other cause will result.

All excavations for concrete structures or trenches which extend down to or below static groundwater elevations shall be dewatered by lowering and maintaining the groundwater surface beneath such excavations a distance of not less than 12 inches below the bottom of the excavation.

Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.

The Contractor will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

6. Sheeting and Shoring. Except where banks are cut back on a stable slope, excavation for structures and trenches shall be properly and substantially sheeted, braced, or shored as necessary to prevent caving or sliding, to provide protection for workmen and the work, and to provide protection for existing structures and facilities. Sheeting, bracing, shoring, and trench boxes shall be designed and built to withstand all loads that might be caused by earth movement or pressure and shall be rigid, maintaining shape and position under all circumstances.

Trench sheeting shall not be pulled unless pipe strength is sufficient to carry trench loads based on trench width to the back of sheeting. Sheeting may not be pulled after backfilling, as directed by the Engineer.

Where trench sheeting is left in place, such sheeting shall not be braced against the pipe, but shall be supported in a manner, which will preclude concentrated loads or horizontal thrusts on the pipe. Cross braces installed above the pipe to support sheeting may be removed after pipe embedment has been completed.

7. Stabilization. Trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workmen.

Trench bottoms which are otherwise solid but which become mucky on top due to construction operations shall be reinforced with one or more layers of crushed stone or gravel. Not more than 1/2 inch depth of mud or muck shall be allowed to remain on stabilized trench bottoms when the pipe bedding material is placed thereon.

8. Trench Excavation. The Contractor shall not open more trenches in advance of pipe laying than is necessary to expedite the work. One block or 300 feet whichever is the shorter, shall be the maximum length of open trench ahead of pipe laying unless by written permission of the Engineer.

Except where tunneling or boring and jacking is specified and shown on the plan by the Engineer, all trench excavations shall be open cut.

9. Alignments and Grade. The alignment and grade or elevation of the pipeline shall be as shown on the plans.

The Contractor must maintain a constant check of the pipe alignment and trench depth and will be held responsible for any deviations there from.

Unless otherwise shown or indicated on the plans or unless otherwise set forth by the Engineer, the horizontal and vertical alignment of the water main shall be maintained to within the following tolerances:

Horizontal
3"

Vertical
42" to 48"
Depth of Cover

10. Minimum Cover. Except where otherwise shown, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe as indicated above. Greater pipe cover depths may be necessary on existing pipe, conduits, drains, drainage structures, or other obstruction encountered at normal pipe grades.

Measurement of pipe cover depth shall be made vertically from the outside top of pipe to finish grade or pavement surface elevations.

11. Limiting Trench Width. Trenches shall be excavated to a width, which will provide adequate working space and pipe clearances for proper pipe installation, jointing and embedment. However, the limiting trench width below an elevation 6 inches above the top of the installed pipe shall be as follows:

Pipe Size	Minimum Trench Width in Earth	Maximum Trench Width In Earth	Minimum Clearance In Rock
4"	18"	30"	6"
6"	24"	30"	6"
8"	26"	32"	6"
10"	28"	34"	6"
12"	28"	34"	6"

Where necessary to reduce earth load on trench banks to prevent sliding and caving, banks may be cut back on slopes which shall not extend lower than 1 foot above the top of the pipe.

12. Unauthorized Trench Widths. When, for any reason, the width of the lower portion of the trench as excavated at any point exceeds the maximum permitted in the foregoing tables, either pipe of adequate strength, special pipe embedment, or arch concrete encasement, as required by loading conditions and as determined by the Engineer, shall be furnished and installed by and at the Contractor's expense.
13. Trench Bottom in Earth. The trench in earth shall have a flat bottom the full width of the trench and shall be excavated to the grade to which the pipe is to be laid. The surface shall be graded to provide a uniform bearing and continuous support for each pipe at every point along its entire length.
14. Rock Exploration. Unless shown otherwise on the plans or noted in the Special Provisions, no rock exploration has been made. On those projects where rock exploration has been made, test holes have been drilled at locations and intervals as shown on the plans or subsurface information report to determine the approximate location and depth of rock. Resistance to penetration was assumed to be "solid rock". This information is furnished for general reference purposes only.

The Contractor must form his own opinion as to the character of materials, which will be encountered from an inspection in the ground, from his own investigation of the test hole information, or from such other investigations, as he may desire.

15. Trench Bottoms in Rock. All rock excavation shall be carried to a minimum of 6 inches below the bottom of the pipe. Granular pipe embedment material shall be used to restore the trench bottom to the desired elevation and grade and to provide a uniform bearing and continuous support for the pipe along its entire length. Care shall be exercised to prevent any portion of the pipe from coming to bear on solid rock or boulders.
16. Mechanical Excavation. The use of mechanical equipment will not be permitted in locations where its operations would cause damage to trees, buildings, culverts, or other existing property, utilities or structures above or below ground. In all such locations, hand-excavating methods shall be used.

Mechanical equipment used for trench excavation shall be of the type, design and construction and shall be so operated that the rough trench excavation bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from the bottom of the trench, and that trench alignment will be centered in the trench with adequate clearance between the pipe and sidewalls of the trench. Undercutting the trench sidewall to obtain clearance will not be permitted.

All mechanical trenching equipment, its operating conditions, and the manner of its operations shall be subject at all times to the approval of the Engineer.

17. Stream Crossings. Stream crossings shall be made in accordance with these specifications and as shown on the plans.

The trench width shall be as required for proper pipe installation and the trench depth shall be as required to give minimum cover shown on the plans. Pipe encasement, where required, shall be in accordance with the specifications and placed as indicated on the plans.

18. Highway and Railroad Crossings. The Contractor shall make highway and railroad crossing in accordance with these specifications, the Special Provisions and as shown on the plans.

All construction or work performed and all operations of the Contractor, his employees, or his subcontractors within the limits of highway or railroad right-of-ways shall be in conformity with all the requirements, regulations and be under the control (through the Engineer) of the authority owning or having jurisdiction over and control of the right-of-way.

The Contractor shall pay fees and obtain permits to make the crossings

unless otherwise directed.

5004 INSTALLATION.

A. General. Laying of ductile-iron pipe; PVC pipe; HDPE pipe; installation of valves, and hydrants; and embedment and backfill shall conform to the following specifications and the details as shown on the plans.

1. Unless otherwise specified or shown on the plans, the water mains shall be laid to have a minimum cover of 42 inches, measured from the finished grade or from established street grades shown on the plans.
2. Whenever pipe laying is stopped, the open end of the line shall be sealed with a watertight plug that will prevent trench water from entering the pipe.
3. Where the pipe is to be installed inside a casing pipe or tunnel liner, polyethylene casing spacers shall be strapped to each pipe before it is placed in the casing pipe or tunnel liner in accordance with these specifications and as shown on the plans. The ends of each casing pipe or tunnel liner shall be closed with a minimum 1/8-inch neoprene rubber end seal with stainless steel bands or as shown on the plans. The closures for each casing pipe or tunnel line shall not be constructed until all testing of the line has been completed and accepted.

B. Ductile-Iron Pipe.

1. Handling. Pipe, fittings and accessories shall be handled in a manner that will ensure installation in a sound, undamaged condition. Equipment, tools, and methods used in unloading, reloading, hauling, and laying pipe and fittings shall be such that the pipe, pipe coating, and fittings are not damaged. Hooks shall not be used. Under no circumstances shall pipe or accessories be dropped or dumped.

The Contractor shall repair all pipe coating, which has been damaged, before installing the pipe.

2. Cutting Pipe. Ductile-iron pipe shall be cut with either a saw or an abrasive wheel. Cutting of existing cast-iron pipe shall be done with mechanical pipe cutters. The cutting of pipe with a torch will not be permitted.

Cutting shall be done in a neat manner without damage to the pipe, or the cement lining. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the end of the pipe shall be dressed with a file or beveled by mechanical means to remove all roughness and sharp corners.

3. Cleaning. The interior of all pipe and fittings shall be thoroughly cleaned of foreign matter before being installed and shall be kept clean until the work has been accepted. Such surfaces shall be wire brushed, if necessary, wiped clean, and kept clean until jointing is completed.

4. Inspection. Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation. Spigot ends shall be examined with particular care since they are vulnerable to damage from handling. All defective, damaged, or unsound pipe and fittings shall be rejected and marked as such and removed from the site of the work.
5. Push-on Joints. The gasket seat in the bell shall be wiped clean after which the gasket should be placed. A thick film of lubricant should be applied to the entire inner surface of the gasket and on the spigot end of the pipe.

The lubricant and the gaskets shall be as recommended and supplied by the manufacturer of the pipe being used. The lubricant shall be odorless, tasteless, nontoxic, and suitable for use in potable water.

Field-cut pipe shall be beveled by filing or by mechanical means to remove any sharp or rough edges that might otherwise damage the gasket.

6. Mechanical Joints. Mechanical joint pipe shall be used only when shown on the plans and shall be installed in strict accordance with the manufacturer's recommendations.
7. Flanged Joints. When bolting flanged joints, care shall be taken to ensure that there is no restraint on the opposite end of the pipe or fitting which would prevent uniform gasket compression or which would cause unnecessary stress in the flanges. One flange shall be free to move in any direction while the flange bolts are being tightened. Bell-and-spigot joints shall not be packed or assembled until all flanged joints affected thereby have been tightened. Bolts shall be tightened gradually and at a uniform rate so that gasket compression is uniform.
8. Restrained Joints. Restrained joints and anchoring joints shall be installed in strict accordance with the pipe manufacturer's recommendations.
9. Alignment of Bell-and-Spigot Pipe. Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line or grade shall not exceed the quantities stipulated in Tables 4 and 5 of ANSI/AWWA C600.
10. Laying Pipe. Pipe shall be protected from lateral displacement by pipe embedment material installed as specified. Under no circumstances shall the pipe be laid in water, and no pipe shall be laid under unsuitable trench conditions.

- C. PVC Pipe. This section covers installation of AWWA C-900, C-905, and C-909 PVC pipe. Ductile Iron fittings and valves are covered in other sections. PVC pipe shall be installed to the minimum of AWWA C605 latest revision and per these specifications.

1. Handling. PVC Pipe, fittings, and accessories shall be handled in a manner

that will ensure installation in sound, undamaged condition. Equipment, tools, and methods used in handling and installing pipe and fittings shall not damage the pipe and fittings. Hooks inserted in ends of pipe shall have broad, well-padded contact surfaces.

2. Laying Pipe. Pipe shall be laid with the bell ends facing the direction of laying except when reverse laying is specifically authorized or as directed by the Engineer.
3. Assembly. For push on pipe, the spigot shall be inserted into the bell to the line on the spigot. The previously completed joints must be braced so the line does not become “stacked”, “over belled”, or inserted past the reference mark on the spigot. If the insertion mark is not visible after assembly, the joints shall be disassembled and done correctly.
4. Alignment. Piping shall be laid to the lines and grades as specified, as indicated on reference points, or as indicated on the drawings. The Contractor must obtain approval from the Engineer for any changes in the alignment or grade.
5. Joint Deflection. Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line using joint deflection shall not exceed the pipe manufacturer’s published axial joint deflection or 1°, whichever is less.
6. Bending pipe. The Contractor will not be allowed to bend PVC pipe. The Contractor shall use the Ceterainteed High Deflection Coupling if joint deflection is insufficient and an 11-1/4 bend is too large of an angle.
7. Mechanical Joints. Mechanical joints shall be carefully assembled in accordance with the manufacturer’s recommendations. If effective sealing is not obtained, the joint shall be disassembled, thoroughly cleaned, and reassembled. Kor-Blue bolts, or approved equal, shall be used for all necessary assembly. Bolts shall be uniformly tightened to the torque values listed in ANSA/AWWA C111/A21.11. Over-tightening of bolts to compensate for poor installation practice will not be permitted.
8. Push-on Joints. All joint surfaces shall be lubricated with heavy vegetable soap solution immediately before the joint is completed. Lubricant shall be stored in closed containers and shall be kept clean. Each spigot end shall be suitably beveled to facilitate assembly.
9. Fittings. Unless directed otherwise by Engineer, Contractor shall determine the type and locations of bends required to complete the main installation. Mains shall be installed with the least number of bends practical.

The Contractor will cut off the bevel of the PVC pipe before insertion into an MJ fitting.

10. Trace Wire. The Contractor shall install trace wire in the trench with the PVC pipe per the Tracer Wire detail in 50-11.

11. Thrust Restraint for PVC. Certa-lok restrained joint PVC shall be used or installed using the EBBA Iron 1900 Series restraint harness or approved equal according to the manufacturer's recommendations.

Thrust restraint devices shall be provided on all pipe installed in encasement pipes and installed for street crossings.

12. Reaction Anchorage and Blocking. Where thrust restraint devices are inappropriate or when directed by the Engineer, concrete thrust blocks, thrust collars, or gravity blocks shall be used to prevent movement of the pipe caused by internal pressure. Reaction Anchorages and Blocking are covered in the Thrust Restraint section and should be installed according to Thrust Block detail 50-7.
13. Cutting Pipe. PVC cutting shall be done in a neat manner, without damage to the pipe. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the end of the pipe shall be deburred to remove the PVC shavings. The cut ends of push-on joint pipe shall be suitably beveled as necessary to provide proper installation. When cutting pipe with couplings, mark the field cut pipe at the same distance in as the mark appeared on the original full-length pipe section.
14. Cleaning. The interior of all pipe and fittings shall be thoroughly cleaned of foreign matter before being installed and shall be kept clean until the work has been accepted. Such surfaces shall be wire brushed, if necessary, wiped clean, and kept clean until jointing is completed.

D. HDPE Pipe.

1. Handling. HDPE pipe and fittings shall be handled to insure installation in a sound undamaged condition.

During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe. No pipe shall be dropped from cars or trucks, or allowed to roll down slides without proper retaining ropes. During transportation each pipe shall rest on suitable pads, strips, skids, or blocks securely wedged or tied in place. Any pipe that is scratched more than 10% of the wall thickness shall not be used.

2. Laying Pipe. HDPE pipe shall not be installed when trenches or weather conditions are not suitable for such work.

HDPE pipe shall be installed in a trench with engineered embedment and backfill per the Excavation and Trenching section, except the bedding material particle size shall not exceed ½ inch for pipe smaller than 4 inches in diameter. The bedding material may be sliced in around the pipe.

3. Fusion. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The preferred joining method shall be the butt fusion method. The butt fusion equipment used in the joining procedures should

be capable of temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI.

Electrofusion couplings shall be used when butt fusion equipment cannot be used. Electrofusion coupling assembly shall be completed as scribed in the attachment at the end of this section.

Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

The operator of the butt fusion or electrofusion machine shall be trained and certified by the fusion equipment supplier to operate the fusion machine.

4. Trace Wire. The Contractor shall install trace wire in the trench with the HDPE pipe per the Tracer Wire detail in 50-11.

5005 TRACER WIRE SYSTEM AND DETECTION MARKING TAPE. Tracer wire and detection tape shall be installed on all plastic sanitary sewer mains and service lines within the public right-of-way per Section 9100 Tracer Wire Pipe Detection System.

5006 CONNECTION TO EXISTING MAINS. The Contractor shall furnish and install all fittings necessary to join the existing and new water mains as shown on the plans.

No connections to existing mains shall be started without prior approval of the Engineering Department, and each connection with an existing main shall be made at a time and under conditions which will least interfere with service to customers affected thereby.

In all cases where it is necessary to take an existing main or service line out of service in order to accomplish the work to be performed, the Contractor shall notify the Engineering Department at least twenty-four (24) hours in advance as to the approximate length of time the main or service line will be out of service. The contractor shall also be responsible for notifying all customers to be affected by loss or interruption of service by means of printed information sheets (door hangers, furnished by the City) forty-eight (48) hours in advance of taking the main or service line out of operation.

When the closing of a valve to make the connections affects a customer who cannot be without service, the Contractor shall arrange to supply a temporary service and schedule the time, which is most convenient to the customer for making the connection to the existing mains.

Facilities shall be provided for properly dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

5007 POLYETHYLENE ENCASEMENT. Polyethylene encasement shall be used around all mechanical connections, including mechanical joints, valves and fire hydrant assemblies. Polyethylene protection shall be installed in accordance with ANSI/AWWA C105/A21.5, Method A. Preparation of the pipe fittings shall include, but is not limited to, removing lumps of clay, mud, cinders, etc., prior to installation. Where pipe is also embedded or encased in concrete, the polywrap shall be installed over the pipe fittings prior to placing the concrete.

5008 SETTING VALVES, FITTINGS AND HYDRANTS.

A. Valves and Fittings. All valves, fittings, plugs and caps shall be set and joined to

the pipe in the manner heretofore specified for cleaning, laying and joining pipe, except that large valves may require special support so that the pipe will not be required to support the valve weight.

Each valve shall be inspected before installation to ensure that all foreign substances have been removed from within the valve body, and shall be opened and closed to see that all parts are in first-class working condition. Gate valves shall be set vertical in the horizontal pipeline. Valves and pipe shall be supported in such a manner as to prevent stress in either with no deflection in the valve/pipe joint.

Valve boxes and lids shall be installed at each valve and shall be supported and maintained centered and plumb over the operating nut of the valve. The valve box shaft shall not transmit shock or stress to the valve. Install valve box covers flush with the surface of the finished area or as directed by the Engineer.

All bends and tees shall be provided with thrust blocks of plain concrete, as specified. All dead ends on new mains shall be closed with plugs or caps suitably restrained to prevent blowing off under test pressure.

- B. Hydrants. All new hydrant installations shall be as shown on the plans or Standard Drawings and shall include all necessary excavation and backfill to make the installation complete.

Each hydrant shall be inspected before installation for direction of opening, nozzle size and threading, nozzle caps and chains, operating nut, and cap nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow and weep hole openings, and handling damage and cracks. Defective hydrants shall be corrected or replaced.

All hydrants shall stand plumb. The weep holes of the hydrant shall be kept clear and free to drain. The areas around each hydrant and hydrant valve shall be thoroughly compacted to prevent settlement of these areas.

Hydrants shall be set to a grade that allows their proper operation. Traffic hydrants with breakaway joint must be set with the joint above the ground line. Hydrants behind curbs shall be placed with the hydrant centerline at least 30 inches from the back of curb. Hydrants shall be rotated so as to have the pumper nozzle facing the street or rotated to face any direction as required by the Engineer.

5009 THRUST RESTRAINTS

- A. Hydrants. The back of the base elbow of each hydrant shall be braced against a sufficient area of unexcavated earth or rock and be restrained by suitable restrained joints as shown on the plans or the Standard Drawings.
- B. Fittings. All plugs, caps, tees, bends and other fittings, unless otherwise specified, shall be provided with reaction blocking or suitable restrained joints as shown on the plans or Standard Drawings.

- C. Thrust Blocks. Vertical and horizontal reaction blocking shall be concrete as specified herein. Thrust blocks shall be installed between solid ground and the fitting to be restrained. Concrete shall be located to contain the resultant thrust force and permit access to pipe and fitting joint for repairs and installed according to the Thrust Block detail 50-7. All nuts and bolts shall be protected with polyethylene encasement to prevent covering or contaminating with concrete.
- D. Restrained Joints. Restrained push-on or mechanical joints, mechanical joint anchoring fittings, and Meg-A-Lug retainer glands may be used in lieu of concrete thrust blocking if so indicated on the plans or approved by the Engineer.

5010 TRENCH BACKFILLING. Compacted backfill shall be required for the full depth of the trench above the embedment where beneath structures, street, road, or highway right-of-way or abutting easements, driveways, walks, parking areas, and at all locations shown on the plans or as directed by the Engineer during the progress of the work.

The top portion of the backfill beneath established sodded areas shall be finished with at least twelve (12) inches of topsoil corresponding to, or better than, that underlying adjoining sodded areas. The Engineer prior to placement shall approve topsoil, and unless otherwise directed, shall be material previously excavated and stockpiled for the purpose during excavating and grading operations. Grades on areas to receive topsoil shall be established and maintained as a part of the grading operations. Immediately prior to dumping and spreading topsoil, the surface shall be loosened by disking or scarifying to a depth of two (2) inches to permit bonding of the topsoil to the underlying surface.

At the option of the Contractor, compacted backfill may be job-excavated material or material obtained "off-site" except that all street crossings shall be backfilled with MoDOT Type I rock, or on-site material provided testing is performed in one (1) foot lifts in the trench four (4) feet back of curb to four (4) feet back of curb. Job-excavated material may be used for compacted backfill (outside of Street Right of Ways) when the job-excavated material is finely divided and free from debris, organic material, cinders, or other corrosive material, and stones larger than three (3) inches in greatest dimension. Large masses of moist, stiff clay shall not be used. Job-excavated material shall be compacted to ninety-five (95) percent of maximum density at optimum moisture content as determined by ASTM D698 when the test is appropriate, or to seventy (70) percent relative density as determined by ASTM D2049 when that test is appropriate.

The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.

The combination of the thickness of the layer, the method of compaction and the type of compaction equipment used shall be at the discretion of the Contractor subject to obtaining the densities as specified above.

Backfill shall not be placed when material contains frost, is frozen, or a blanket of snow prevents proper compaction. Backfill shall not contain waste material, organic material, or debris of any kind.

Trench backfill above pipe embedment in locations other than those specified shall be compacted to ninety (90) percent of maximum density at optimum moisture content as determined by

ASTM D698, unless otherwise permitted by the City Engineer.

Uncompacted earth backfill material to be placed above embedment shall be free of brush, roots more than two (2) inches in diameter, debris, cinders, or other corrosive material, and junk, but may contain rubble and detritus from rock excavation, stones, and boulders in certain portions of the trench depth. Uncompacted backfill material above embedment may be placed by any method acceptable to the Engineer which will not impose excessive concentrated or unbalanced loads, shock, or impact on and which will not result in displacement of installed pipe. Uncompacted backfill shall be placed to the extent necessary to prevent excessive future settlement.

Compact masses of stiff clay or other consolidated material more than one (1) cubic foot in volume shall not be permitted to fall more than five (5) feet into the trench unless cushioned by at least two (2) feet of loose backfill above pipe embedment.

No uncompacted trench backfill material containing rocks, or rock excavation detritus, shall be placed in the upper eighteen (18) inches of the trench except with specific permission of the Engineer, nor shall any stone larger than eight (8) inches in its greatest dimension be placed within three (3) feet of the top of pipe.

5011 DENSITY TESTING. At the option of the Engineer, in-place field density testing to determine compliance with specified compaction requirements may be performed using a nuclear moisture-density measuring device. The laboratory shall furnish field results to the inspector immediately. If, as a result of this field-testing, the engineer determines that further compaction is required, the Contractor shall revise his compaction procedures to obtain the results specified.

5012 DRAINAGE MAINTENANCE. Trenches across roadways, driveways, walks, or other traffic ways adjacent to drainage ditches or water courses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the traffic way, to prevent impounding water after the pipe has been laid. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by the contractor. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other watercourses crossed by the line of trench shall be removed immediately after backfilling is completed and the original section, grades, and contours of ditches or watercourses shall be restored. Surface drainage shall not be obstructed longer than necessary.

5013 DISPOSAL OF EXCESS EXCAVATED MATERIALS. Except as otherwise permitted, all excess excavated materials shall be disposed of away from the site of work at a site approved by the Engineer, unless otherwise specified in the plans. Broken concrete and other debris resulting from pavement or sidewalk removal, excavated rock in excess of the amount permitted to be and actually installed in trench backfill, junk, and debris encountered in excavation work and other similar waste materials shall be disposed of away from the site of the work.

Excess earth from excavations located in unimproved property shall be distributed directly over the pipe trench and within the pipeline right-of-way to a maximum depth of six (6) inches above the original ground surface elevation at and across the trench and sloping uniformly. Drag with blade machine or other suitable tool to a smooth, uniform surface without obstructing drainage at any point. Wasting of excess excavated material in the above manner will not be permitted

where the line of trench crosses or is within a railroad, public road, or highway right-of-way. The disposal of waste and excess excavated materials, including hauling, handling, grading, and surfacing shall be a subsidiary obligation of the contractor and no separate payment will be made therefore.

5014 SETTLEMENT. The contractor shall be responsible for all settlement of backfill, fills and embankments, which may occur within two (2) years of time after final acceptance of the contract under which the work was performed.

The Contractor guaranteeing the maintenance of the construction under which the contract was performed shall furnish a suitable maintenance bond in an amount approved by the City Engineer to the City of Liberty. Said bond shall remain in effect for the period mentioned above from the date of completion and acceptance of the work by the City.

5015 DISINFECTION AND TESTING.

- A. **Disinfection.** After installation, the entire main shall be flushed and disinfected by chlorination. Flushing shall be carried out until turbidity-free water is obtained from all points along the main.

Immediately prior to disinfection, the main to be disinfected shall be flushed at the maximum velocity, which can be developed. The flushing velocity shall be at least 2.5 feet per second.

All flushing work shall be done in the presence of the Engineer. The contractor shall notify the Engineer at least 24 hours in advance of the times and places at which flushing work is to be done.

1. Chlorination by the Contractor shall conform to AWWA C651 and be performed using a 1 percent chlorine solution prepared from granular calcium hypochlorite (1 pound of HTH per 8 gallons of water). Water entering the new main shall receive a dose of the chlorine solution fed at a constant rate such that the water will have not less than 50 mg/l free chlorine.

**Chlorine Required to Produce 50 mg/l Concentration
in 100 feet of Pipe**

Pipe Diameter (in)	1 percent Chlorine Solution (gal)
4	0.16
6	0.36
8	0.65
10	1.02
12	1.44

2. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances.

3. At the end of the 24-hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/l free chlorine.
4. Mains shall be flushed prior to placing in service. The water shall be disposed of without damage to public or private property. Disposal of Heavily-Chlorinated Water: The heavily-chlorinated flush water shall be dechlorinated in a manner complying with AWWA C651.

Pounds of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 100,000 gal of water:

Residual Chlorine Concentration (mg/L)	Sulfur Dioxide (SO₂)	Sodium Bisulfate (NaHSO₃)	Sodium Sulfite (Na₂SO₃)	Sodium Thiosulfate (Na₂S₂O₃·5H₂O)
1	0.8	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
10	8.3	12.5	14.6	12.0
50	41.7	62.6	73.0	60.0

5. Following the flushing of the mains, water samples shall be taken from the new main and tested by the City for bacteria. In accordance with AWWA Standard 651, additional samples shall be taken at least 24 hours later and tested by the City for bacteria. No less than three (3) sample points shall be installed on any water main. A corporation cock with a copper-tube gooseneck assembly shall be used at all line sampling locations. Locations shall be as follows:
 - a. Within fifty (50) feet of the beginning of the pipeline, mid-way in the pipeline, and within fifty (50) feet of the end of the pipeline.
 - b. Sample points shall be located at a minimum of every one thousand (1000) feet in addition to the locations at the beginning and end of the line, in addition to which sample points shall be located on all branch lines.
 6. The contractor shall repeat disinfection procedure should initial treatment fail to yield satisfactory results.
- B. Pressure and Leakage Testing of Water Mains. All newly installed mains must be pressure and leakage tested prior to final acceptance. This memorandum provides recommended standards for pressure and leakage testing ductile iron and PVC water mains. These recommendations closely follow relevant AWWA Standards and industry specifications. The applicable AWWA Standards are C600 for ductile iron mains and C605 for PVC mains, or their most recent revision. Pressure and leakage testing requirements for materials other than ductile iron or PVC will be determined on a case-by-case basis. Alternate pressure and leakage criteria for ductile iron or PVC mains are acceptable provided they are shown to be at least as stringent as the criteria presented in this memorandum or most recent revision of applicable AWWA

Standards.

Simultaneous or separate pressure and leakage tests may be performed. The test durations and pressures for each option are specified in Table 1. If separate tests are made, the pressure test should be conducted prior to the leakage test.

TABLE 1 – PRESSURE AND LEAKAGE TEST METHODS

Procedure	Test Pressure	Duration of Test
Simultaneous Pressure & Leakage Test	150% of working pressure* at point of test, but not less than 125% of normal working pressure at highest elevation.	2 Hours
Separate Pressure Test	150% of working pressure* at point of test, but not less than 125% of normal working pressure at highest elevation.	1 Hour
Separate Leakage Test	150% of working pressure* of segment tested.	2 Hours

* Working pressure is defined as the maximum anticipated sustained operating pressure. However, in no case shall the test pressure exceed the pressure rating for the pipe, valves, appurtenances, or thrust restraints.

1. **Pressure Test.** The purpose of the pressure test is to locate defects in materials or workmanship. Before testing, the pipeline must be backfilled and braced sufficiently to prevent movement under pressure.

If concrete thrust blocks are used, sufficient time must be allowed before testing to ensure that the concrete has cured sufficiently. The test ends also should be restrained to withstand thrusts potentially developed under the test pressures.

A pressure test should be conducted at 150 psi in the line. Care must be taken not to exceed the pressure rating of pipes, valves, fittings, thrust restraints, or other appurtenances. Pressures in the main may exceed the specified test pressure if the water pressure is read from a gauge located at a high point in the main.

Potable water is introduced into the main through a temporary connection to a hydrant, corporation stop in the new main, or valved connection with the existing line. While filling the new main, air must be expelled from the pipeline by venting through service connections, hydrants, or air-release valves. Corporation stops may be required at high points in the line if there are insufficient valves to release air from the main. It is important to completely expel air from each section of the main to be tested. Compressed entrapped air may amplify surges within the main or cause erroneous pressure test results.

After filling the main with water and expelling air, a pump is utilized to increase the water pressure within the line up to the required test pressure and

to maintain that pressure for the required duration (See Table 1). An accurate method for measuring the amount of water pressure within the line must be provided. A key criterion for the pressure test is that the measured water pressure within the main (after reaching the required test pressure) should not vary by more than 5 psi during the duration of the test. While the line is under pressure, the system and all exposed pipe, fittings, valves, and hydrants should be examined for leakage. Any damaged or defective pipe, fittings, valves, hydrants, or joints should be repaired or replaced and the pressure test repeated until satisfactory results are obtained.

2. Leakage Test. The purpose of the leakage test is to establish that the section of main being tested, including all joints, fittings and other appurtenances, will not leak or that leakage is within acceptable limits. If the leakage test is to be performed simultaneously with the pressure test, the system should be allowed to stabilize at the test pressure before conducting the leakage test.

Equipment necessary for conducting the leakage test includes a pump equipped with a make-up reservoir and a pressure gauge for measuring water pressure in the main. In addition, there must be an accurate method for measuring the quantity of water pumped into the main being tested. Methods used to measure water volume include a calibrated make-up reservoir, a calibrated positive-displacement pump, or a water meter.

The specified test pressure for the leakage test is the same as for the pressure test (See Table 1) and the test should be conducted for at least 2 hours in duration. Leakage is defined as the quantity of water that must be supplied into the main in order to maintain the water pressure within 5 psi of the specified test pressure after the pipe has been filled with water and air expelled. No pipe installation will be acceptable if the leakage is greater than that determined by the following formulas:

For PVC or DIP:

$$L = \frac{SD\sqrt{P}}{148,000}$$

where,

L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the leakage test, in pounds per square inch

The above equation is based on a leakage rate of 10.5 gallons per day per mile per inch of nominal diameter of pipe. Leakage values determined by the above formula for 1000 feet of pipe are presented in Table 2.

TABLE 2 - ALLOWABLE LEAKAGE (gal/hr) FOR 1000 FT OF GASKETED PVC OR DIP PIPE

Nominal Pipe Size (in)	Average Test Pressure in Pipeline, psi													
	50	75	100	125	150	175	200	225	250	275	300	350	400	450
2	0.10	0.12	0.14	0.15	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.25	0.27	0.29
3	0.14	0.18	0.20	0.23	0.25	0.27	0.29	0.30	0.32	0.34	0.35	0.38	0.41	0.43
4	0.19	0.23	0.27	0.30	0.33	0.36	0.38	0.41	0.43	0.45	0.47	0.51	0.54	0.57
6	0.29	0.35	0.41	0.45	0.50	0.54	0.57	0.61	0.64	0.67	0.70	0.76	0.81	0.86
8	0.38	0.47	0.54	0.60	0.66	0.72	0.76	0.81	0.85	0.90	0.94	1.01	1.08	1.15
10	0.48	0.59	0.68	0.76	0.83	0.89	0.96	1.01	1.07	1.12	1.17	1.26	1.35	1.43
12	0.57	0.70	0.81	0.91	0.99	1.07	1.15	1.22	1.28	1.34	1.40	1.52	1.62	1.72
14	0.67	0.82	0.95	1.06	1.16	1.25	1.34	1.42	1.50	1.57	1.64	1.77	1.89	2.01
16	0.76	0.94	1.08	1.21	1.32	1.43	1.53	1.62	1.71	1.79	1.87	2.02	2.16	2.29
18	0.86	1.05	1.22	1.36	1.49	1.61	1.72	1.82	1.92	2.02	2.11	2.28	2.43	2.58
20	0.96	1.17	1.35	1.51	1.66	1.79	1.91	2.03	2.14	2.24	2.34	2.53	2.70	2.87
24	1.15	1.40	1.62	1.81	1.99	2.15	2.29	2.43	2.56	2.69	2.81	3.03	3.24	3.44
30	1.43	1.76	2.03	2.27	2.48	2.68	2.87	3.04	3.21	3.36	3.51	3.79	4.05	4.30
36	1.72	2.11	2.43	2.72	2.98	3.22	3.44	3.65	3.85	4.03	4.21	4.55	4.86	5.16
42	2.01	2.46	2.84	3.17	3.48	3.75	4.01	4.26	4.49	4.71	4.92	5.31	5.68	6.02
48	2.29	2.81	3.24	3.63	3.97	4.29	4.59	4.86	5.13	5.38	5.62	6.07	6.49	6.88
54	2.58	3.16	3.65	4.08	4.47	4.83	5.16	5.47	5.77	6.05	6.32	6.83	7.30	7.74
60	2.87	3.51	4.05	4.53	4.97	5.36	5.73	6.08	6.41	6.72	7.02	7.58	8.11	8.60
64	3.06	3.75	4.32	4.83	5.30	5.72	6.12	6.49	6.84	7.17	7.49	8.09	8.65	9.17

Note: The allowable leakage for test sections with different diameters is the sum of the computed leakage for each pipe size.

When testing against closed metal seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in of nominal valve size is allowed.

Leakage less than the quantity specified by the above equation may be considered "allowable leakage" resulting from such factors as trapped air, take-up of restraints, and temperature variations during testing. However, observed leaks should be repaired regardless of leakage measurements through metering equipment.

A swift loss of water pressure in the main could be the result of a break in the line, major valve opening, loose mechanical joint bolts, missing or dislodged gasket, or inadequate thrust block. A slow loss of pressure in excess of allowable limits could be the result of minor problems such as a leaking valve or a corporation stop not completely shut off. In addition, air entrapped in the line can result in an apparent leakage in excess of the allowable limit.

Recommendations for avoiding minor leaks include the following:

- Vent all high points in the line by use of air release valves or corporation stops.
- Check all mechanical joint bolted connections.
- Cure thrust blocks before testing.
- Insure that exposed gasket grooves are properly cleaned before inserting gaskets.
- When inserting pipe into a mechanical joint or gasket joint, insure that the spigot end is squarely cut and beveled properly for the hub.

One approach for determining if the apparent leakage is the result of air entrapped in a line is to immediately repeat the leakage test (i.e., continue the test for another two hours) and determine the amount of make-up water required to fill the line a second time. If this amount is significantly less than the first filling, the difference in apparent leakage is probably the result of air being present in the line. If no significant difference in make-up water is recorded, a leak is probable.

5016 SEPARATION OF WATER MAINS AND SANITARY SEWERS.

- A. General. The following factors should be considered in providing adequate separation:
 - a. Materials and type of joints for water and sewer pipes;
 - b. Soil conditions;
 - c. Service and branch connections into the water main and sewer line;
 - d. Compensating variations in the horizontal and vertical separations;
 - e. Space for repair and alterations of water and sewer pipes; and
 - f. Off-setting of water mains around manholes.
- B. Parallel Installation. Water mains shall be laid at least ten feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten-foot separation, the department may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer and on either case, at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. In areas where the recommended separations cannot be obtained, either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing.
- C. Crossings. Water mains crossing sewers shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, the full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than ten feet. Special structural support for the water and sewer pipes may be required. In areas where the recommended separations cannot be obtained either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing that extends no less than ten feet on both sides of the crossing.
- D. Exceptions. Any variance from the specified separation distances in paragraphs 5016.B and 5016.C must be approved by the City Engineer.
- E. Force Mains. There shall be at least a ten-foot horizontal separation between water mains and sanitary sewer force mains and they shall be in separate trenches. In areas where these separations cannot be obtained, either the waterline or the sewer line shall be cased in a continuous casing.

- F. Sewer Manholes. No waterline shall be located closer than ten (10) feet to any part of a sanitary or combined sewer manhole.
- G. Disposal Facilities. No waterline shall be located closer than 25 feet to any on-site wastewater disposal facility, agricultural waste disposal facility, or landfill.

SECTION 6000 TUNNELING, BORING AND JACKING (PIPELINES)

6001 SCOPE. This section governs construction of steel casings, complete with bulkheads and sand fill, by boring and/or jacking at the locations and to the lines and grades indicated on the drawings directed by the Engineer, or where constructed at the contractor's option, when approved, to bypass obstructions without open cutting.

6002 MATERIALS.

A. Steel Liner Plate. Steel tunnel liner plates shall be Armco "Standard", Commercial Shearing and Stamping Company "Commercial", Republic "Truscon Paneled Out", or equal and shall be galvanized in accordance with ASTM A 123. The design and shape of the liner plates shall be such that assembly can take place entirely from within the tunnel liner. Sufficient sections shall be provided with one and one-half (1 1/2) inch or larger grouting holes, located near the centers, so that when the plates are installed there will be one line of holes on either side of the tunnel and one at the crown. The holes in each line shall not be more than nine (9) feet apart and, unless otherwise approved, shall be staggered. Bolts and nuts shall conform to ASTM A 153, A 307, A 325 and A 449 as applicable.

B. Steel Casing.

1. Steel casing for bored or jacked construction shall conform to ASTM A-139.
2. Steel shall be grade B under railroads and grade A for all other uses.
3. Minimum wall thickness for steel casing shall be in accordance with the following table:

<u>Diameter of Casing</u>	<u>Under Railroads</u>	<u>All Other Uses</u>
24"	0.406"	0.281"
26"	0.438"	0.281"
28"	0.469"	0.312"
30"	0.469"	0.312"
32"	0.500"	0.312"
34"	0.500"	0.312"
36"	0.500"	0.312"

4. Casing joints shall be welded by a certified welder in accordance with AWWA C-206.

C. End Seals. Ends of each casing pipe or tunnel liner shall be closed with a minimum 1/8-inch neoprene rubber end seal (CCI Pipeline Products, Advance Products & Systems, or approved equal) with stainless steel bands or as shown on the plans. The closure for each casing pipe or tunnel line shall not be constructed until all testing of the line has been completed and accepted.

D. Casing Spacers. Projection-type casing spacers shall be constructed of stainless

steel with glass filled polymer runners of type CCI Pipeline Products model CSS, or approved equal. Casing spacers shall be fastened tightly onto the carrier pipe so that when the carrier pipe is being installed the spacers will not move along the pipeline. Casing spacers shall be no more than 10 feet apart and doubled on each end of the encasement.

- E. Sand Fill. Sand fill shall comply with ASTM C-33 or MCIB Section 4, Fine Aggregate. Moisture content of the sand shall not exceed. 0.5%.

6003 CONSTRUCTION DETAILS.

A. General.

- 1. Prior to starting work, complete details of the method of operation and liner materials to be used shall be submitted to the Engineer. The pipe line, in the area to be tunneled, bored or jacked, shall be completed before the construction of adjacent portions of the same pipe line. The purpose of this requirement is to allow for slight discrepancies in alignment and grade which may occur in the tunneled, bored or jacked installation, so minor adjustments in the adjacent pipe can be made.
- 2. The maximum allowable deviation from plan alignment and grade shall be as follows:
 - a. Alignment 1.0%
 - b. Grade 1.0%

B. Casing Installation.

- 1. The steel casing shall be advanced in a continuous operation without interruption. Sections of the casing pipe shall be welded together to form a continuous conduit capable of resisting all stresses, including jacking stresses. The casing in its final position shall be within alignment and grade tolerances specified in Section 6003 (A2). There shall be no space between the earth and the outside of the casing. Any voids which do occur shall be filled by pressure grouting.
- 2. Boring operations shall be performed by experienced crews using a rotary type boring machine designed especially for this purpose. Boring shall be performed in a manner to prevent disturbing the overlying and adjacent materials.
- 3. Jacking.
 - a. Jacking frame, guides, blocking, head and reaction devices shall be arranged to apply uniform pressure about the casing circumference without damage to the casing material, and to maintain alignment within specified tolerances.

- b. Jacking reaction device shall provide adequate resistance to withstand 200 percent of the maximum jacking pressure.
 - c. Provide jacks of adequate number and size for the required jacking pressure; but not less than two jacks.
 - d. Maintain jacking pit and pipe installation in such condition that drainage does not accumulate. Control and disposition of surface and subsurface water at the site of jacking operations shall be the Contractor's responsibility subject to the approval of the Engineer.
 - e. Excavation of the heading shall not be extended more than 1 inch outside the top and sides (upper 300-degree sector) of the casing and shall be true to grade at the invert (lower 60-degree sector).
 - f. Once jacking begins, it shall proceed without interruption until installation of the entire length of the jacked line is complete.
- 4. Excavation in Jacked Casings. Perform excavation within jacked casings by hand or machine methods as necessary to remove the materials encountered without disturbing the overlying material. The jacked casing shall be advanced a sufficient distance ahead of the excavation face and/or shield used as necessary to protect the workman and the work, and to prevent the uncontrolled entry of unstable materials into the casing.
 - 5. Unstable Materials. If materials are encountered during casing installation that cannot be excavated safely or without creating voids around the exterior of the casing, the Contractor shall discontinue casing installation and stabilize such materials by dewatering, chemical soil stabilization, grouting, or other methods, and/or modify equipment and procedures as necessary to complete the casing installation.

C. Lining Installation.

- 1. Excavation. Excavate by approved methods applicable to materials encountered. Boring operations shall be performed by experienced crews using a rotary type boring machine designed especially for this purpose. Include dewatering and chemical soil stabilization or grouting when necessary due to existing field conditions. Conduct excavation in a manner to prevent disturbing the overlaying and adjacent material.
- 2. Lining. Assemble liner plates immediately following the excavation. Advance casing continuously with excavation. When liner plates are being installed, care shall be taken to maintain alignment, grade and circular shape of the tunnel. All voids between liner and surrounding earth shall be filled with grout forced in under pressure. The grout shall consist of two parts of sand to one part of portland cement, mixed with sufficient water to maintain a freely pouring consistency. As the pumping

through any hole is stopped, it shall be plugged to prevent the backflow of grout. After lining installation is complete it shall be cleaned of all debris and all leaks which allow flowing or seeping water into tunnel, shall be stopped.

D. Pipe Installation.

1. Pipe shall be placed inside the casing to the plan line and grade by the use of projection type spacers. Projection type spacers shall be RACI or approved equal per Section 6002(D). The casing spacers shall be installed according to the manufacturer's guidelines and recommendations. Wooden skids are not acceptable.
2. End seals shall be constructed per Section 6002(C) after the pipe is installed and approved.
3. No interruption of traffic will be permitted at any location where a tunnel or casing is required.
4. All boring or jacking under Railroads shall conform to the specifications of that specific Railway.

SECTION 8100 FENCING

8101 SCOPE. This specification covers chain link, barbed wire, and pipe rail fencing and gates.

Fencing or handrails (minimum 42" height) are required along the top of retaining walls of at least four (4) feet in height and shall conform to the standards in this section.

8102 MATERIALS. All steel or malleable iron parts and accessories shall be hot-dip galvanized or aluminum coated after fabrication.

Fabric	9 gauge, 2-inch mesh; galvanized ASTM A392, Class II or aluminum-coated ASTM A491, Class II.
Posts	Steel H-Section , 0.35 percent carbon; steel pipe, ASTM A120, standard weight (Schedule 40); or steel hollow structural tubing, ASTM A500 or A501.
Line Posts	
For 6-foot Fencing	H-Section 4.10 pounds per foot; 2 3/8 inch OD pipe, 3.65 pounds per foot; or 2 inch square, 3.85 pounds per foot.
For 42-inch Fencing	H-Section, 2.70 pounds per foot; or 1 7/8 inch OD pipe, 2.72 pounds per foot.
Terminal Posts	End, corner, and pull posts.
For 6-foot Fencing	2 7/8 inch OD pipe, 5.79 pounds per foot; or 2 1/2 inch square, 5.59 pounds per foot.
For 42-inch Fencing	2 3/8 inch OD pipe, 3.65 pounds per foot; or 2 inch square, 3.85 pounds per foot.
Gate Posts	Gate or leaf 6 foot or less, 2 7/8 inch OD pipe, 5.79 pounds per foot; or 2 1/2 inch square, 5.59 pounds per foot; gate or leaf over 6 foot, 4 inch OD pipe, 9.10 pounds per foot; or 3 inch square, 9.10 pounds per foot.
Top Rail	1 5/8 inch OD steel tubing, 1.40 pounds per foot.
Rail Couplings	Sleeve type, 6 inches long.
Post Tops (when barbed wires are required at	Pressed steel, malleable iron, with pressed steel extension arm, or one-piece aluminum

the top of the fence)	casting; with hole for top rail, designed to prevent entry of moisture into tubular posts.
Post Tops	Pressed steel, malleable iron, or cast aluminum; designed to prevent entry of moisture into tubular posts.
Barbed Wire	Galvanized, ASTM A121, Class 2 or aluminum coated ASTM A585, Class II; two 12 1/2 gauge steel wires with 4 point barbs.
Stretcher Bars	Steel, 3/16 inch by 3/4 inch, or equivalent area.
Fabric Ties	Aluminum bands or wires.
Gate Frames	Steel tubing, 1 7/8 inch OD, 2.09 pounds per foot; or 2 inch square, 2.10 pounds per foot.
Tension Wire	Galvanized or aluminum coated coil spring wire, 7 gauge.
Pipe Rail	2" circular galvanized tubing, Schedule 40 or approved equal. Connections shall be welded.
Handrail-Setting Cement	Hallemite "Por-rok Cement".

8103 CHAINLINK FENCE TYPE. Fencing shall conform to the alignment and details shown on the drawings and shall consist of galvanized or aluminum-coated steel fabric, steel posts, top rail, and bottom rail or tension wire. Posts shall be set in concrete.

8104 GATES. Gates shall be swing type, hinged to swing 90 deg. from closed to open, complete with frames, latches, stops, keepers, hinges, and fabric. Gate leaves shall have intermediate members and diagonal truss rods as required for rigid construction. Joints between frame members shall be made by welding or by means of heavy fittings, and shall be rigid and water tight. Gate fabric shall be same as fence fabric and shall be attached to frame ends by stretcher bars, bolt hooks, or other mechanical means.

Hinges shall be heavy pattern with large bearing surfaces and shall not twist or turn under the action of the gate. Latches shall be plunger bar type, full gate height, and arranged to engage the gate stop, except single gates less than ten (10) feet wide may be provided with a forked latch. Latches shall be arranged for padlocking with the padlock accessible from both sides of the gate. Stops shall consist of a roadway plate with anchor set in concrete and arranged to engage the plunger. Keepers shall consist of mechanical devices for securing and supporting the free end of gates when in the full-open position.

Gates shall be installed so that they cannot be removed without disassembly of the hardware. Hardware attachment bolts shall be peened so that removal will be difficult.

8105 CHAINLINK FENCE CONSTRUCTION. The installed fence shall conform to the alignment and finish grade indicated. All posts shall be plumb unless otherwise shown or required and shall be spaced to match existing or according to manufacturer's recommendations. Where necessary, the fence grade shall be adjusted to fit the ground contour by slipping the fence fabric links. Found surface irregularities shall be graded as required to maintain not more than a two (2) inch clearance below the bottom of the fence fabric.

Where posts are set in earth, concrete foundations thirty-six (36) inches deep shall be provided. If bedrock is encountered, post excavation shall be continued to the thirty-six (36) inch depth or eighteen (18) inches into the rock, whichever is less. Concrete foundation shall be circular in horizontal section, not less than ten (10) inches in diameter for line posts, and with a diameter not less than the post OD plus nine (9) inches for terminal and gate posts, except that foundations in bedrock shall be a minimum of six (6) inches larger than the outside dimension of the post. Foundations shall extend above the ground surface and shall be crowned approximately one (1) inch. Concrete for foundations shall conform to the requirements of Section 2000 "Concrete". Each foundation shall be cured for at least seventy-two (72) hours before further work is done on the post.

Top rails and bottom tension wires shall be installed before the fabric. Top rails shall be furnished in at least eighteen (18) foot lengths and shall be securely connected to gate and terminal posts. Tension wires shall be installed approximately six (6) inches above grade and shall be attached to each post and securely anchored at terminal and gate posts. Straight runs between braced posts shall not exceed 1,500 feet. A terminal post shall be provided at each change in slope.

Fabric shall be installed with finished edge up and selvage edge down. Attach fabric to the top rail, bottom rail, and bottom tension wire at twenty-four (24) inch centers and to the line posts at fifteen (15) inch centers. Barbed wire shall be fastened to each extension arm by internal clips or external fabric ties. Each stretcher bar shall be threaded through the fabric and anchored to the post at fifteen (15) inch center by positive mechanical means.

Each gate and terminal post shall be braced by horizontal pipe brace and an adjustable truss extending to an adjacent line post. Corner posts shall be braced in both directions.

Fabrics shall be stretched taut and anchored so that a pull of 150 pounds at the middle of a panel will not lift the bottom of the fabric more than six (6) inches.

8106 BARBED WIRE FENCING. Fencing shall conform to the alignment and details shown on the drawings and shall consist of galvanized or aluminum-coated steel fabric, steel posts, top rail, and bottom rail or tension wire. Posts shall be set in concrete.

8107 PIPE RAIL FENCE. Materials for pipe railing fencing shall be standard commercial products which meet the general requirements of the specifications. All pipe used for railing, end, corner and intermediate posts shall be round tubular steel (Schedule 40) galvanized pipe having a diameter of 2 inches.

DESIGN CRITERIA FOR WATER LINE CONSTRUCTION

- A. GENERAL. Proposed extensions of the water distribution system shall, in general, follow the pattern established in the Water Facilities Plan as adopted by the City of Liberty. Deviations from this general policy may be deemed necessary by the City Engineer should the provision of adequate service to prospective customers or fire protection needs, existing or anticipated, in the area to be served warrant said deviations.

No public water line shall be constructed less than six (6) inches in diameter.

- B. LOCATION OF WATER MAINS AND APPURTENANCES. Proposed water mains shall be so located within street right-of-way to provide the least interference with the location of other utility lines. Street grades and elevations of proposed main shall be taken into consideration so that once constructed they will not require regrading or relocation.

- C. DEPTH. All water mains shall have a minimum cover of forty-two (42) inches.

- D. MATERIALS OF CONSTRUCTION. Water main material may be ductile-iron, PVC or HDPE described as follows:

1. Ductile-Iron Pipe. Unless indicated otherwise on the construction plans or directed by the Engineer, all 6 inch pipes and larger shall be Class 50 ductile iron, all 4 inch pipes shall be Class 51 Ductile iron complete with all accessories and conforming to ANSI A21.51, AWWA C151, ASTM A536, and Grade 60-42-10.

The outside coating used under normal conditions shall be an asphaltic coating approximately 1 mil thick. The coating shall be applied to the outside of all pipes, unless otherwise specified. The finished coating shall be continuous and smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the pipe.

The lining for use under normal conditions shall be a cement-mortar lining in accordance with ANSI/AWWA C104/A21.4, unless otherwise specified.

Joints, unless otherwise specified, shall be of the push-on type conforming to ANSI A21.11/AWWA C111, except gaskets shall be synthetic rubber. Natural rubber will not be acceptable.

Restrained joints (if required) shall be Loc-Tite, Meg-a-Lug, or approved equal.

2. Ductile-Iron Fittings. Ductile-iron fittings shall be complete with all accessories and shall be ASTM A536, Grade 70-50-05, conforming to ANSI A21.10/AWWA C110, ANSI A21.53/AWWA C153, 350 psi pressure rating. Joints shall be of the standard mechanical joint type conforming to ANSI A21.11/AWWA C104 and shall be coated inside and

out with a bituminous coating. Fittings shall have distinctly cast upon them the pressure rating and letters "DI" or "DUCTILE".

3. PVC Pipe. The non-restrained PVC pipe will be push-on joints. PVC pipe will be DR14 C-900/DR18 C-905 DIPS or C-909 PC150 DIPS. Restrained joints will be Certainteed Certa-lok C-900 Restrained Joint Pipe, EBAA bell restrained harnesses, or Diamond Plastic Bulldog Restraint Joint System.

Bends may either be Certa-lok sweeps or MJ ductile iron bends. Tees and valves will be ductile iron mechanical joints. For changes in alignment less than 11-1/4 degrees but more than the allowable joint deflection, then Certainteed High Deflection Couplings shall be used. Romac Grip Rings or EBAA Iron Mega-Lugs designed for PVC for MJ fittings and valves shall be used.

4. HDPE Pipe. HDPE will be AWWA C906 with a working pressure rating of PC 160 (Diameter Ratio, DR11), nominal Ductile Iron Pipe Size (DIPS).
 - a. Butt Fusion Fittings – All butt fusion fittings will be AWWA C906 and have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.
 - b. Electrofusion Fittings – All electrofusion fittings will be PE3408 HDPE. Electrofusion fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the working pressure rating (WPR) of the fitting.
 - c. Mechanical Joint Adapters – Mechanical joint adapters shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D3261. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

- E. FIRE HYDRANTS. Fire hydrants shall conform to AWWA C502 and shall be traffic models with breakaway flanges and shall have one (1) 2-inch pumper nozzle and two (2) 2-inch nozzles. All hydrants shall be furnished with auxiliary gate valves, and conform to acceptable models as listed in Appendix "A" of Section 5000 Water Lines as set forth in the Technical Specifications of the City of Liberty.

Hydrants should be placed at or near street intersections and at intermediate points when block lengths become long. Under no circumstances shall the spacing of fire hydrants exceed five hundred (500) feet in residential areas or three hundred (300) feet in commercial areas.

Fire Hydrant installations shall conform to the Standard Drawings.

- F. LINE VALVES. Gate valves shall be of the resilient-seated configuration and shall conform to the applicable requirements of AWWA C509. Gate valves shall be used in all water mains twelve (12) inches in diameter and smaller. Butterfly valves shall conform to AWWA C504. Butterfly valves shall be used in mains larger than twelve (12) inches in diameter or where otherwise approved by the City Engineer.

Valves shall be placed in all straight runs of pipe at intervals not to exceed 800 feet. Valves should be placed so that no more than an average of 25 customers (maximum of 30) would be without service due to a line being shutdown.

Extension stems shall be provided for buried valves when the operating nut is more than three feet below finished grade. Each extension stem for a buried valve shall extend to within three feet of the ground surface, shall be provided with spacers which will center the stem in the valve box, and shall be equipped with a wrench nut.

- H. TAPPING SLEEVES AND VALVES. Tapping sleeves and valves shall be used where required to connect to existing in-service mains.

The valves shall be Stainless Steel as set forth in the Technical Specifications of the City of Liberty.

Tapping sleeves shall be of the flanged-outlet type designed for attachment to the flanged inlet end of the tapping valve, and shall be provided with mechanical joint ends at each end of the run.

- I. CONNECTIONS TO EXISTING WATER MAINS. Connections to existing water mains shall be made in such a manner as to provide the least amount of interruption to water service. In the event closing of valves to make a connection will affect a customer who cannot be without service, provisions shall be made on the plans for a temporary service.

- J. PROVISIONS FOR FUTURE EXTENSIONS OF WATER MAINS. At the termination of all water mains or at locations as specified by the City Engineer, a dead end assembly in accordance with the Standard Drawings of Section 5000 of the Technical Specifications of the City of Liberty shall be provided to allow for future water main extensions.

Flushing assemblies shall be used only at locations approved by the Engineer to provide for thorough flushing of all water mains in the project area. Whenever practical, water mains five hundred (500) feet and longer shall be provided with a fire hydrant for flushing.

- K. THRUST BLOCKING. Reaction blocking of adequate size shall be provided at all tees, elbows and bends to resist all resultant thrusts due to hydrostatic pressure. All blocking shall conform to the Standard Drawings. Restrictive joints may be used as set forth in the Technical Specifications of the City of Liberty.

- L. HIGHWAY AND RAILROAD CROSSINGS. All crossings of highways or railroads shall be made by boring or tunneling. The work shall be in conformity with all

requirements and regulations and be under the control of the authority owning or having jurisdiction over and control of the right-of-way in each case.

- M. STREET CROSSINGS. Open cutting of streets shall be allowed only where permitted by the City Engineer. At locations where open cutting is not permitted, the crossing shall be made by boring or tunneling. Crossings made by boring or tunneling shall require a casing pipe unless otherwise approved by the City Engineer. All work and materials shall be in conformity with all requirements of Section 6000 Tunneling, Boring, and Jacking (Pipelines) of the Technical Specifications of the City of Liberty. The diameter and length of the casing pipe to be used shall be as determined by the City Engineer.
- N. FIRE FLOW REQUIREMENTS. Public improvement plans for water line projects serving development sites other than single family or duplex subdivisions shall be reviewed for fire protection sufficiency. The Chief Building Official shall determine the amount of water that is required for fire protection based on I.S.O. guidelines for the proposed type of structures to be built within the development. The design engineer shall obtain the flow requirement and then determine if the existing and proposed water lines can provide this flow based on existing operating conditions. Calculations verifying that the required flows can be met shall accompany the drawings when submitted for approval.
- O. BACKFLOW PREVENTION. All private, non-potable water uses shall require backflow prevention devices at all connections to the public main. This shall include but not be limited to fire protection lines.
- O. EASEMENTS. Public water mains outside of the public right-of-way shall be encompassed entirely by a public water line easement, at least fifteen (15) feet minimum width, and centered over the facilities. Excessively deep facilities, or other special circumstances may require a wider easement as determined by the City Engineer.
- P. TRACER WIRE PIPE DETECTION SYSTEM. Tracer wire pipe detection shall be installed on non-ductile public mains and private service lines within the public right-of-way per Section 9100 Tracer Wire Pipe Detection System.



DIVISION 01

GENERAL REQUIREMENTS



SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Location and description of Work and prior uses of the Site.
 - 2. Construction Contracts for this Project.
 - 3. Others retained by Owner for the Project.
 - 4. Work by Owner.
 - 5. Sequence and progress of Work.
 - 6. Contractor's use of the Site.
 - 7. Easements and rights-of-way.
 - 8. Tree trimming, clearing, and tree removal.
- B. Related Requirements:
 - 1. Include, but are not limited to, the following:
 - a. Section 01 14 19 - Use of Site.
 - b. Section 01 71 33 - Protection of the Work and Property.

1.2 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located in City of Liberty and extends from the Water Treatment Plant south and west along E Ruth Ewing Dr to west of Missouri Hwy 291 at Southview Dr.
- B. Work to be performed under this Contract includes, but is not limited to, constructing 24-inch diameter potable water transmission main. Included, but not limited to, are a meter and valve vault, trenchless roadway crossings, an open-cut stream crossing and all other Work required in accordance with the Contract Documents.
- C. Contracting Method: The Project will be constructed under a single prime construction Contract.

1.3 CONSTRUCTION CONTRACTS FOR THIS PROJECT

- A. Single Prime Construction Contract: The Contract requires all the Work for the Project not expressly allocated to Owner or others in the Contract Documents.

1.4 OTHERS RETAINED BY OWNER FOR THE PROJECT

- A. Engineer:
 - 1. Engineer is identified in the Agreement.
 - 2. Engineer's responsibilities for the Project, relative to Contractor, are indicated throughout the Contract Documents.

1.5 WORK BY OWNER

- A. Owner will perform the following in connection with the Work:
 - 1. Operate all existing valves, pumps, equipment, and appurtenances that will affect Owner's operations or facility processes, unless otherwise specified or indicated.

1.6 SEQUENCE AND PROGRESS OF WORK

- A. Sequencing:
 - 1. Incorporate sequencing of the Work into the Progress Schedule.
- B. Requirements for sequencing and coordinating with Owner's operations, including maintenance of facility operations during construction, and requirements for tie-ins and shutdowns, are in Section 01 14 16 - Coordination with Owner's Operations.

1.7 CONTRACTOR'S USE OF SITE

- A. Use of Site - General:

1. Limits on Contractor's use of the Site are indicated in Section 01 14 19 - Use of Site, and as may be shown on the Drawings.
 2. Contractors shall share use of the Site with other contractors and others specified in Articles 1.3 through 1.6 (inclusive) of this Section.
 3. Relocate stored materials and equipment that interfere with operations of Owner, other contractors, and others performing work for Owner.
 4. Comply with restrictions set forth in Section 01 14 19 - Use of Site.
- B. Owner will occupy the Site jointly with Contractor during construction for performance of Owner's typical operations. Coordinate with Owner in all construction operations to minimize conflicts between Contractor and Owner's employees and others under Owner's control. If the Site is a treatment facility or other production facility, Owner will have Owner's suppliers for deliveries of chemicals and other items accessing the Site from time to time, possibly on a daily basis.

1.8 EASEMENTS AND RIGHTS-OF-WAY

- A. Easements and Rights-of-Way - General:
1. Easements and rights-of-way required for the permanent improvements included in the Work will be provided by Owner in accordance with the General Conditions and Supplementary Conditions.
 2. Confine construction operations within Owner's property, public rights-of-way, easements obtained by Owner, and limits shown, and property for which Contractor has made arrangements directly with property owner(s).
 3. Use care in placing construction tools, machinery and equipment, excavated materials, and materials and equipment to be incorporated into the Work to avoid damaging property and interfering with traffic.
 4. Do not enter private property outside the construction limits without permission from the owner of the property.
- B. Within Highway and Railroad Rights-of-Way:
1. Permits required for the permanent facilities will be obtained by Owner. Contractor shall obtain and pay for work permits and fees for safety and inspection forces to be furnished by the right-of-way owner.
 2. Owners of rights-of-way are indicated in Section 01 14 33 - Work in Rights-of-Way.
 3. Work performed and Contractor's operations within rights-of-way, including railroad and highway rights-of-way, shall comply with requirements of right-of-way owner and owners of facilities thereon, and with applicable work permits, and orders of authorities having jurisdiction over right-of-way.

1.9 TREE TRIMMING, CLEARING, AND TREE REMOVAL

- A. Provide all required labor and equipment for trimming, clearing, and tree removal as shown on the Drawings.
1. Comply with Section 01 71 33 - Protection of the Work and Property.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 14 16

COORDINATION WITH OWNER'S OPERATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for coordinating with Owner's operations during the Project.
 - 2. Requirements for tie-ins and shutdowns necessary to complete the Work without impact on Owner's operations except as allowed in this Specifications section.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to coordinate with Owner's operations during the Work in accordance with this Specifications section.
 - 2. Except for shutdowns specified in this Specifications section, perform the Work such that Owner's facilities remain in continuous, satisfactory operation during the Project. Schedule and perform the Work such that the Work does not: impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, cause odors or other nuisances, does not affect the public health, safety, welfare, and convenience, and does not adversely affect the environment resulting in violation of Laws or Regulations.
 - 3. Work not specifically addressed in this Specifications section or in referenced sections may, in general, be performed, to be completed within the Contract Times, at any time during regular working hours in accordance with the Contract Documents, subject to the requirements in this section.
- C. Related Requirements: Include but are not necessarily limited to:
 - 1. Section 01 11 00 - Summary of Work.
 - 2. Section 01 75 00 - Checkout and Startup Procedures.
 - 3. Section 02 41 00 - Demolition.
 - 4. Section 40 05 01 - Common Work Results for Process Piping.
 - a. Perform cleaning, disinfection, and purging and testing of all piping systems in accordance with Section 40 05 01.

1.2 REFERENCES

- A. Terminology:
 - 1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this Specifications section have the meaning indicated below:
 - a. The term "Owner" is used throughout this section. When the facility is operated or managed by an entity other than Owner, references in this section to "Owner" as the operator or manager of the facility will be interpreted as referring to the facility manager.
 - b. A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, conduit (including piping and ducting), has to be temporarily suspended or taken out of service to perform the Work.
 - c. A "tie-in" is a connection of new Work to existing facilities, including connecting to existing conduits (including piping and ducting), electrical systems, structural elements, process/mechanical elements, and other physical connections. Some tie-ins may require that the tie-in be made without an associated shutdown.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Review construction procedures under other Specifications sections and coordinate Work that will be performed with or before the Work indicated in this Section.
- B. Sequencing and Scheduling:
 1. Refer to this Specifications sections articles on sequencing, tie-ins, and shutdowns.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:
 1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor, materials, and equipment required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to Engineer not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning Submittal.
 2. Shutdown Notification:
 - a. After Engineer's acceptance of shutdown planning Submittal and prior to starting the shutdown, submit written notification to Owner and Engineer of date and time each shutdown is to start. Submit notification not less than 72 hours in advance of each shutdown.

1.5 GENERAL CONSTRAINTS

- A. Indicated in the Contract Documents are the sequence and shutdown durations, where applicable, for Owner's equipment, systems, and conduits (including piping and ducting) that are to be taken out of service temporarily for the Work. New materials and equipment may be used by Owner after the specified field quality control activities are successfully completed and the materials or equipment are substantially complete in accordance with the Contract Documents.
- B. The following constraints apply to coordination with Owner's operations:
 1. Operational Access: Owner's personnel shall have access to equipment and areas of the facility that remain in operation.
 2. Temporary Partitions and Enclosures: Provide temporary partitions and enclosures necessary to maintain dust-free, heated, and ventilated spaces in areas of the facility that are adjacent to the Work and that must be kept operational.
 3. Schedule and perform equipment and system start-ups in accordance with Section 01 75 00 - Checkout and Startup procedures. Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday, or holidays without prior approval of Owner, unless specifically indicated otherwise in the Contract Documents.
 4. Dead End Valves or Conduits:
 - a. Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of conduits, including piping and ducting.
 - b. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as necessary or as required by Engineer.
 - c. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of conduit, including piping or ducting, also provide on downstream side of valve a blind flange with drain/flushing connection.
 5. Owner will assist Contractor in dewatering process tanks, basins, conduits, and other work areas to be dewatered for shutdowns. Maintain clean, dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.
 6. Draining and Cleaning of Conduits, Tanks, and Basins:
 - a. Unless otherwise shown or indicated in the Contract Documents, Contractor shall dewater process tanks, basins, conduits (including piping) at beginning of each shutdown. Flush, wash down, and clean tanks, basins, conduits (including piping), and other work areas.

- b. Contractor shall remove liquids and solids and dispose of them at appropriate location at the Site as directed by Engineer. Unless otherwise specified or indicated, contents of tanks, basins, and conduits (including piping) undergoing modifications shall be transferred to existing process tanks or conduits at the Site with capacity sufficient to accept such discharges, using hoses, temporary piping, temporary pumps, and other means provided by Contractor. Discharge of fluids across floors is not allowed.
- c. If drainage point is not available on the conduit (including piping) to be drained, provide a wet tap using tapping saddle and valve or other method approved by Engineer. Uncontrolled spillage of contents of conduits (including piping) is not allowed.
- d. Spillage shall be brought to Engineer's attention immediately, both orally and in writing, and reported in accordance with Laws and Regulations. Contractor shall wash down spillage to floor drains or sumps or other appropriate location and flush the system to prevent clogging and odors. If spillage is not suitable for discharge to the drainage system, such as chemical spills, as determined by Engineer, Contractor shall remove spillage by other means, such as vactor truck, sorbents, or other method acceptable to Engineer.

1.6 SEQUENCE OF WORK

- A. Perform the Work in the indicated sequence. Certain phases or stages of the Work may require working 24 hour days or work during hours outside of regular working hours. Work may be accelerated from a later stage to an earlier stage if Owner's operations are not adversely affected by proposed substitute sequence, with Engineer's approval. Stages specified in this article are sequence-dependent.
- B. Sequencing Requirements:
 - 1. Normal operations through the existing meter vault shall remain in service and uninterrupted, unless noted otherwise below.
 - 2. Construct new meter vault and 24-inch watermain from within the meter vault to the tie-in connection at Southview Dr. Connect to 16-inch watermain at Southview Dr.
 - 3. Subsequent activities shall be performed following the construction and acceptance of the aforementioned new meter vault and 24-inch watermain.
 - a. Isolate and demolish existing piping between the High Service Pump Station (Pump Nos. 1 and 2) and the new meter vault to the extent necessary.
 - b. Construct new 24-inch water main between the High Service Pump Station (Pump Nos. 1 and 2) and the new meter vault. Connect to high service pump station piping.
 - 4. Subsequent activities shall be performed following the construction and acceptance of the aforementioned new 24-inch watermain between the High Service Pump Station and the new meter vault.
 - a. Commission new meter vault and 24-inch water main between the High Service Pump Station (Pump Nos. 1 and 2) and tie-in connection at Southview Dr. into service.
 - b. Isolate and demolish existing piping between the High Service Pump Station (Pump Nos. 3 and 4) and the existing meter vault.
 - c. Construct new 24-inch water main between the High Service Pump Station (Pump Nos. 3 and 4) and the existing meter vault. Connect to high service pump station piping and interconnect to new meter vault.
 - 5. Subsequent activities shall be performed following the construction and acceptance of the aforementioned new 24-inch water main between the High Service Pump Station and the existing meter vault.
 - a. Commission all new 24-inch water main including between the High Service Pump Station (Pump Nos. 3 and 4) and the existing meter vault and interconnect.

1.7 TIE-INS

- A. Table 01 14 16-A in this Specifications section lists connections by Contractor to existing facilities. Table 01 14 16-A may not indicate all tie-ins required for the Work; Contractor shall

perform tie-ins necessary and required to complete the Work as shown or indicated in the Contract Documents, regardless of whether tie-in is indicated in Table 01 14 16-A. For tie-ins not indicated in Table 01 14 16-A, obtain requirements for tie-ins from Engineer by requesting an interpretation or clarification.

- B. The estimated operating pressure of the existing water main is 162 PSI. Contractor shall confirm system operating pressure with the Owner prior to performing the Work.

1.8 SHUTDOWNS

- A. Shutdowns shall be in accordance with Table 01 14 16-B of this Specifications section. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
- B. Work that may interrupt normal operations shall be accomplished at times convenient to Owner unless otherwise indicated in the Contract Documents.
- C. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
- D. Fines and Penalties Imposed by Authorities Having Jurisdiction:
 - 1. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not comply with requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in performing the Work and complying with applicable permits, Laws, and Regulations.
 - 2. Owner or Engineer may deduct as set-offs such amounts from payments due Contractor.
- E. Temporary, short-term shutdowns of smaller conduits (including piping and ducting), equipment, and systems may not be included in Table 01 14 16-B. Coordinate requirements for such shutdowns with Engineer and Owner. Where necessary, obtain Engineer's interpretation or clarification before proceeding.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SUBSTITUTE PROCEDURES

- A. Proposal of Substitute Sequencing, Shutdowns, and Tie-Ins:
 - 1. As a substitute to the procedures indicated in this Specifications section, Contractor may propose providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.
 - 2. Engineer will consider proposals for substitute procedures after the Effective Date of the Contract. All Bids shall be based on the requirements of the Contract Documents, including this section.
 - 3. Substitution Requests:
 - a. When proposing a substitute procedure for a tie-in or shutdown or other requirements of this section, comply with the requirements of the General Conditions and Supplementary Conditions (regarding substitutes) and Section 01 25 00 - Substitution Procedures.
 - b. When deviation from specified sequence or procedures is proposed, Contractor's proposal shall explain in detail the proposed sequence and procedures and associated

effects, including evidence that Owner's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents, by proposed substitution. List benefits of proposed substitution, including benefits to Progress Schedule.

3.2 GENERAL PROVISIONS FOR COORDINATING WITH OWNER'S OPERATIONS

- A. When possible, combine multiple tie-ins into a single shutdown to reduce impacts on Owner's operations and processes.
- B. Operation of Existing Systems and Equipment during the Work:
 - 1. Do not shut off or disconnect existing operating systems or equipment, unless accepted by Engineer in writing.
 - 2. Operation of existing systems and equipment will be by Owner unless otherwise specified or indicated.
 - 3. Where necessary for the Work, Contractor shall seal or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both.
 - 4. Provide temporary watertight plugs, bulkheads, and line stops as necessary and as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.
- C. Bypassing:
 - 1. Diversion of flows around treatment processes is not allowed.
- D. Performing the Work of this section constitutes Contractor's approval of underlying work and field conditions prevailing at the time of the Work.

3.3 PREPARATION

- A. Coordinate preparations for removals with requirements of Section 02 41 00 - Demolition, as applicable.
- B. Shutdowns - General Preparation:
 - 1. Coordinate shutdowns with Owner and Engineer.
 - 2. Submit shutdown planning Submittals and shutdown notification Submittals in accordance with this Specifications section's "Submittals" Article.
 - 3. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, materials, equipment, spare parts, both temporary and permanent, necessary to successfully perform the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to commencing the associated shutdown. Demonstrate to Engineer's satisfaction that Contractor has complied with such requirements before commencing the shutdown.
 - 4. Engineer shall have no duty to Contractor to advise Contractor of inadequate preparations by Contractor; Contractor is solely responsible for the means, methods, procedures, techniques, and sequences of construction.
- C. Shutdowns of Electrical Systems:
 - 1. Comply with Laws and Regulations, including the National Electric Code.
 - 2. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before starting other Work associated with the shutdown.
 - 3. Upon completion of shutdown Work, remove the locks and tags and advise Engineer or Resident Project Representative (RPR) that facilities are available for use.

3.4 SHUTDOWN REQUIREMENTS

- 1. Shutdowns are not permitted during seasonal high periods (May 15 - October 15) or during peak demands events.
- 2. General
 - a. Equipment Operating During Shutdown: In accordance with Table 01 14 16-B of this Specifications section.

- b. Equipment Out of Service During Shutdown: In accordance with Table 01 14 16-B of this section.
- 3. Following Shutdown:
 - a. Verify functionality of equipment and systems.
 - b. Verify operation of new equipment and systems, and verify that joints in conduits (including piping and ducting) are watertight or gastight as applicable.
 - c. Repair joints that are not watertight or gastight, as applicable.
 - d. Remove temporary pumping system and appurtenances.

3.5 ATTACHMENTS

- A. The following, bound after this Specifications Section's "End of Section" designation, are part of this Specifications Section:
 - 1. Tables:
 - a. Table 01 14 16-A, Schedule of Tie-ins (1 pages).
 - b. Table 01 14 16-B, Schedule of Shutdowns (1 pages).

END OF SECTION

Table 01 14 16-A Schedule of Tie-Ins				
Tie-In No.	New Line Size and Service	Existing (Connecting) Line Size & Service	Tie-In Building/Location	Remarks
1	24-inch, potable water	16-inch, potable water	Southview Dr.	Remove 16-inch cap, connect to existing 16-inch gate valve
2	24-inch, potable water	20-inch, potable water	High Service Pump Station (Pump Nos. 1 and 2)	Connect to existing 20-inch wall pipe
3	24-inch, potable water	24-inch, potable water	High Service Pump Station (Pump Nos. 3 and 4)	Includes 24-inch interior/exposed piping and exterior/buried interconnect piping to the new meter vault
Note: The estimated operating pressure of the existing water main is 162 PSI. Contractor shall confirm system operating pressure with the Owner prior to performing the Work.				

Table 01 14 16-B Schedule of Shutdowns				
Shut-down No.	Process Equipment and Service Lines Out-of-Service During Shutdown	Process Equipment In Operation During Shutdown	Tie-In Nos.	Maximum Duration
A	High Service Pump Station (Pump Nos. 1 and 2)	N/A	2	12 HRS
B	High Service Pump Station (Pump Nos. 3 and 4), existing 24-inch water main from WTP to distribution system (E Ruth Ewing)	N/A	3	12 HRS
Note: Shutdowns shall be performed between the hours of 8 p.m. and 8 a.m. Shutdowns can be combined into a single shutdown completed in a maximum duration of 12 HRS. Shutdowns are not permitted during seasonal high periods (May 15 - October 15) or during peak demands events.				

SECTION 01 14 19

USE OF SITE

PART 1 - GENERAL

1.1 SUMMARY

1. Section Includes:
 1. Restrictions on Contractor's use of the Site and premises.
 2. Restrictions on use of existing buildings and structures, including:
 - a. Permanent utilities and sanitary facilities.
- B. Scope:
 1. Contractor shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to comply with restrictions on Contractor's use of the Site and other areas.
 2. Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions, regarding the Contractor's use of the Site and other areas.

1.2 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Shop Drawings:
 - a. Site plan showing proposed location of field offices, storage trailers, staging and laydown areas, temporary sanitary facilities, fuel and oil storage, fueling location, bottle gas storage facilities, and other areas Contractor proposes to occupy.

1.3 USE OF PREMISES

- A. Limit use of premises at the Site to work areas shown or indicated on the Drawings and as specified in this Section. Do not disturb portions of the Site beyond areas of the Work.
 1. Limits:
 - a. Confine storage of materials and equipment, and locations of temporary facilities to the following areas:
 - 1) Contractor's gang boxes and storage containers for tools in active use in the Work may be kept in reasonable quantity in the work areas as long as such items do not obstruct access to the facilities by Owner or occupants.
 - 2) Do not store items of any sort, whether temporarily or otherwise, in stairways and ramps, whether existing or under construction.
 - b. Do not enter the following areas:
 - 1) Passenger elevators at the Site, unless such use is expressly allowed by other provisions of this Specifications section.
 - 2) Areas outside of the work areas indicated in Paragraph A.1.a of the "Use of Premises" Article in this Specifications section, and outside of work areas indicated on the Drawings.
 2. Prohibitions:
 - a. Do not use the Site for the following:
 - 1) Conducting Contractor's business not related to the Project or other work for Owner.
 - 2) Overnight lodging or other, non-work use of the Site by workers or others for whom Contractor is responsible, whether housed in recreational vehicles, other vehicles, tents, quarters in field offices or Contractor-furnished temporary structures, or in work areas, is unacceptable.
- B. Use of Existing Buildings and Structures: Maintain existing buildings and structures in weather-tight condition throughout construction unless otherwise indicated in the Contract Documents. Protect buildings, structures, and occupants during construction.
 1. Use of Existing Utilities, Sanitary Facilities, and First-aid Facilities:
 - a. Do not use permanent sanitary facilities, whether provided under the Project or existing prior to the Project, at the Site.
 - b. Do not use permanent telephone, Internet, or other communications utilities and facilities at the Site, regardless of whether such services and facilities were provided under the Project or existed prior to the Project, except in cases of emergency.

- c. Do not use Owner's or occupants' first-aid facilities, except in cases of medical emergency.
Promptly replenish used items and supplies with items identical to those used.
- 2. Use of Owner's Hoisting Equipment and Access to Work Areas for Loading:
 - a. The use of Owner's Hoisting Equipment is not permitted.
- C. Promptly repair damage to premises, including existing structures, finishes, equipment, and other features, caused by construction operations. Upon completion of the Work, restore premises to specified condition; if condition is not specified, restore to pre-construction condition.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 14 33

WORK IN RIGHTS-OF-WAY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Work in street and highway rights-of-way.
- B. Scope:
 - 1. Contractor shall obtain necessary permits, arrange and pay for inspections required by each right-of-way owner, and pay all charges for the Work in each right-of-way where the Work will be performed.
 - 2. Comply with applicable rules, regulations, permits, and standards of right-of-way owner.
 - 3. As indicated in other Article(s) of this Section, Owner has obtained or will obtain occupancy permits or similar permits required by owners of rights-of-way for the permanent location of Owner's facilities within the subject right-of-way. Contractor shall obtain necessary work permits and similar permits necessary for installing the Work in and adjacent to each subject right-of-way.

1.2 WORK IN STREET AND HIGHWAY RIGHTS-OF-WAY

- A. Owners of streets or highway rights-of-way in which the Work will be performed include:
 - 1. Street or highway name as it appears on the Drawings:
 - a. Jurisdiction: Missouri Department of Transportation (MODOT).
 - b. Method: The Work includes open cut and trenchless pipe installation.
 - c. Occupancy Permit: Is not required.
 - d. Maintain not less than one lane(s) of traffic in each direction during the Work.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Permits:
 - a. Copy of work permit obtain from owner of each right-of-way in which Work will be performed.
 - b. Submit prior to starting work in or adjacent to the associated right-of-way.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used shall be in accordance with requirements of associated right-of-way owner and the Contract Documents.

PART 3 - EXECUTION

3.1 PREPARATION AND PROTECTION

- A. Contractor shall implement means necessary to prevent accidents caused or influenced by the Work. Provide flaggers, temporary barriers, barricades, lights, signs, and other temporary measures to provide safe conditions during the Work.

3.2 INSTALLATION

- A. Utility Crossings of Rights-of-Way:
 - 1. Work shall be located as shown on the Drawings.
 - 2. Provide materials, equipment, piping, and appurtenances required for crossings of existing Underground Facilities and aboveground facilities, utilities, and structures.
 - 3. Furnish and maintain at the Site sufficient additional pipe fittings, adapters, and short lengths of required utility carrier pipe (quantities to be determined by Contractor) to expedite providing complete installation of utility carrier piping without unduly long period for open excavations in or

adjacent to rights-of-way. Such pipe fittings, adapters, and short pieces are eligible for payment when properly installed and are in accordance with the Contract Documents.

B. Pavement:

1. When fill is stabilized in accordance with requirements of owner of the street or highway right-of-way and the Contract Documents, replace roadway subbase material and pavement with materials as required by the Contract Documents and, if not expressly required, replace with pavement of similar type and equal thickness to the pavement in place prior to start of the Work.
2. Paving shall comply with requirements of owner of the street or highway right-of-way and the Contract Documents.

C. Restoration for Other than Paved Areas:

1. Restore disturbed areas of rights-of-way in accordance with associated permits and the Contract Documents. Where permits and the Contract Documents do not expressly address the type or extent of such restoration, restore all areas disturbed during the Work to condition equal to or better than preconstruction conditions.
2. If owner of the right-of-way requires restorations beyond that required by the Contract Documents and applicable permits, promptly advise Engineer and submit Change Proposal in accordance with the Contract Documents. Obtain authorization in accordance with the Contract prior to performing any Work not in accordance with or beyond the scope of the Contract Documents.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements applicable to all substitution requests.
 - 2. Provisions specific to Contractor's substitution requests for:
 - a. Materials and equipment to be incorporated into the Work.
 - b. Methods, procedures, and sequences indicated in the Contract Documents.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals, and pay all costs associated with requests for approval of substitutes.
 - 2. Where the Contract Documents expressly indicate that substitutes are not allowed, are unacceptable, or time-barred, do not submit substitution requests for such items or procedures.
 - 3. Requirements for Contractor's proposal of "or-equals", where allowed by the Contract, are in the General Conditions, as may be modified by the Supplementary Conditions.
- C. Related Requirements:
 - 1. Include, but are not necessarily limited to:
 - a. Section 01 26 00 - Contract Modification Procedures.

1.2 REFERENCES

- A. Terminology:
 - 1. The following terminology, although not indicated with initial capital letters, has the following meaning in this Section:
 - a. "Or-equal" and "or equal" each means material or equipment items to be incorporated into the completed Work as a functioning whole, or method, procedure, or sequence that, in Engineer's sole opinion, are equivalent to that shown or indicated in the Contract Documents.
 - b. "Substitute" means a proposed materials or equipment to be incorporated into the completed Work as a functioning whole, or a proposed construction method, procedure, or sequence that is not, in Engineer's sole opinion, equivalent to the associated, similar material or equipment item or method, procedure, or sequence shown or indicated in the Contract Documents, but accomplishes the same or similar purpose. Unless expressly indicated otherwise in the Contract Documents, Contractor's proposals for "value engineering" (and similar terms) are substitutes.
 - c. "Substitution request" means Contractor's written request for Engineer's approval of a proposed substitute, in accordance with this Section. Substitution requests are separate from Shop drawings and other Submittals required by the Contract Documents.

1.3 SUBSTITUTES - GENERAL

- A. This Article applies to all substitutes and substitution requests, whether for substitute materials or equipment, or for substitute methods, procedures, or sequences.
- B. This Section expands on the provisions on substitutes in the General Conditions, as may be modified by the Supplementary Conditions.
- C. Time Limits for Submitting Substitution Requests:
 - 1. Where the Contract allows Contractor's substitution requests, such proposals will be considered by Engineer only during a period of 60 days after the date the Contract Times start to run, unless otherwise indicated.

2. Substitution requests will be accepted for consideration by Engineer after the time limit indicated in the paragraph above this, when materials or equipment shown or indicated, and all associated “or-equals”, are either:
 - a. Unavailable; or
 - b. Despite Contractor’s due diligence, are unavailable in time for the Work to be completed within the Contract Times.
 3. The foregoing notwithstanding, substitutes will not be approved when received by Engineer after Contractor has commenced the associated Work at the Site, where approval of the substitute would require rework or removing Work already installed.
- D. Design Professional:
1. Engineer is responsible for design of the completed Project as a functioning whole and has responsible charge of the Project except for Work for which design responsibility is expressly delegated by the Contract Documents.
 2. Do not retain services of any third-party design professional to prepare modifications of Engineer’s design of the completed Project as a functioning whole without Engineer’s express, written consent via an appropriate Contract modification setting forth appropriate performance and design criteria for delegating the design of the substitute.
- E. Contractor’s Representations:
1. In submitting each substitution request, Contractor represents that:
 - a. Contractor has read and understands the Contract’s provisions on substitutes, as indicated in the General Conditions, as may be modified by the Supplementary Conditions, this Section, and elsewhere in the Contract Documents.
 - b. Substitution request is complete and includes all documents and information required by the Contract Documents.
 - c. Contractor certifications required by the General Conditions, as may be modified by the Supplementary Conditions, and this Section are valid and made with Contractor’s full knowledge, information, and belief.
 - d. Contractor will provide the same or better guarantees and warranties for substitute as for the specified materials, equipment, methods, procedures, and sequences (as applicable).
 - e. Contractor waives all rights for increasing the Contract Price or extending the Contract Times, related to the substitute, that subsequently may become apparent to Contractor after issuance of the associated Contract modification instrument approving such substitute, except for those associated with differing subsurface or physical conditions or discovery of a previously unforeseen Hazardous Environmental Condition associated with the Work involving the approved substitute.
- F. Submittal of Substitution Requests - General:
1. Substitution requests must be submitted by Contractor. Engineer will not accept or review substitution requests from prospective or bona-fide Subcontractors or Suppliers.
 2. Submit separate substitution request for each proposed substitute.
 3. Submit substitution requests in accordance with requirements for Shop Drawings and other Submittals, as indicated in the General Conditions, as may be modified by the Supplementary Conditions, Section 01 33 00 - Submittal Procedures.
 4. Do not submit substitution requests as any of the following (such substitution requests will be returned by Engineer without review):
 - a. Shop Drawing, Sample, or other Submittal.
 - b. Request for approval of an “or-equal”.
 - c. Request for interpretation (RFI) or clarification.
 - d. Change Proposal without all other, required substitution request elements indicated below.
 - e. Other oral or written communication not in accordance with this Section.
 5. Each substitution request shall include:

- a. Transmittal letter (one per substitution request) expressly indicating the communication is a substitution request.
 - b. Completed substitution request form, on the form attached to this Section.
 - c. Change Proposal, submitted in accordance with the Contract Documents, including Section 01 26 00 - Contract Modification Procedures. Clearly indicate the proposed changes in Contract Price and Contract Times if substitute is approved; if none, clearly so indicate on the Change Proposal.
 - d. Certifications and written representations required by the Contract Documents to accompany substitution requests.
 - e. Other information: (1) required elsewhere in this Section and in other elements of the Contract Documents, and (2) deemed appropriate by Contractor to support Contractor's substitution request.
6. When Engineer requires additional information to evaluate a substitution request, furnish such information within five days of receipt of Engineer's request, unless additional time is granted by Engineer, in writing.
 7. Engineer and Owner have the right to rely upon the completeness and accuracy of information, documents, certifications, and representations in Contractor's substitution request. Contractor accepts full responsibility for completeness and accuracy of substitution requests (except for Engineer's professional liability).
- G. Engineer's Review of Substitution Requests:
1. Engineer has no obligation to approve any substitute.
 2. Substitutes will not be approved unless all of the following are satisfied for the associated substitute:
 - a. The Contract supports submittal of such substitution request; and
 - b. Substitute is reasonably consistent with Engineer's design intent for the Project as a completed, functioning whole; and
 - c. As indicated in Paragraph 1.3.A.3 of this Section.
 - d. Substitute will not have an adverse effect on the work of other contractors, or existing or proposed construction; and
 - e. Substitution request is complete in accordance with the Contract Documents and Engineer's requests, and
 - f. Owner agrees to the substitute; and
 - g. Associated changes in Contract Price and Contract Times, if any, are acceptable to Owner.
 3. Engineer is not obligated to approve any substitute where such approval is conditioned on an increase in the Contract Price, the Contract Times, or both.
 4. Timeliness of Engineer's Review:
 - a. Allow not less than 14 days for Engineer's review of each substitute. Allow longer for larger, more-complex substitutes.
 - b. Engineer will endeavor to perform timely review of substitution requests. However, Contractor is responsible for complying with the Contract Times, regardless of whether the substitute is approved.
 - c. Where approval of a substitute would necessitate other changes to the Project's design, additional time, beyond that indicated above, will be necessary for Engineer's preparation of revisions to the design.
 5. When Design Changes are Required with Approval of Substitute:
 - a. Engineer will advise Contractor promptly following Engineer's review (and Owner's comment, if any) on substitution request to indicate whether the substitute will be acceptable. Engineer's advisory to Contractor will indicate whether changes in Engineer's design are necessary and include a preliminary estimate of Engineer's fee and time required for modifying the design and preparing an associated Proposal Request to Contractor.
 - b. Engineer's preliminary estimates of fee and time for design modifications will be prepared in good faith, but are not binding on Owner or Engineer.

- c. Contractor shall reimburse Owner for costs incurred by Owner for design modifications necessitated by approval of substitute. Owner may deduct such amounts, as one or more set-offs, from payments due Contractor under the Contract.
- d. Upon Contractor's receipt of Engineer's estimate of fee and time for design modifications, contractor shall advise Engineer, in writing, within three days whether Contractor will continue pursuing approval of the substitute.
- e. Request to Contractor.
- f. Engineer may reject a substitute that would require substantial changes in the Project's design.

H. Approval of Substitutes:

- 1. Substitutes are approved only via issuance of an appropriate Field Order or Change Order in accordance with Section 01 26 00 - Contract Modification procedures, and the General Conditions, as may be modified by the Supplementary Conditions.
- 2. Approval of a substitute does not relieve Contractor from obligation to comply with the Contract Documents, including submitting Shop Drawings, Samples, and other Submittals in accordance with the Contract Documents.

1.4 SUBSTITUTE MATERIALS AND EQUIPMENT

A. In addition to other requirements of this Section and elsewhere in the Contract Documents, substitution requests for substitute materials or equipment shall include:

- 1. Manufacturer and Location:
 - a. Name and address of manufacturer of the proposed substitute. Indicate country where manufacturer is incorporated and owned.
 - b. Companies and brands owned by or affiliated with manufacturer.
 - c. Name of manufacturers of principal component items, such as motors, bearings, and similar items.
 - d. Location where the items would be manufactured, including country and address. Indicate the total percentage of the items' value that will be manufactured outside of the United States and its territories.
 - e. Name, address, and driving distance from the Site of:
 - 1) Manufacturer's sales representative.
 - 2) Nearest service center offering full array of service capabilities.
 - 3) Warehouse or other location where spare parts for the proposed substitute are available.
 - f. Number of years that manufacturer has actively participated the North American market.
- 2. Proposed Materials and Equipment:
 - a. Model designation and quantity of each proposed for the Work.
 - b. Manufacturer's literature for proposed substitute, with description of the materials and equipment.
 - c. Performance information and representative test data.
 - d. Indication of reference standards with which materials and equipment comply.
 - e. Preliminary process and instrumentation diagrams (P&ID), where applicable.
 - f. Identification of hazardous materials, including Constituents of Concern, used in the materials and equipment, and associated permitting or licensing required.
 - g. Manufacturer's standard warranty and applicable, proposed special or extended warranties, including indication of specific entities that will be beneficiary of such warranties.
 - h. Complete list of proposed deviations from requirements of the Contract Documents.
 - i. Itemized comparison of specified materials and equipment and proposed substitute, indicating:
 - 1) Size (physical dimensions) when: item is in use, when not in use, and space required for routine and major maintenance.
 - 2) Weight and loading at supports, when item is full and empty.

Materials of construction.

3. Operation requirements, including:
 - a. Anticipated consumption of each item of: Electricity, other energy sources, water, chemicals (indicate each), and other needs for operation at the Site.
 - b. Typical labor required for operation and associated skill level.
 - c. Description of remote monitoring and control capabilities, as applicable.
4. Maintenance requirements, including:
 - a. Anticipated life in the service and environment required.
 - b. Frequency and general scope of routine and major maintenance typically necessary.
 - c. Typical labor requirements and general qualifications of personnel performing routine maintenance.
 - d. Major, associated equipment necessary for routing and major maintenance, including hoisting equipment type and capacity (when applicable).
 - e. Availability, scope, cost, and general conditions of service and maintenance contracts, if any.
5. References for similar projects on which the materials and equipment were used. Indicate for each:
 - a. Project owner name, name of facility where installed, and name of project.
 - b. City, state, and country of installation.
 - c. Model number/size and quantity furnished and installed.
 - d. Year of installation.
 - e. Contact information for owner and design professional, including telephone numbers.
6. Other information required by the Contract Documents.
7. Other information reasonably requested by Engineer.

1.5 SUBSTITUTE CONSTRUCTION METHODS, PROCEDURES, OR SEQUENCES

- A. Provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding substitutes of materials and equipment are hereby extended to apply to substitute methods, procedures, and sequences as shown or indicated in the Contract Documents.
- B. In addition to other requirements of this Section and elsewhere in the Contract Documents, substitution requests for substitute methods, procedures, or sequences shall include:
 1. Clear identification of the method, procedure, or sequence shown or indicated in the Contract Documents for which substitute is requested.
 2. Detailed description of proposed substitute method, procedure, sequence, or combination thereof.
 3. Reasons why substitute is proposed and benefits to the Project should the substitute be approved.
 4. Detailed list of how the proposed substitute deviates from associated method, procedure, or sequence shown or indicated in the Contract Documents.
 5. Impact of the substitute, if approved, on Owner's or facility manager's operations, when the Work is at an existing facility.
 6. Effect on other contractors working at the Site, if substitute is approved.
 7. Description of temporary equipment and temporary facilities needed, should the substitute be approved, including quantity of items, capacities, performance characteristics, permitting and approvals required by authorities having jurisdiction, and proposed location at the Site.
 8. Written evaluation of how substitute method, procedure, or sequence complies with Laws and Regulations.
 9. Drawings illustrating method, procedure, or sequence.
 10. Materials to be used that contain Constituents of Concern or that have potential to cause or exacerbate a Hazardous Environmental Condition.
 11. Other information and data required by the Contract Documents.
 12. Other information reasonably required by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Specifications Section:
 - 1. Exhibit A - Substitution Request Form (one page).

END OF SECTION

EXHIBIT A Substitution Request Form (One Item per each Form)

Project: 24-Inch Resilient Water Transmission Main and Vault		Date:
Substitution Requestor:		
Contractor:		
Specification Section No:	Paragraph No. (i.e. 2.1.A.1.c):	Specified Item:
Proposed Substitution:		
Provide Product Data Sheets, Manufacturer's written installation instructions, drawings, diagrams, or any other information as an attached to this Form that will demonstrate the proposed substitution is an Approved Equal.		
State differences between proposed substitutions and specified item. Differences include but are not limited to interrelationship with other items; materials, equipment, function, utility, life cycle costs, applied finished, appearances, and quality.		
Document how the proposed substitution is compatible with or modifies other systems, parts, equipment or components of the Project and Work under the Contract		
Describe what effect the proposed substitution has on dimensions indicated on the Drawings and previously reviewed Shop Drawings?		
Describe what effect the proposed substitution has on the Construction Schedule and Contract Time.		
Describe what effect the proposed substitution has on the Contract Price. This includes all direct, indirect, impact and delay costs.		
Manufacturer's guarantees of the proposed and specified items are:		
☐ Same ☐ Different (explain on attachment)		
The undersigned state that the function, utility, life cycle costs, applied finishes, appearance and quality of the proposed substitution are equal or superior to those of the specified item.		
For use by Engineer: ☐ Accepted – eligible for approval via Change Order ☐ Accepted as Noted – approval via Change Order ☐ Not Accepted _____ Date _____ (Telephone): _____ Signature of PE, RA, or PG in Responsible Charge	_____ (Contractor's Signature) _____ (Contractor's Firm) _____ (Firms Address) _____ (Telephone)	

Comments:

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SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

1.1 SUMMARY

A. Section Includes:

1. This Specifications section expands upon provisions of the General Conditions, as may be modified by the Supplementary Conditions, and includes:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Minor changes in the Work and Field Orders.
 - d. Work Change Directives.
 - e. Proposal Requests.
 - f. Change Proposals.
 - g. Change Orders.

1.2 GENERAL – APPLICABLE TO ALL PROVISIONS OF THIS SECTION

- A.** Submit Contract modification documents to Engineer, addressed to the contact person and contact information indicated in Section 01 33 00 - Submittal Procedures.
- B.** Retain at Contractor's office and at the Site complete copy of each Contract modification document, all interpretations and clarifications, related documents, and Engineer's response.

1.3 REQUESTS FOR INTERPRETATION

A. General.

1. Transmit written requests for interpretation to Engineer. Contractor and Owner may prepare and transmit requests for interpretation.
2. Prepare and transmit request for interpretation to obtain clarifications or interpretations of the Contract Documents. Report conflicts, errors, ambiguities, and discrepancies in the Contract Documents by requesting an interpretation.
3. Do not transmit request for interpretation when other form of communication is appropriate, such as Submittals, requests for approvals of substitutes, notices, ordinary correspondence, or other form of communication. Improperly prepared or inappropriate requests for interpretation will be returned without response or action by Engineer.
4. Do not submit request for interpretation or clarification when:
 - a. answer may be obtained by observations at the Site; or
 - b. required information is clearly indicated in the Contract Documents; or
 - c. required information is included in industry standards referenced in the Contract Documents or Supplier's instructions that are consistent with the Contract Documents; or
 - d. are reasonably inferable from any of foregoing.
5. Engineer will return requests for interpretation without response for any of the following reasons:
 - a. Request is regarding one of the items addressed in Paragraphs 1.3.A.3 and 4 of this Specifications section.
 - b. Request is unclear or incomplete.
 - c. Request was answered in Engineer's response to a prior request for interpretation.
 - d. Request is related to construction means, methods, techniques, procedures, or sequences of construction that are not required by the Contract Documents.
 - e. Request is related to safety and protection matters that are solely Contractor's responsibility.
 - f. Request resulted in whole or in part to lack of adequate coordination by Contractor, including coordination of Subcontractors and Suppliers.
 - g. Requests that are otherwise frivolous or unnecessary.
6. Should requests be categorized by Engineer as within the limits of Paragraphs 1.3.A.3, 4, or 5 of this Specifications Section, Engineer may recommend and Owner may withhold from payments due Contractor under the Contract set-off(s) sufficient to cover Owner's costs of Contractor's submittal of invalid, frivolous, unnecessary, or inappropriate requests for interpretation or clarification..
7. Contractor shall have sole financial responsibility for Contractor's costs for requests for interpretation or clarification that are submitted late, out of sequence, or that are unnecessary.

B. Procedure.

1. Transmit requests for interpretation in accordance with requirements of this Specifications section. Include with each request for interpretation a separate letter of transmittal.
 2. If Engineer requests additional information to make an interpretation, entity requesting the interpretation shall transmit the information requested within 10 days, unless Engineer allows additional time, via correspondence referring to request for interpretation number.
 3. Engineer will review and respond to requests for interpretation with reasonable promptness. Allow sufficient time for review and response.
 4. Engineer will maintain log of requests for interpretation. Upon request, copy of log will be transmitted to requestor.
 5. Engineer's response to requests for interpretation will be transmitted in accordance with requirements of this Specifications section. Each response to a request for interpretation will include a separate letter of transmittal.
 6. Engineer's response to each request for interpretation will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
 7. If Contractor desires to appeal Engineer's interpretation or clarification, comply with the appeals procedure set forth in the General Conditions, as may be modified by the Supplementary Conditions.
 8. Interpretations that One or Both Parties Believes Entails a Change to the Contract:
 - a. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's interpretation, so advise Engineer in writing before proceeding with the Work associated with the request for interpretation.
 - b. If, after this initial communication, either Owner or Contractor believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
- C. Preparation of Requests for Interpretation:
1. Prepare each request for interpretation on the "Request for Interpretation" form included with this Specifications section, or other form acceptable to Engineer.
 2. Number each request for interpretation as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First request for interpretation on the general contract for project titled, "Contract WWTP09" would be, "RFI No. WWTP09-GC-001".
 3. In space provided on form, describe the interpretation requested. Provide additional sheets as necessary. Include text and sketches as required in sufficient detail to describe the need for interpretation.
 4. When applicable, request for interpretation shall include Contractor's recommended resolution.

1.4 WRITTEN CLARIFICATIONS

- A. General:
1. Written clarifications, when required, will be initiated and issued by Engineer.
 2. Written clarifications do not change the Contract Price or Contract Times, and do not alter the Contract Documents.
 3. Written clarifications will be issued as correspondence or using clarification notice form acceptable to Engineer, with additional information as required.
- B. Procedure.
1. Engineer's written clarifications will be transmitted in accordance with requirements of this Specifications section.
 2. Each written clarification will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
 3. If Contractor desires to appeal Engineer's interpretation or clarification, comply with the appeals procedure set forth in the General Conditions, as may be modified by the Supplementary Conditions.
 4. Written Clarifications that One or Both Parties Believes Entails a Change to the Contract:

- a. If Contractor or Owner believe that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's written clarification, so advise Engineer in writing before proceeding with the Work associated with the written clarification.
 - b. If, after this initial communication, either Owner or Contractor believes that change in the Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
5. If Engineer's written clarification is unclear, prepare and transmit a request for interpretation in accordance with the Contract Documents.

1.5 MINOR CHANGES IN THE WORK AND FIELD ORDERS

A. General:

1. Field Orders, when required, will be initiated and issued by Engineer.
2. Field Orders authorize minor changes in the Work but do not change the Contract Price or Contract Times.
3. Field Orders will be in the form of Engineers Joint Contract Documents Committee document EJCDC C-942, "Field Order".
4. Engineer will maintain a log of Field Orders issued. Copy of Engineer's log of Field Orders will be transmitted to Contractor or Owner upon request.

B. Procedure:

1. Field Orders will be transmitted in accordance with requirements of this Specifications section. Each Field Order will include a separate letter of transmittal.
2. Each Field Order will be distributed to the following:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
3. Field Orders that One or Both Parties Believes Entails a Change to the Contract Price or Contract Times:
 - a. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of a Field Order, so advise Engineer in writing before proceeding with the Work associated with the Field Order.
 - b. If, after this initial communication, Contractor believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
4. If the Field Order is unclear, submit request for interpretation.
5. If Owner disagrees with the Field Order, Engineer may issue a revised or amended Field Order, or a Change Order or Work Change Directive may be issued.

1.6 WORK CHANGE DIRECTIVES

A. General:

1. Work Change Directives, when issued, order additions, deletions, or revisions to the Work. When issued, Contractor shall promptly implement the changes ordered in the associated work Change Directive.
2. Work Change Directives do not change the Contract Price or Contract Times but are evidence that the parties to the Contract expect that the change ordered or documented by the Work Change Directive will be incorporated in subsequently issued Change Order following agreement by the parties as to the Work Change Directive's effect, if any, on the Contract Price, Contract Times, or both.
3. Work Change Directives will be in the form of EJCDC C-940, "Work Change Directive".

B. Procedure.

1. Work Change Directives signed by Owner and Engineer will be transmitted in accordance with requirements of this Specifications section. Each Work Change Directive will include a separate letter of transmittal. Signed Work Change Directives will be transmitted to:
 - a. Contractor.
 - b. Owner.
 - c. Engineer.
 - d. Resident Project Representative.

- e. Contractor: One original.
 - f. Owner: One original.
 - g. Engineer: One original.
 - h. Resident Project Representative (RPR): One copy.
2. Documentation of Costs:
- a. Promptly following receipt of the Work Change Directive:
 - 1) Advise Engineer and Owner in writing of the anticipated quantity and types of construction equipment and machinery required or anticipated for the associated Work.
 - 2) Advise Engineer and Owner in writing of which construction equipment and machinery is owned by the Contractor or Subcontractor and which is, or will be, rented from an equipment rental firm.
 - 3) When construction equipment and machinery is rented from a rental firm, transmit to Engineer and Owner copy of the associated rental agreements(s) pertinent to the Work ordered by the Work Change Directive.
 - 4) For all construction equipment and machinery, indicate to Engineer and Owner whether each item is required only for the Work ordered by the Work Change Directive and whether each item is being, or will be, used for other Work on the Project or other projects for Owner.
 - 5) Advise Engineer and Owner in writing of information on anticipated temporary materials (including items such as temporary support of excavations, scaffolding, temporary barriers, temporary plates covering excavations, and other temporary materials) to the same extent as that required for construction equipment and machinery.
 - b. When basis of payment for Work ordered under a Work Change Directive will be paid as Cost of the Work plus a fee, or when otherwise required by Engineer, document for the Work performed under each separate Work Change Directive, for each day, the following:
 - 1) Number and labor classifications of workers employed and hours worked each day on the Work ordered via the Work Change Directive.
 - 2) Construction equipment used, including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used each day for the Work under the Work Change Directive. Indicate where the equipment was used for other Work under the Contract and idle time.
 - 3) Temporary materials; furnish the same information as required for construction equipment and machinery. Where rental costs of such items approaches the purchase cost of such item, or when otherwise requested by Engineer, furnish evidence, satisfactory to Engineer, of the purchase price of such temporary materials.
 - 4) Consumables and similar materials used.
 - 5) Suppliers' receipts, bills, or invoices for and descriptions of materials and equipment incorporated into the Work.
 - 6) Invoices and labor and equipment breakdowns for Subcontractors.
 - 7) Other information required by Owner or Engineer.
 - 8) Transmit such documentation as a Change Proposal promptly after such documentation is available to Contractor. Actively pursue Subcontractors and Suppliers for required documentation to promptly furnish required documentation to Engineer.
 - c. Separately track and document Work performed in accordance with each Work Change Directive and Work performed under stipulated price methods of compensation (including lump sums and Unit Price Work).
 - d. Submit such information in a format acceptable to Engineer.
3. Documentation of Time:
- a. General:
 - 1) Contractor will be entitled to change of Contract Times Work ordered by a Work Change Directive in accordance with the requirements of the General Conditions, as may be modified by the Supplementary Conditions.
 - 2) Contractor will be entitled to a change in Contract Times only when the Work ordered by the Work Change Directive is implemented promptly and affects the Contractor's ability to comply with the Contract Times.
 - b. Requirement Documentation: Submit the following as part of the Change Proposal documenting price-related impact of the Work ordered by the Work Change Directive:

- 1) Statement on whether the subject Work affected Contractor's ability to comply with the Contract Times.
- 2) If Contractor's ability to comply with the Contract Times was so affected, indicate the effect on each of the relevant Contract Times.
- 3) Document that Contractor acted promptly and properly upon receipt of the Work Change Directive to promptly implement the Work ordered thereby.
- 4) Time impact analysis for the affected Work.
- 5) Other time-related documentation required by Engineer.

1.7 PROPOSAL REQUESTS

A. General:

1. Proposal Requests may be initiated by Engineer or Owner.
2. Proposal Requests are for requesting the effect on the Contract Price and the Contract Times and other information relative to contemplated changes in the Work. Proposal Requests do not authorize changes or variations in the Work, and do not change the Contract Price or Contract Times or terms of the Contract.
3. Proposal Requests will be furnished using the "Proposal Request" form included with this Specifications section.

B. Procedure:

1. Proposal Requests will be transmitted in accordance with requirements of this Section. Each Proposal Request will include a separate letter of transmittal.
2. Each signed Proposal Request will be transmitted to the following:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
3. Transmit request for interpretation to obtain clarification of conflicts, errors, ambiguities, and discrepancies in Proposal Request.
4. Upon receipt of Proposal Request, Contractor shall prepare and transmit to Engineer a Change Proposal, in accordance with the Contract Documents, for the proposed Work described in the Proposal Request.

1.8 CHANGE PROPOSALS

A. General:

1. Prepare and transmit written Change Proposal to Engineer in response to each Proposal Request; or when Contractor believes a change in the Contract Price, Contract Times, both, or other change to the terms of the Contract is required; or to appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract.

B. Procedure:

1. Prepare and transmit Change Proposals within time limits indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Submit only one Change Proposal for each change issue, unless Engineer requires additional information or clarification. Do not submit repeated Change Proposals for the same change issue. Rather, when Contractor is dissatisfied with Engineer's decision on a Change Proposal, recourse is set forth in the General Conditions, as may be modified by the Supplementary Conditions, and elsewhere in this Article.
3. Transmit Change Proposals in accordance with requirements of this Specifications section. Include with each Change Proposal all required supporting documentation and a separate letter of transmittal.
4. Engineer's Review and Requests for Additional Information:
 - a. Engineer will review and act on each Change Proposal in accordance with, and within the time limits indicated in, the General Conditions, as may be modified by the Supplementary Conditions.
 - b. When, Engineer requests additional information to render a decision, submit required information within five days of receipt of Engineer's request, unless Engineer allows more time. Submit the required information via correspondence that refers to the specific Change Proposal number.

- c. Owner shall transmit to Engineer such comments, if any, that Owner has on the Change Proposal, within 10 days of Owner's receipt of the Change Proposal.
 - d. Engineer will render a written decision on the Change Proposal or take other action in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - e. Engineer's response to Change Proposals will be transmitted in accordance with requirements of this Specifications section, the General Conditions, and the Supplementary Conditions.
5. Engineer's response to each Change Proposal will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
 6. If Change Proposal is recommended for approval by Engineer and is approved by Owner, a Change Order will be issued or, when applicable, an appropriate use of an allowance (already included in the Contract Price) will be authorized by Owner.
 7. If parties do not agree on terms for the change, Owner or Contractor may file a Claim against the other, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
- C. Preparation of Change Proposals:
1. Each Change Proposal shall be submitted on the "Change Proposal" form included with this Specifications section, or other form acceptable to Engineer.
 2. Number each Change Proposal as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First Change Proposal for the general contract for project named "Contract No. 8" would be, "Change Proposal No. 8-GC-001".
 3. In space provided on Change Proposal form:
 - a. Describe scope of each proposed change. Include text and sketches on additional sheets as required to provide detail sufficient for Engineer's review and response. If a change item is submitted in response to Proposal Request, write in as scope, "In accordance with Proposal Request No." followed by the Proposal Request number. Submit written clarifications, if any, to scope of change.
 - b. Submit justification for each proposed change. If change is in response to proposal request, write in as justification, "In accordance with Proposal Request No." followed by the Proposal Request number.
 - c. Indicate the total change in the Contract Price and Contract Times for each separate change item included in the Change Proposal.
 4. Proposed Effect on Contract Price: Unless otherwise directed by Engineer, attach to the Change Proposal detailed breakdowns of pricing (Contractor's cost and Contractor's fee) including:
 - a. List of Work tasks to accomplish the change.
 - b. For each task, labor cost breakdown including labor classification, total hours per labor classification, and hourly cost rate for each labor classification. Where overtime is included, indicate the overtime hours, labor classifications, and associated overhead rates.
 - c. Construction equipment and machinery to be used, including manufacturer, model, and year of manufacture, and number of hours for each. Indicate whether the construction equipment or machinery is owned by Contractor, Subcontractor, or leased from a rental firm; if leased, include with the Change Proposal a copy of the rental agreement. Indicate whether the construction equipment and machinery is already onsite and used for other activities, or whether it is required solely for the Work in the contemplated change. Indicate overtime hours budgeted, if any, and the associated cost rate for overtime compared with the straight-time rate.
 - d. Indicate temporary materials required, including description of extent, scope, and quality, and associated cost. Temporary materials include items such as temporary sheeting for support of excavations, scaffolding, temporary plates to cover open excavations, temporary barriers, and other temporary items. Indicate ownership or source of such items. Include copy of rental agreement if rented from a third-party rental firm in which neither Contractor nor any Subcontractor has a financial interest. Indicate intended duration of use for such items and purchase cost of such items.
 - e. Detailed breakdown of cost of materials and equipment to be incorporated into the Work, including quantities, unit costs, and total cost, with Supplier's written quotations. When requested by Engineer, submit quotes by multiple prospective Suppliers.

- f. Breakdowns of each Subcontractors' pricing, including labor, construction equipment and machinery, temporary materials, and materials and equipment incorporated into the Work, other costs, and Subcontractor fees (e.g., overhead and profit). Breakdown of Subcontractors' pricing shall be the same level of detail as that for Contractor.
 - g. Breakdown of other costs eligible, in accordance with the General Conditions and the Supplementary Conditions under "Cost of the Work" provisions.
 - h. Other information required by Engineer.
 - i. Contractor's fees (overhead and profit) applied to eligible Contractor costs and eligible Subcontractor costs.
5. Proposed Effect on Contract Times: Unless otherwise directed by Engineer, attach to the Change Proposal detailed information substantiating the proposed change in Contract Times, including:
- a. Time impact analysis.
 - b. Indication of whether the Work associated with the contemplated change will affect Contractor's ability to comply with the Contract Times.
 - c. Other time-related information requested by Engineer.

1.9 CHANGE ORDERS

A. General:

- 1. Change Orders will be recommended by Engineer (when required by the General Conditions) and will be signed by Owner and Contractor (subject to the General Conditions related to a party withholding its signature from a contractually-required Change Order)), to authorize additions, deletions, or revisions to the Work, changes to the Contract Price, changes in the or Contract Times, changes to the terms of the Contract, or a combination thereof.
- 2. Change Orders will be in the form of EJCDC C-941, "Change Order".

B. Procedure.

- 1. Change Orders for signature by Contractor will be transmitted in accordance with requirements of this Specifications section. Each Change Order will include a separate letter of transmittal. Contractor shall print three originals of Change Order for Contractor's signature.
- 2. Contractor shall promptly sign each original Change Order and, within five days of receipt, deliver all originals to Engineer.
- 3. Engineer will sign each original Change Order and forward them to Owner.
- 4. After approval and signature by Owner, original Change Orders will be distributed as indicated below.
- 5. Original, signed Change Orders will be distributed as follows:
 - a. Contractor: One original.
 - b. Owner: One original.
 - c. Engineer: One original.
 - d. Resident Project Representative (RPR): One copy.
- 6. Upon Contractor's receipt of the fully-signed Change Order, promptly perform the Work ordered thereby in accordance with the Contract Documents and the Progress Schedule accepted by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below and bound following this Specifications section's "End of Section" designation, are part of this Specifications section:
 - 1. Request for Interpretation form (one page).
 - 2. Proposal Request form (one page).
 - 3. Change Proposal form (one page).

END OF SECTION

REQUEST FOR INTERPRETATION

Owner: _____

Project Name: _____

Contractor: _____ RFI No. [____]

Date Transmitted: _____ Date Received: [____]

Date Response Requested: _____ Date Response Transmitted: [____]

Subject: _____ [____]

Specification Section and Paragraph: _____

Drawing References: _____

INTERPRETATION REQUESTED:

Signature: _____ Date: [____]

ENGINEER'S RESPONSE:

Signature: _____ Date: [____]

PROPOSAL REQUEST

Owner: _____

Project Name: _____

Proposal Request No.: _____ Date: [____]

Contract Name and No.: _____

Contractor: _____

Other Contracts Involved in Proposed Change: _____

TO CONTRACTOR: Please submit a complete Change Proposal for the proposed modifications described below. If the associated Change Proposal is approved, a Change Order or allowance authorization will be issued to authorize adjustment so the Contract. **This Proposal Request is not a Change Order, Work Change Directive, Field Order, or an authorization to proceed with the proposed Work described below.**

SCOPE OF PROPOSED CHANGE(S) IN THE WORK:

1. [Title 1]:
2. [Title 2]:
3. [Title 3]:

Attachments to this Proposal Request:

1. [None].

Proposal requested by: _____
HDR (Engineer)

Signature of Requestor: _____

CHANGE PROPOSAL

Owner: _____

Project Name: _____

Change Proposal No.: _____ Date: [____]

Submitted in Response to Proposal No.: _____

Contractor Name and No.: _____

Contractor: _____

Subject: _____

The following changes to the Contract are proposed:

SCOPE OF PROPOSED CHANGE TO CONTRACT: *(attach supporting information as required)*

1. [Title 1]:

2. [Title 2]:

JUSTIFICATION:

1. [Title 1]:

2. [Title 2]:

PROPOSED CHANGES IN CONTRACT PRICE AND CONTRACT TIMES:

We propose that the Contract Price and Contract Times be changed as follows:

For Contract Price, attach detailed cost breakdowns for Contractor and Subcontractors, Supplier quotations, and other information required.

For the Contract Times, state increase, decrease, or no change to Contract Times for Substantial Completion, readiness for final payment, and Milestones, if any. If increase or decrease, state specific number of days for changes to the Contract Times. Submit supporting data, including time impact analysis for the Progress Schedule.

Description	Amount	Contract Times (days)	
		Substantial	Final
1. [Title 1]	\$0.00	0	0
2. [Title 2]	\$0.00	0	0
Total This Change Proposal	\$0.00	0	0

Changes to Milestones, if any: [____][____]

Contractor represents that supporting data attached to this Change Proposal are accurate and complete. The requested time or price adjustment indicated in this Change Proposal is the entire adjustment to which Contractor believes it is entitled as a result of the proposed change(s) indicated herein.

Change Proposal by: _____

Signature of Proposer: _____

SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for the Schedule of values, including:
 - a. Applicability.
 - b. General provisions for Schedules of Values.
 - c. Format, organization, and content of Schedule of Values.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Schedule of Values and Payment – General:
1. Contractor shall prepare and submit to Engineer for acceptance Schedule of Values that presents (as applicable): (a) an appropriate, detailed breakdown of the price of lump sum bid/pay items, and (b) an appropriate, detailed breakdown of the price of Work compensated on the basis of Cost of the Work plus a fee, and (c) lists bid/pay items of Unit Price Work. The total of all Work among the various bid/pay items shall equal the Contract Price.
 2. For each item of lump sum Work and Work compensated on the basis of Cost of the Work plus a fee, the Schedule of Values shall, establish in detail the portion of the Contract Price allocated to each component of such Work.
 3. Upon request of Engineer, promptly furnish data and information that substantiates and supports the amounts indicated in the Schedule of Values.
 4. Submit preliminary Schedule of Values to Engineer for initial review. Contractor shall incorporate Engineer's comments into the Schedule of Values and resubmit to Engineer. Engineer may require corrections and re-submittals until Schedule of Values is acceptable.
 5. Schedule of Values may be used, where appropriate, as a basis for negotiating price of changes, if any, in the Work.
- B. Applicability:
1. Lump Sum Work:
 - a. For Work paid on a lump sum basis, progress payments will be on the basis of Work performed in accordance with the Contract Documents, for each line item in the Schedule of Values, as recommended to Owner by Engineer..
 2. Work Compensated on the Basis of Cost of the Work Plus a Fee:
 - a. Such Work will be paid, based on Engineer's recommendation to Owner, based on documentation of eligible costs submitted by Contractor with progress payment requests, in accordance with the General Conditions (as may be modified by the Supplementary Conditions).
 - b. Schedule of Values accepted by Engineer will be used by Engineer in evaluating reasonableness of Contractor's progress payment requests.
 - c. While the actual Cost of the Work plus applicable fee for a given line item in the Schedule of Values may vary somewhat from the scheduled amount of such line item, where actual Cost of the Work (plus fee) for such line item differs substantially from the scheduled amount of such line item indicated in the Schedule of Values, Engineer may refuse to recommend further payment for such line item, in accordance with the Contract Documents.
 - d. Nothing in the Schedule of Values accepted by Engineer changes the Guaranteed Maximum Price, if any.

1.3 ADMINISTRATIVE PROCEDURES

- A. General Provisions for Schedules of Values:
1. This Section augments requirements for the Schedule of Values, indicated in the General Conditions, as may be augmented by the Supplementary Conditions.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:

1. Submit to Engineer the Schedule of Values in the form and quantity required in Section 01 33 00 - Submittals.
2. Content of Schedule of Values Submittals shall be in accordance with this Section.
3. Timing of Submittals:
 - a. Preliminary Schedule of Values:
 - 1) Submit preliminary Schedule of Values within time limit indicated in the General Conditions.
 - b. Initial Acceptable Schedule of Values:
 - 1) Revise the preliminary Schedule of Values in accordance with Engineer's comments.
 - 2) Contractor will not be eligible for progress payment until acceptable Schedule of Values is submitted in accordance with the Contract Documents.
 - 3) Submit the Schedule of Values acceptable to Engineer in accordance with the General Conditions.
 - c. Updates: Submit updated Schedule of Values when:
 - 1) The Contract Price has changed.
 - 2) Requested by Engineer

1.5 FORMAT, ORGANIZATION, AND CONTENT OF SCHEDULE OF VALUES

- A. Organization and Major Elements of Schedule of Values.
 1. Prepare Schedule of Values on the "progress estimate" or "continuation sheets", as applicable, of the Application for Payment .
 2. Include in Schedule of Values itemized list of Work for each major work area included in the Work, for each lump sum payment item included in the Contract.
 - a. Contractor will not be eligible for progress payment until acceptable Schedule of Values is submitted in accordance with the Contract Documents.
 3. Organization in Accordance with Specification Sections:
 - a. Within each work area, organize the Schedule of Values by the various Specifications section numbers and titles included in the Contract Documents.
 - b. Label each row in the Schedule of Values with the appropriate Specifications section number. Include an amount for each row in the Schedule of Values.
 - c. List sub-items of major materials, equipment, or systems, as appropriate or when requested by Engineer.
- B. Requirements for both the preliminary Schedule of Values Submittal and the Schedule of Values Submittal for Engineer's acceptance are:
 1. Subcontracted Work:
 - a. Schedule of Values shall indicate division of Work between Contractor and each Subcontractor.
 - b. Line items for Work to be performed by each Subcontractor shall include the word, "(SUBCONTRACTED)" and the name of the Subcontractor once the associated subcontract is signed and effective.
 2. Sum of individual line item amounts indicated on the Schedule of Values shall equal the total of associated bid/pay item. Sum of bid/pay item totals in the Schedule of Values, plus the sum of any separate listing of Unit Price Work items, shall equal the total Contract Price.
 3. Mobilization and Demobilization:
 - a. Include separate line items under each appropriate lump sum bid/pay item for mobilization and demobilization.
 - b. Document for Engineer the activities included in mobilization and demobilization line items.
 - c. Mobilization includes:
 - 1) Obtaining Owner's acceptance of proposed Subcontractors and Suppliers and entering into subcontracts and purchase orders needed to start the Work.
 - 2) Preparing and obtaining Engineer's approval of Shop Drawings required in Section 01 14 19 - Use of Site.
 - 3) Preparing and obtaining Engineer's acceptance of schedules, including Progress Schedule, Schedule of Submittals, and Schedule of Values.
 - 4) Preconstruction conference(s) required by the Contract Documents.
 - 5) Preconstruction photographic documentation.
 - 6) Establishing Contractor's Site-specific health and safety plan, preconstruction activities needed to start implementing Contractor's safety programs, and verifying status of training

- of construction workers and personnel and condition of construction equipment, machinery, and tools.
- 7) Submitting acceptable emergency contact information
 - 8) Obtaining required permits needed to start the Work.
 - 9) Initial establishment of temporary utilities and temporary facilities.
 - 10) Establishing Contractor's field office and sheds, Contractor's storage areas, staging and laydown areas, and other areas necessary to perform the Work.
 - 11) Initial establishment of construction vehicular access to the Site, parking needed for construction, and offsite haul routes.
 - 12) Establishing construction equipment, machinery, and tools at the Site.
 - 13) Providing initial temporary controls.
 - 14) Establishing temporary security needed to start Work at the Site.
 - 15) Other mobilization acceptable to Engineer.
- d. Mobilization will be limited to 2 percent of the Contract Price, and will be paid in equal payments, each of a maximum of 0.5 percent of total amount for mobilization. Should Contractor propose mobilization in an amount greater than the limit indicated in this paragraph or on an alternative schedule from that indicated in this paragraph, submit to Engineer for acceptance information and documentation sufficient to support and substantiate the proposed amount and payment schedule for mobilization.
4. Costs for Submittals, field quality control activities, and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by Engineer:
- a. Submittals: Up to 8.0 percent of cost (including all associated overhead and profit) of each equipment item, exclusive of transportation and installation costs associated therewith, may be allocated to preparation of Shop Drawings, Samples, and other Submittals required for release for purchase, fabrication, or delivery (as applicable) and may be included in the Application for Payment following Engineer's approval of Shop Drawings (and acceptance of other Submittals, as applicable) required for fabricating or purchasing for that item for the Work.
 - b. Field Quality Control: Up to 3.0 percent of total cost of each item (including all associated overhead and profit), including materials and equipment, and installation, may be apportioned to specified or required field quality control activities (including required testing and inspections) and included in the Application for Payment following Engineer's acceptance of the associated written field quality control report Submittal(s).
 - c. O&M Manual Submittals and Training: Up to a total of 4.0 percent of equipment cost (including all associated overhead and profit), exclusive of transportation and installation costs, may be apportioned to operations and maintenance manuals and training of operations and maintenance personnel, which may be included in the Application for Payment following completion of training for the associated item.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Definition of various types of Submittals.
 - 2. Coordination requirements for Submittals.
 - 3. General provisions concerning Submittals.
 - 4. Schedule of Submittals.
 - 5. Contractor's preparation of Submittals, including:
 - a. Numbering.
 - b. Marking.
 - c. Organization and content.
 - d. Proposed "or-equals", substitutes, and deviations from Contract requirements.
 - e. Electronic Documents Submittals.
 - f. Contractor's review and approval of each Submittal.
 - g. Resubmittals.
 - 6. Contractor's transmittal of Submittals, including transmittal letters, transmittal and delivery method, and delivery of Samples, Closeout Submittals, and Maintenance Materials Submittals.
 - 7. Engineer's review, including:
 - a. Timing.
 - b. Meaning of Engineer's Submittal action code(disposition) assigned.
 - c. Delivery of Engineer's responses on Submittals.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, incidentals, and other effort necessary to furnish Shop Drawings, product data Submittals, Samples, and other Submittals in accordance with the Contract Documents.
 - 2. This Section's Article, "General Provisions Concerning Submittals" includes a summary of the Contract Documents' locations of Submittals requirements.
 - 3. Shop Drawings, product data Submittals, Samples, and other Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Engineer's approval or acceptance, as applicable, of a Submittal does not alter or modify the Contract Documents.
 - 4. Engineer and Owner have the right to rely on Contractor's representations and certifications made regarding each Submittal.
- C. Related Requirements: Include but are not limited to:
 - 1. Section 01 25 00 - Substitution Procedures.

1.2 REFERENCES

- A. References – Introduction:
 - 1. This Article presents definitions and terminology used in this Section and throughout the Contract Documents.
 - 2. Applicability of the Term "Submittals": Where reference is made to Shop Drawings, product data Submittals, Samples, or other Submittals in this Section and elsewhere in the Contract Documents, the term "Submittals", as defined in the Contract Documents, is intended. The foregoing applies regardless of whether such term is indicated with an initial capital letter, unless context of the subject provision clearly indicates otherwise.
 - 3. Types of Submittals:
 - a. Submittal types are classified as follows: (1) Action Submittals, (2) Informational Submittals, (3) Closeout Submittals, and (4) Maintenance Materials Submittals.

- b. Type of each required Submittal is indicated in the associated Specifications section. When Submittal type is not clearly indicated in the associated Specifications section, Submittal will be classified as indicated in this Article. Submit request for interpretation when Contractor is uncertain of required Submittal type.
- B. Action Submittals:
 1. Action Submittals require an explicit, written approval or other appropriate action by Engineer (or other entity to whom the Submittal is required to be furnished, in accordance with the Contract Documents) before Contractor may release the associated item(s) for raw materials procurement, fabrication, production, and shipping.
 2. Unless otherwise indicated in the Contract Documents, Action Submittals include the following:
 - a. Shop Drawings.
 - b. Product data.
 - c. Samples.
 - d. Testing plans for quality control activities required by the Contract Documents.
 - e. Delegated Designs: Delegated design professional's "instruments of service" Submittals required by the Contract Documents.
 3. General Conditions' requirements for Shop Drawings and Samples hereby apply to all Action Submittals.
- C. Informational Submittals:
 1. Informational Submittals are so indicated in the Contract Documents. Unless otherwise indicated, Informational Submittals include certifications, evaluation reports, results of source quality control activities, results of field quality control activities, Supplier instructions, reports of Suppliers' visits to the Site, sustainable design Submittals (that are not Closeout Submittals), delegated design Submittals that are not "instruments of service" Submittals, qualifications statements, and others.
 2. Informational Submittals, when submitted in accordance with the Contract and indicating full compliance with the Contract Documents, do not require explicit response from Engineer (or other entity to whom the Submittal is to be delivered); Engineer's (or other entity's) acceptance thereof will be indicated in the Engineer's Submittals log. Copy of Engineer's Submittals log is available to Contractor upon Contractor's written request.
 3. When Informational Submittal does not indicate full compliance with the Contract Documents, Engineer (or other entity to which Submittal is to be delivered) will indicate the non-compliance in a written response to Contractor.
- D. Closeout Submittals:
 1. Closeout Submittals are so indicated in the Contract Documents and are, in general, required before the associated Work is completed, unless earlier submittal is required by the Contract Documents.
 2. Unless indicated otherwise in the Contract Documents, Closeout Submittals include maintenance contracts, operation and maintenance data, warranties, bonds (other than performance and payment bonds required prior to the start of construction), record documents, sustainable design closeout Submittals, software, keys, and others.
 3. Closeout Submittals are processed in the same manner as described above for Informational Submittals.
- E. Maintenance Materials Submittals:
 1. Maintenance materials include spare parts, extra materials, tools, and similar items required to be furnished in accordance with the Contract Documents.
 2. Furnish required physical maintenance materials, delivered to Owner or facility manager (if other than Owner), as applicable, at the location(s) indicated in the Contract Documents, for the corresponding required Maintenance Materials Submittals.
 3. Maintenance Materials Submittals are documentation of delivery to Owner's or facility manager, and their acceptance of, required physical maintenance materials.

4. Maintenance Materials Submittals are processed in the same manner as described above for Informational Submittals.
- F. Additional Terms:
1. The following terms have the meanings indicated below, regardless of whether such terms are indicated using initial capital letters, and apply to singular and plural of each:
 - a. “Product data” means illustrations, standard schedules, performance charts, Supplier’s published instructions, brochures, diagrams, and other information furnished by Contractor to illustrate or describe materials or equipment for some portion of the Work. In general, product data are manufacturers’ pre-published information on the items proposed to be incorporated into the Work. Product data includes manufacturer’s catalog pages and similar documents with contractor-made markings and indications of proposed products and proposed options.
 - b. The term “Shop Drawings”, defined in the General Conditions, is supplemented by the following: Shop Drawings include: (1) fabrication and assembly drawings, usually having a title block, or (2) schedules, prepared specifically for the Project. Here, “schedules” means a Project-specific summary of systems and components, such as a schedule of HVAC equipment, schedules of doors and door hardware, or windows, or a schedule of paint systems by room and surface, or other, similar Project information in a tabular format. In contrast, construction Progress Schedules, Schedules of Submittals, and Schedules of Values are not Shop Drawings. Unless expressly required otherwise in the Contract Documents, Shop Drawings shall not be prepared from, or on, the Drawings or any other component of the Contract Documents.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Furnish Submittals well in advance of need for the associated material or equipment, or procedure (as applicable), in the Work and with ample time necessary for delivery of materials and equipment and to implement procedures following Engineer’s approval or acceptance of the associated Submittal.
 2. Work covered by a Submittal will not be included in payments by Owner until approval or acceptance (as applicable) of related Submittals has been obtained in accordance with the Contract Documents.

1.4 GENERAL PROVISIONS CONCERNING SUBMITTALS

- A. Locations of Requirements:
1. Requirements concerning Submittals are generally located as follows:
 - a. General Conditions, as may be modified by the Supplementary Conditions, applicable to the Project.
 - b. This Section, which presents general requirements for Submittals applicable to the Project.
 - c. Other Division 01 Specifications that include general requirements for certain types of Submittals, such as Section 01 78 23 - Operation and Maintenance Data, and others.
 - d. The “Submittals” Article of the various Specifications sections, which indicates the required Submittals for the associated Work. Furnish all Submittals required by the Contract Documents regardless of whether explicitly indicated in the associated Specifications’ “Submittals” Article.
- B. This Section augments and supplements the requirements of the General Conditions, as may be modified by the Supplementary Conditions, relative to Submittals.

1.5 SCHEDULE OF SUBMITTALS

- A. Informational Submittals: Submit the following:
1. Schedule of Submittals:
 - a. Timing:

- 1) Furnish Schedule of Submittals within time frames indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 - 2) Submit updated Schedule of Submittals with each submittal of the updated Progress Schedule.
- b. Content: In accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent Submittals of the Schedule of Submittals are identical. Identify on Schedule of Submittals all Submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Clearly indicate Submittals that are on the Project's critical path. Indicate the following for each Submittal:
- 1) Date by which Submittal will be received by Engineer.
 - 2) Whether Submittal will be for a substitution or "or-equal".
 - 3) Date by which Engineer's response is required. Allow not less than 14 days for Engineer's review, starting on Engineer's actual receipt of each Submittal. Allow increased time for large or complex Submittals.
 - 4) For Submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of others (if any).
- c. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules.
- d. Coordinate Schedule of Submittals with the Progress Schedule.
- e. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate Submittals on the Project's critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include Submittals not required by the Contract Documents.
- f. In preparing Schedule of Submittals:
- 1) Considering the nature and complexity of each Submittal, allow sufficient time for reviews and revisions.
 - 2) Allow reasonable time for: Engineer's review and processing of Submittals, for Submittals to be revised and resubmitted, and for returning Submittals to Contractor.
 - 3) Identify and accordingly schedule Submittals that are expected to have long anticipated review times.

1.6 PREPARATION OF SUBMITTALS

- A. Prior to Submittal Preparation:
1. The General Conditions, as may be modified by the Supplementary Conditions, address Contractor's responsibility for submitting for Owner's acceptance identification of Subcontractors and Suppliers. Obtain Owner's acceptance before entering into subcontracts and purchase orders for the Work.
 2. Comply with the Contract Documents relative to terms and conditions of subcontracts and purchase orders for the Work.
 3. Contractor's responsibilities for the following are set forth in the General Conditions, as may be modified by the Supplementary Conditions, and as may be augmented elsewhere in the Contract Documents:
 - a. Obtaining field measurements and dimensions.
 - b. Determining and verifying required quantities.
 - c. Verifying compatibility of materials.
 - d. Apportioning the Work among Subcontractors, Suppliers, and Contractor.
 - e. Reconciling required materials, equipment, and other Contract requirements with Contractor's means, methods, techniques, sequences, and procedures of construction and with Contractor's safety and protection programs and precautions incident thereto.
 - f. Reviewing applicable provisions of the Contract Documents and obtaining from Engineer necessary interpretations or clarifications.

B. Submittal Identification:

1. Submittal Number: Shall be a unique number assigned to each individual Submittal. Assign Submittal numbers as follows:
 - a. First part of Submittal number shall be the applicable Specifications section number, followed by a hyphen.
 - b. Second part of Submittal number shall be a three-digit number (sequentially numbered from 001 through 999) assigned to each separate Submittal furnished under the associated Specifications section.
 - c. Example: Submittal number for the third Submittal furnished for Section 10 14 00 - Signage, would be "10 14 00-003".
2. Review Cycle Number: Each resubmittal of a given Submittal shall be indicated with a lower-case letter designation:
 - a. No letter designation for initial (first) submittal of the Submittal number.
 - b. "a" shall indicate first resubmittal of the Submittal number.
 - c. "b" shall indicate second resubmittal of the Submittal number.
3. Examples:

Example Description	Submittal Identification	
	Submittal No.	Review Cycle
Initial (first) review cycle of the third Submittal furnished under Section 10 14 00 – Signage	10 14 00-003-	
Second review cycle (first resubmittal) of third Submittal furnished under Section 10 14 00 - Signage	10 14 00-003-	a

C. Marking of Submittals:

1. Mark on each page of each Submittal and each individual component submitted with Submittal number and applicable Specifications paragraph.
2. Mark each page of each Submittal with the Submittal page number.
3. Each Shop Drawing sheet shall have title block with complete identifying information satisfactory to Engineer.
4. For product data Submittals, operation and maintenance data Submittals, and other Submittals:
 - a. Mark options to be furnished using broad, dark arrows or "clouds" clearly drawn around the relevant text or diagrams. Do not use highlighter for indicating options and features.
 - b. Indicate options and features not furnished using clear strikeouts through the text or diagrams.

D. Submittal Organization and Content – General:

1. Page or Sheet Size: Furnish Submittals with one or more of the following page or sheet sizes: (a) 8.5 inches by 11 inches; (b) 11 inches by 17 inches; (c) 22 inches by 34 inches; unless another sheet size is acceptable to Engineer.
2. Language: All parts of each Submittal shall be in the English language.
3. Units of Measurement: Clearly indicate units of measurement on Shop Drawings, product data Submittals, record documentation, and operation and maintenance data Submittals.
4. Organize each Submittal logically to facilitate ease of understanding and review.
5. To the extent practicable, arrange Submittal information in same order as requirements are written in the associated Specifications section.
6. Each Submittal shall cover Work under only one Specifications section.
7. To the extent practicable, package together Submittals for the same Specifications section. Do not furnish required information piecemeal.
8. For large or complex Submittals, include a title page and table of contents.
9. Include appropriately labeled fly sheets to separate distinct parts of each Submittal.

10. Ensure legibility of all pages in each Submittal.
 11. Minimize extraneous and unnecessary information in Submittals for materials and equipment. Do not submit information not relevant to the Submittal and associated requirements of the Contract Documents.
 12. Contractor's, Subcontractor's, and Supplier's written comments on Shop Drawings and product data diagrams shall be colored green
 13. Do not submit under Specifications sections with title that includes either, "Common Work Results for" or, "Basic Requirements", unless the subject material or equipment is specified, in total, in a Specifications section with the words, "Common Work Results for" or, "Basic Requirements" in its title.
- E. Electronic Documents Submittals:
1. Format: Electronic Documents Submittals shall be "portable document format" (.PDF) files unless expressly required otherwise by applicable provisions of the Contract Documents.
 2. Electronic Documents Submittals must be electronically searchable when delivered to Engineer and other recipients.
 3. Organization and Content:
 - a. Each Electronic Documents Submittal shall be one file; do not divide individual Submittals into multiple Electronic Documents files each unless file size will exceed 20 MB.
 - b. When Submittal is large or contains multiple parts, furnish PDF file with suitably titled electronic bookmark for each section of the Submittal.
 - c. Content shall be identical to paper or other original Submittal. First page of each Electronic Documents Submittal shall be transmittal letter required in this's Paragraph 1.7.A.
 4. Quality and Legibility: Electronic Documents Submittal files shall be made from the original and shall be clear and legible. Markings applied by Contractor, Subcontractor, or Supplier shall be clear, distinct, and readily apparent. Electronic Documents file shall be full size of original documents. Properly orient all pages for convenient reading on a computer display; do not furnish pages sideways or upside-down..
 5. Provide sufficient internet service, software, and systems for Contractor with capability appropriate for transmitting the necessary files and receiving responses from Engineer or other entities.
 6. Check not less than once per day for distribution of Electronic Documents Submittals responses and related Electronic Documents correspondence.
- F. Proposed "Or-Equals", Substitutes, and Deviations from Contract Requirements:
1. "Or-Equals":
 - a. The meaning of "or-equal" is addressed in Section 01 25 00 - Substitution Procedures.
 - b. Contractor's request for approval of "or-equals" is to be presented via the associated Action Submittal(s) and shall include the information required in provisions governing "or-equals".
 - c. Expressly and prominently indicate, "Proposed Or-Equal" on the associated Action Submittals when Submittal is for an "or-equal".
 - d. Submittals requesting approval of an "or-equal" but not accompanied by the required, supplemental information will be deemed incomplete by Engineer and returned to Contractor without approval.
 2. Substitutes:
 - a. The meaning of "substitute" is indicated in Section 01 25 00 - Substitution Procedures.
 - b. Requests for approval of substitutes shall comply with Section 01 25 00 - Substitution procedures, and other relevant provisions of the Contract Documents.
 - c. Contractor's request for approval of substitute is separate from the associated Action Submittal(s). Action Submittals that request approval of a substitute when a separate, formal substitution request (furnished in accordance with the Contract Documents) was not previously furnished to Engineer, followed by formal approval in via an appropriate contract modification (typically either a Field Order or Change Order), will be deemed

by Engineer as non-compliant with the Contract Documents and will be returned to Contractor without approval.

- d. Contractor is solely responsible for delays incurred due to substitutes proposed via Submittals that have not been previously duly approved via an appropriate Contract modification.
 - e. Action Submittals for items or procedures approved via an appropriate Contract modification shall include a copy of the Contract modification in which the substitute was approved.
3. Submittals with Proposed Deviations from Contract Requirements:
- a. When Submittal proposes deviations from requirements of the Contract Documents, the Submittal shall clearly and expressly indicate each proposed deviation.
 - b. Also comply with this Section's provision, in the Article below, on Contractor's transmittal letter expressly alerting Engineer to the proposed deviations.
 - c. Comply with requirements of the Contract regarding substitutes and "or-equals".
 - d. When deviation is proposed, also appropriately revise text of Contractor's approval, from that required below in this Article.
 - e. When Submittal includes deviations from Contract requirements and either the Submittal itself, Contractor's transmittal letter, or both, do not comply fully with Contract requirements for indicating deviations in Submittals and giving separate written notice thereof, Engineer's approval of such deviations will be deemed null and void unless Engineer's written response to the Submittal has expressly acknowledged such deviation and indicated Engineer's approval thereof.
 - f. Contractor is solely responsible for delays and costs incurred due to any and all Submittals with deviations from Contract requirements that were not properly, expressly indicated and approved in accordance with the Contract Documents. Deviations not duly approved in accordance with the Contract Documents may be deemed defective Work. Contractor is solely responsible for remedying defective Work and all associated cost and time impacts.

G. Contractor's Approval of Submittals:

- 1. Contractor's Review: Before transmitting Submittals to Engineer, review each Submittal to:
 - a. Ensure proper coordination of the Work.
 - b. Determine that each Submittal is in accordance with Contractor's desires.
 - c. Verify that Submittal contains sufficient information for Engineer to determine compliance with the Contract Documents.
- 2. Incomplete or inadequate Submittals will be returned without detailed review by Engineer.
- 3. Contractor's Approval Stamp and Signature:
 - a. Each Submittal furnished shall bear Contractor's approval stamp (or facsimile thereof) and signature, as evidence that the Submittal has been reviewed and approved by Contractor and verified as complete and in accordance with the Contract Documents.
 - b. Submittals without Contractor's approval and signature (as required by the contract Documents) will be returned to Contractor without further review by Engineer and deemed incomplete.
 - c. Engineer reserves the right to reject as incomplete Submittals where Contractor's approval signature appears computer-generated or reproduced without the active involvement or review of Contractor's signatory.
 - d. Contractor's approval shall contain the following text:

Project Name: _____
Contractor's Name: _____
Contract Designation: _____
Date: _____

----- Reference -----

Submittal Title: _____
Specifications: _____
Section: _____
Page No.: _____
Paragraph No.: _____
Drawing No.: _____ of _____
Location of Work: _____

Submittal No. and Review Cycle: _____
Coordinated by Contractor with Submittal Nos.: _____

I hereby certify that Contractor has satisfied Contractor's obligations under the Contract Documents relative to Contractor's review and approval of this Submittal, including: (1) reviewed and coordinated the Submittal with other Submittals and with the requirements of the Work and the Contract Documents; (2) determined and verified all: field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal, (b) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work, and (c) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; (3) confirmed the Submittal is complete with respect to all related data included in the Submittal; and (4) clearly and expressly indicated all proposed deviations (if any) from the requirements of the Contract Documents both in the Submittal itself and in the Submittal's transmittal letter. Accordingly, this Submittal is hereby approved for Contractor by:

Approved for Contractor by: _____

H. Resubmittals:

1. Refer to the General Conditions, as may be modified by the Supplementary Conditions, for requirements regarding resubmitting required Submittals.
2. In addition to limits on the quantity of resubmittals, as indicated in the General Conditions, Contractor shall furnish Submittals with such completeness, accuracy, and compliance with the Contract Documents to obtain Engineer's approval or acceptance, as applicable, without the total quantity of Submittals furnished, including all initial Submittals and all resubmittals, exceeding 125% of the number of Submittals indicated on the Schedule of Submittals initially accepted by Engineer, plus a corresponding percentage of the quantity of Submittals required by Change Orders, Work Change Directives, and Field Orders.
3. Do not increase the scope of prior review cycle of the same Submittal.
4. Indicate on Contractor's transmittal letter how Submittal was revised from previous review cycle of the Submittal and where the revisions or corrections are located within the resubmittal.
5. Expressly address and provide response for all components previously transmitted by Engineer on prior review cycles of the subject Submittal. Where resubmittal lacks complete response to Engineer's prior comments, Engineer may deem such resubmittal as incomplete and return it to Contractor without further review.
6. Where part of the Submittal's prior review cycle was expressly approved or accepted, as applicable, by Engineer, do not include such items in subsequent resubmittals.
7. Indicate, "Not Yet Resolved—To Be Resubmitted at a Later Date" for any items not approved in prior review cycle of the Submittal for items not included in the subject resubmittal. Engineer reserves the right to deem incomplete Submittals "Not Approved" or "Revise and Resubmit". Furnishing incomplete or partial resubmittals is discouraged.
8. Resubmittal of Previously Approved or Accepted Items:
 - a. Do not resubmit on a given item previously approved or accepted, as applicable, by Engineer, without Engineer's advance consent. Consent will be given for bona-fide

- unavailability of a previously approved or accepted item where Contractor has acted in good faith in a timely manner with due diligence to comply with the Contract Times.
- b. Destroy or conspicuously mark "SUPERSEDED" on all documents having previously received Engineer's approval or acceptance, as applicable, that are superseded by a resubmittal.

1.7 TRANSMITTAL OF SUBMITTALS BY CONTRACTOR

- A. Contractor's Transmittal Letters for Submittals:
 1. Furnish separate transmittal letter with each Submittal. Use transmittal form attached to this Section (as Exhibit 01 33 00-A) unless other transmittal form is acceptable to Engineer at the start of the Project's construction.
 2. When transmittal form other than this Section's Exhibit 01 33 00-A is acceptable to Engineer, at beginning of each transmittal, include a reference heading indicating: Contractor's name, Owner's name, Project designation, Contract designation, transmittal number, and Submittal number (with review cycle).
 3. "Or-Equals": When the Submittal is proposing an "or-equal", expressly so indicate on transmittal form submitted by Contractor.
 4. Proposed Deviations from Contract Requirements: When the Submittal proposes deviations from requirements of the Contract Documents, transmittal letter shall specifically describe each proposed deviation.
- B. Submittal Delivery Method:
 1. This provision presents general requirements for delivery of all Submittals unless otherwise required elsewhere in the Contract Documents.
 2. Furnish Submittals to Engineer and each other entity indicated in the Contract Documents as receiving a Submittal directly from Contractor.
 3. Address Submittals to Engineer as follows: HDR, 10450 Holmes Rd., Kansas City, MO 64131, to attention of Eric Farrow, eric.farrow@hdrinc.com.
- C. Samples - Transmittal and Delivery:
 1. Labeling and Tagging Samples:
 - a. Securely label or tag each Sample with Submittal identification number.
 - b. Label or tag shall include clear space at least 4 inches by 4 inches in size for affixing Engineer's review stamp indicating disposition assigned by Engineer.
 - c. Label or tag shall not cover, conceal, or alter Sample's appearance or features.
 - d. Label or tag shall not be separated from the Sample.
 2. Timing: Deliver required Samples concurrently with other Action Submittals required for the same element of the Work, unless other delivery time frame is indicated in the Schedule of Submittals accepted by Engineer.
 3. Quantity Required:
 - a. Where the Contract Documents require a Sample as a field mock-up, provide Sample at the Site or in the Work at location acceptable to Engineer. Provide the quantity of field mock-ups required by the contract Documents; if not otherwise shown or specified, provide one of each required field mock-up. .
 - b. For reasonably portable Samples, deliver the quantity of Samples required in the associated Specifications section. If quantity of Samples is not indicated in the associated Specifications section, deliver to Engineer not less than three identical Samples of each item for which Sample is required.
 - c. Samples will not be returned to Contractor. If Contractor requires Sample(s) for Contractor's use, so advise Engineer in writing and furnish additional copies of the Sample. Contractor is responsible for furnishing, shipping, and transporting additional Samples.
 4. Locations for Delivery of Reasonably Portable Samples for Review:
 - a. Deliver one physical Sample to Owner's Site Representative's field office at the Site.
 - b. Deliver balance of required physical Samples to Engineer at address indicated in this Article for receipt of Submittals, unless otherwise directed by Engineer.

- D. Closeout Submittals –Transmittal and Delivery:
1. Furnish the following Closeout Submittals in accordance with general requirements for transmitting and delivering Submittals, indicated above in this Article: maintenance contracts; warranty bonds (when required) and other bonds required for specific materials, equipment, or systems; warranty documentation; and sustainable design closeout documentation (when required). On documents such as maintenance contracts and bonds, include on each document furnished original (“wet”) signature of entity issuing said document. When original “wet” signatures are required, furnish such Submittals to Engineer both on original paper and as Electronic Documents, and to other entities furnish as indicated above in this Article for general requirements for Submittals.
 2. Operations and Maintenance Manuals: Submit in accordance with Section 01 78 23 - Operation and Maintenance Data.
 3. Software: In addition to software installed on Owner’s computer system, furnish number of copies of software required in the Specifications section where the software is specified. Preferred means of transmittal is via secure file transfer directly to Owner (or facility manager, if other than Owner) via secure file transfer method mutually acceptable to software developer and the receiving entity. When secure file transfer is used, submit to Engineer documentation signed or electronically acknowledged by Owner that the files were received. Where such software is available only on the software developer's portable media, furnish such software on software developer’s original, portable media, sealed in software developer’s original, unopened, clearly labeled packaging.
- E. Maintenance Materials Submittals – Delivery:
1. Deliver physical maintenance materials required by the Contract Documents in accordance with applicable provisions of the Contract.
 2. Submit documentation of delivery of (Maintenance Materials Submittals) in accordance with general requirements for Submittals as indicated in this Section.

1.8 ENGINEER’S REVIEW OF SUBMITTALS

- A. This Article applies to review of all Submittals by Engineer or other entity to whom the Contract Documents require such Submittal be furnished.
- B. Timing:
1. Timing of Engineer’s review will be in accordance with the Schedule of Submittals accepted by Engineer.
 2. When Submittal is delivered to Engineer on a date other than that indicated in the Schedule of Submittals accepted by Engineer, duration of Engineer’s review may differ from that indicated in the Schedule of Submittals, based on Engineer’s availability and resources. Engineer will make good-faith effort to furnish responses to Submittals in a timely manner.
 3. Contractor is responsible for communicating to Engineer when a Submittal is on the Project’s critical path.
- C. Engineer’s Review:
1. Markings:
 - a. Comments or responses marked directly on Submittal by Engineer (or other entity reviewing Submittal) will be colored red.
 - b. Engineer may also present narrative comments on a comment sheet inserted by Engineer into the Submittal or included on Engineer’s transmittal letter for the Submittal. Such comments will be in black text. When a separate comment sheet is included by Engineer, such sheet will be clearly identified as Engineer’s comments.
 2. Engineer’s review and disposition assigned to Submittal are subject to the following:
 - a. Submittal disposition is subject to: Engineer’s comments on the Submittal; disclaimer language on Engineer’s Submittal transmittal letter; Engineer’s Submittal review stamp (when used) or equivalent (when used); and this provision.

- b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.
 - c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.
 - d. Engineer is not responsible for resubmittals not yet furnished by Contractor or tracking Contractor's progress on resubmittals.
 - 3. Documents not required by the Contract Documents but nonetheless furnished by Contractor as submittals will not be reviewed by Engineer.
- D. Meaning of Submittal disposition Assigned by Engineer:
- 1. Action Submittals:
 - a. "Approved" (Action Code A): Upon return of Submittal marked "Approved", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents.
 - b. "Approved as Noted" (Action Code B): Upon return of Submittal marked "Approved as Noted", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents, and in accordance with Engineer's comments and notes indicated in Engineer's Submittal response
 - c. "Revise and Resubmit" (Action Code C): Upon return of Submittal marked "Revise and Resubmit", make the revisions necessary and indicated and resubmit to Engineer for approval.
 - d. "Not Approved" (Action Code D): This disposition indicates material or equipment that cannot be approved. "Not Approved" disposition may also be applied to Submittals that are incomplete. Upon return of Submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable material or equipment, with a complete Submittal clearly indicating all information required.
 - 2. Informational, Closeout, and Maintenance Materials Submittals:
 - a. "Accepted" (Action Code F): Information included in Submittal complies with the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to such Submittal, and the Work covered by the Submittal may proceed. Materials and equipment with Submittals with this disposition may be shipped or operated, as applicable. Submittals assigned "Accepted" by Engineer (or other reviewing entity) does not indicate Engineer's acceptance of the associated Work, which is indicated only as set forth in the General Conditions and Section 01 77 19 – Closeout Requirements.
 - b. "Not Acceptable" (Action Code G): Submittal, or part thereof, does not indicate full compliance with applicable requirements of the Contract Documents and is not acceptable. Provide labor, materials, equipment, services, and incidentals necessary to properly and accurately revise Submittal and resubmit to indicate acceptability and compliance with the Contract Documents
 - 3. Other:
 - a. "Submittal Not Reviewed" (Action Code E): Documents so marked by Engineer are not required by the Contract Documents. Submittals may also be marked with this

disposition when information in the document was previously reviewed and approved or accepted by Engineer, as applicable.

- E. Distribution of Engineer's Responses:
1. Unless otherwise indicated in the Contract Documents, Engineer will distribute written responses (as Electronic Documents) to Submittals to the following:
 - a. Contractor.
 - b. Owner.
 - c. Engineer's file.
 2. Engineer's acceptance of Informational Submittals, Closeout Submittals, and Maintenance Materials Submittals will be recorded in Engineer's Submittal log. Copy of Engineer's Submittals log is available from Engineer upon written request of Owner or Contractor. If no such request is received by Engineer, Engineer will distribute copy of Engineer's Submittals log once per month (when Submittals have been received or acted on by Engineer). Engineer may distribute copy of Engineer's Submittals log as an Electronic Document or as handout at construction progress meetings.
 3. Paper copies of Engineer's Submittal responses will not be distributed unless otherwise required by the Contract Documents or otherwise agreed to by Engineer.
 4. Contractor is responsible for forwarding Engineer's Submittals responses to Subcontractors and Suppliers as appropriate, and for coordinating the Work of all trades.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Section's "End of Section" designation, are part of this Specifications Section:
1. "Exhibit 01 33 00-A – Transmittal for Submittal No. ##" (one page).

END OF SECTION

Project Name:				Date Received:	
Project Owner:				Checked By:	
Contractor:		HDR Engineering, Inc.		Log Page:	
Address:		Address:		HDR No.:	
				Spec Section:	
				Drawing/Detail No.:	
Attn (Contractor):		Attn (HDR):		Review Cycle	
Date Transmitted by Contractor:		Date of Engineer's Response Transmittal:			
Item No.	Submittal No.	Description (indicate number of copies where paper copies of physical Samples are returned)	Manufacturer	Supplier Dwg or Data No.	Engineer's Disposition (Action Code) *
1					
2					
3					
4					
Contractor's Remarks (insert text):					
Engineer's Remarks (insert text):					
* Legend for Action Code indicated above, assigned by Engineer:					
Action Submittal: A – Approved B – Approved as Noted C – Revise and Resubmit D – Not Approved		E – Submittal Not Reviewed Informational, Closeout, or Maintenance Materials Submittal: F – Accepted (this code normally recorded in Engineer's Submittals log). G – Not Acceptable			
Engineer's Disclaimer (for Submittals that do <u>not</u> involve delegated design):					
a. Submittal action code is subject to: Engineer's comments on the Submittal, comment sheets (if any), and this transmittal letter; disclaimer language on Engineer's Submittal review stamp or equivalent; and Specifications Section 01 33 00 – Submittal Procedures.					
b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.					
c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.					
d. Engineer is not responsible for resubmittals or tracking progress of resubmittals.					
Reviewed for HDR by:				Date of Engineer's Review:	
Distribution:	Contractor	File	Field	Owner	Other

SECTION 01 41 24

PERMIT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements relative to permitting of which Owner and Engineer are aware that apply to the Work.
 - 2. Required municipal permits and licenses of which Owner and Engineer are aware.
 - 3. Erosion and sediment control permits.
 - 4. Nationwide Permit.
- B. Scope:
 - 1. Contractor shall provide labor, materials, equipment, tools, and incidentals shown, specified, and required to obtain required permits and comply with required permits and licenses.
 - 2. Obtain, pay for, and comply with required permits and licenses whether or not indicated in this Specifications section or elsewhere in the Contract Documents.
- C. Related Requirements:
 - 1. In addition to permits and licenses required under this Specifications section, obtain and comply with permits required under the following Specifications:
 - a. Section 01 14 33 - Work in Rights-of-Way.
 - b. Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compliance with permit and license requirements with Work under other Specifications sections and with other contractors, if any, working at the Site.
 - 2. Coordinate with the Progress Schedule the time required to apply for and obtain required permits and licenses and to comply with requirements thereof. Changes in Contract Times or Contract Price will not be authorized because of timing and costs associated with obtaining permits and licenses required for the Work.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Copy of each of the following licenses, as applicable to the Work:
 - a. Business License, City of Liberty, Missouri.

1.4 MUNICIPAL PERMITS AND LICENSES

- A. Licenses:
 - 1. City Business License, City of Liberty Missouri.
 - a. Obtain city business license to perform construction activities.
 - b. Before starting Work at the Site, submit to Engineer copies of the applicable City license required for the Project.

1.5 EROSION AND SEDIMENT CONTROL PERMIT

- A. Erosion and Sediment Control Permit – General:
 - 1. Coordinate compliance with erosion and sediment control permit with requirements of Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 41 26
STORMWATER POLLUTION PREVENTION PLAN AND PERMIT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for compliance with the Project's Storm Water Pollution Prevention Plan (SWPPP) and its revisions, Laws and Regulations, and permit(s) applicable to the Project, including:
 - a. Contractor's general responsibilities for storm water discharges associated with construction activity.
 - b. SWPPP Revisions.
 - c. Inspection, during construction, of storm water controls and temporary erosion and sediment controls, and associated repair and maintenance.
 2. Administrative forms for documenting compliance with the SWPPP and the Project's storm water permit are attached to this Section.
- B. Scope:
1. Contractor shall provide all labor, materials, tools, equipment, services, and incidentals necessary and required to fulfill Contractor's responsibilities under this Section, including complying with the applicable general permit for storm water discharges associated with construction activity ("storm water permit") administered by City of Liberty, Missouri for the Project.
 - 1) Other prime Contractors shall cooperate and, as applicable to their Work, provide to the contractor responsible for preparing SWPPP Revisions such information necessary to prepare SWPPP Revisions relative to their Work.
 - 2) Other prime Contractors (other than contractor responsible for temporary storm water controls and temporary erosion and sediment controls) engaging in earthwork, including trenching, stockpiling soil or other erodible material, and backfilling, shall be co-permittee with Owner on the Project's storm water permit, and shall comply with the SWPPP and other applicable permits and with requirements for controlling discharges of storm water and erosion and sediment, control requirements associated with their Work. Such other prime Contractors engaging in earthwork shall coordinate their earthwork with contractor responsible for the temporary storm water controls and temporary erosion and sediment controls on a daily basis, and submit to Engineer complete Notice of Termination documents.
 2. Requirements of this Section are in addition to, and do not supersede or conflict with, requirements of other Specifications, including:
 - a. Section 01 41 24 - Permit Requirements.
 - b. Section 01 57 05 - Temporary Controls, including requirements for controlling storm water during construction and temporary erosion and sediment controls.
- C. Related Requirements:
1. Include, but are not necessarily limited to:
 - a. Section 01 41 24 - Permit Requirements.
 - b. Section 01 57 05 - Temporary Controls.

1.2 REFERENCES

- A. Relevant Documents:
1. Storm Water Pollution Prevention Plan (SWPPP):

- a. Initially prepared for the Project by or for Owner, prior to construction, the SWPPP was submitted to authorities having jurisdiction over storm water discharges associated with construction activity.
 - b. The SWPPP is part of the Contract Documents and includes:
 - 1) This Section.
 - 2) Section 01 57 05 – Temporary Controls, relative to temporary storm water controls and temporary provision and sediment controls.
 - 3) Required temporary erosion and sediment controls shown on the Drawings.
 - c. The SWPPP is intended to establish requirements so that the Project's construction complies with the Project's storm water permit and other, related permits (if any).
2. Storm Water Permit for the Project:
 - a. Application for the Project's storm water permit was prepared by or for Owner and, prior to construction, was submitted to the authority having jurisdiction.
 - b. The Project's storm water permit is part of the Contract Documents and is an attachment to this Section.
 - c. Prior to starting Work at the Site that disturbs ground cover, Contractor shall sign Co-Permittee Agreement and become a co-permittee with Owner on the Project's storm water permit.
 3. Erosion and Sediment Control Permit:
 - a. Application for the Project's erosion and sediment control permit was prepared by or for Owner and, prior to construction, was submitted to City of Liberty, Missouri, which is the authority having jurisdiction over erosion and sediment control during construction.
 - b. Erosion and sediment control permit are part of the Contract Documents and is an attachment to this Section.
 4. SWPPP Revisions:
 - a. SWPPP Revisions shall be prepared by Contractor or Subcontractor and submitted to Engineer by Contractor.
 - b. Contractor shall submit SWPPP Revision prior to starting Work at the Site, and as required by authorities having jurisdiction.
 - c. SWPPP Revision shall include Contractor's proposed temporary means for storm water control during all phases of the Work and include plans for storm water conveyance and retention, as applicable. Coordinate with Contractor's plans for excavation and filling.
 - d. Should Contractor-propose deviations to the SWPPP included in the Contract Documents, or if Project-specific modifications of the SWPPP are required because of field conditions, Contractor shall prepare and submit additional SWPPP Revisions as necessary, in accordance with requirements of authorities having jurisdiction and applicable permits.
 - e. Comply with this Section's Article titled, "SWPPP Revisions".
 - f. SWPPP Revisions shall use the SWPPP Revision form included in this Section, with supporting documents attached as necessary and required, or forms available from authorities having jurisdiction.
 - g. SWPPP Revisions that do not comply with the Contract Documents and are not required by authorities having jurisdiction will be regarded as substitutions, in accordance with the General Conditions and substitution procedures requested by the Specifications.
 5. Storm Water Certification Statement:
 - a. To be prepared by Contractor and submitted to Engineer on the form included with this Section, or on appropriate form obtained from authority having jurisdiction.
 - b. Do not perform Work at the Site until the Storm Water Certification Statement has been submitted to and accepted by Engineer.

Notice of Intent (NOI):

- c. Prepared by Owner or Engineer and submitted to authorities having jurisdiction following Engineer's receipt and acceptance of Contractor's SWPPP Revision and preliminary Progress Schedule.

- d. NOI will be submitted to authorities having jurisdiction by Engineer within 10 days of Engineer's acceptance of Contractor's SWPPP Revision and preliminary Progress Schedule.
 - e. Do not perform Work at Site until NOI is submitted to authorities having jurisdiction.
- 6. Co-Permittee Agreement:
 - a. Prepared by Contractor using forms included with the SWPPP, and submitted to Engineer within five days of the date the Contract Times commence running, for signature by Owner.
 - b. Engineer will submit co-permittee agreement to authorities having jurisdiction.
 - c. Do not perform Work at the Site until co-permittee agreement is submitted to authorities having jurisdiction.
- 7. Storm Water Inspection Report:

Prepared by Engineer's Resident Project Representative (RPR) using the appropriate form included in this Section, or appropriate form provided by authority having jurisdiction.

 - a. Storm water inspection reports will be filed in a log book kept at the Site by RPR. Copy of each storm water inspection report will be furnished to Contractor upon Contractor's request.
 - b. Storm water inspection report will be completed for each of the following:
 - 1) Preconstruction: After installation of temporary storm water management measures, including erosion and sediment controls, and temporary field offices and other temporary facilities, prior to starting Work at the Site (other than mobilization and initial establishment of temporary controls).
 - 2) During the Work: Every seven days until Notice of Termination is completed. When the Site is stabilized relative to storm water, erosion, and discharge of sediment, inspection frequency during temporary shutdowns of construction and seasonal shutdowns of construction shall be once per month until Notice of Termination is completed.
 - 3) Final: Final inspection report will be prepared prior to completion of Notice of Termination.
- 8. Notice of Termination (NOT):
 - a. Prepared by Contractor on the form included in the Project's storm water permit and submitted to Engineer for review and signature by Owner.
 - b. Engineer will submit the NOT to authorities having jurisdiction.
 - c. Contractor shall submit the NOT following completion of all Work that may result in pollution in storm water discharges, including landscaping Work.
 - d. Final payment to Contractor will not be made until the NOT is submitted to authorities having jurisdiction in accordance with this provision and the Project's storm water permit.

1.3 CONTRACTOR'S GENERAL RESPONSIBILITIES UNDER THIS SECTION

- A. The Contract Price includes all labor, material, tools, equipment, services, and incidental costs necessary for:
 - 1. Preparing SWPPP Revisions and other documents that are Contractor's responsibility, in accordance with this Section.
 - 2. Installing and maintaining structural and non-structural items used in complying with the SWPPP and its revisions.
 - 3. Other administrative Work required by this Section.
 - 4. Clean-up, disposal, and repairs following precipitation events or spills caused by Contractor.
 - 5. Implementing and maintaining "best management practices", as defined in applicable permits and Laws or Regulations, to comply with requirements that govern storm water discharges at the Site.
 - 6. Complying with other requirements of this Section.
- B. Storm Water Pollution Prevention and Approval of System Owner:

1. Prevent erosion on the Site and discharge of sediment to surface waters, drainage routes, streets and rights-of-way, and private property, including dewatering operations.
 2. Prevent onsite trash, debris, and other pollutants from leaving the Site via storm water runoff.
 3. Provide berms, swales, and other appropriate methods of directing storm water around work areas to appropriate drainage routes.
 4. Prior to starting the Work associated with such discharge of storm water, construction-related discharges to publicly-owned conveyance or treatment systems shall be approved by owner of system to which the discharge will be directed.
- C. Water Quality:
1. Do not cause or contribute to a violation of water quality standards, Laws or Regulations, or the Project's storm water permit.
 2. Notify Engineer of revisions to the SWPPP, update the SWPPP, and implement SWPPP changes necessary to prevent any violations of the stormwater permit.
- D. Liability for Costs Incurred due to Violations:
1. Contractor shall pay civil penalties and other costs incurred by Owner, including additional engineering (including RPR) and inspection services, associated with non-compliance with applicable permits related to storm water discharges associated with construction activity and erosion and sediment controls associated with the Project.
 2. Owner may deduct such amounts, as one or more set-offs, from payments due Contractor for the Project.
- E. Inspections and Recordkeeping:
1. Contractor shall perform inspections of storm water, and erosion and sediment controls in accordance with this Section
 2. Resident Project Representative (RPR) shall prepare and maintain records of storm water inspections.
 3. Contractor shall maintain records of maintenance of storm water controls and temporary erosion and sediment controls, SWPPP Revisions, and other records required by this Section and shall keep these records and copies of all documents that make up the SWPPP at the construction site and available to the inspector and engineer that may need to review them.
- F. Coordination:
1. Coordinate requirements of this Section with requirements for earthwork, temporary and permanent erosion and sediment controls, and landscaping in the Contract, applicable permit requirements, and Laws and Regulations.
 2. Implement SWPPP controls and practices prior to starting other Work at the Site. Each prime contractor and Subcontractor identified in the SWPPP and SWPPP Revisions shall sign a copy of the storm water certification statement.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Comply with Laws and Regulations, including federal, state, and local, relative to storm water discharges associated with construction activity, and associated restoration. Comply with applicable permits.

1.5 SUBMITTALS

- A. Informational Submittals: Submit the following:
1. Submit the following, in accordance with Paragraph 1.2.A and Article 1.6 of this Section. When the Project involves Work at multiple sites, submit each of the following for each Site, as applicable:
 - a. SWPPP Revisions.
 - b. Co-permittee Agreement.
 - c. Storm Water Certification Statement.
 2. Storm Water Site Plan Updates:

- a. Within three days after each storm water inspection, submit updated storm water site plan.
- B. Closeout Submittals: Submit the following:
 - 1. Notice of Termination:
 - 2. Submit in accordance with Paragraph 1.2.A and Article 1.6, “SWPPP Revisions”, of this Section.
 - 3. When the Project involves Work at multiple sites, submit separate Notice of Termination for each Site, as applicable.

1.6 SWPPP REVISIONS

- A. Contractor shall prepare a SWPPP Revision in accordance with the Project’s storm water permit when:
 - 1. There is a significant change in design, construction, operation, or maintenance of the Project that significantly affects the potential for discharging pollutants.
 - 2. SWPPP proves ineffective relative to:
 - a. Eliminating or significantly minimizing discharge of pollutants from sources identified in the SWPPP required by the Project’s storm water permit; or
 - b. Achieving general objectives of controlling pollutants in storm water discharged from permitted construction activity.
 - 3. Prepare and submit SWPPP Revisions identifying responsibilities of Contractor, Subcontractors, and other prime contractors (if any) at the Site, relative to implementing part of the SWPPP.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 INSPECTIONS AND REPAIRS

- A. Perform site inspections and assessments of the Site as required by the Project’s storm water permit and this Section. Inspections and assessments shall be by Contractor’s site superintendent or project manager, together with RPR.
- B. Inspections:
 - 1. After the Effective Date of the Contract, relative to the Project’s storm water permit, inspect the Site:
 - a. Preconstruction: After controls required to comply with the SWPPP, including temporary erosion and sediment controls and other temporary controls necessary for mitigating or eliminating pollution in storm water discharged from the Site, are installed and prior to starting other Work at the Site.
 - b. During Construction: At the interval called out within the SWPPP until Notice of Termination is completed and submitted to authority having jurisdiction. When the Site is stabilized relative to storm water and pollution sources that may impair quality of storm water discharged from the Site, temporary shutdowns of construction activity, and during seasonal shutdowns of construction activity, required frequency of inspections shall be at the interval called out within the SWPPP until Notice of Termination is completed.
 - c. Prior to Contractor submitting the Notice of Termination.
 - 2. During each inspection:
 - a. Inspect and verify erosion and sediment control physical controls and practices, and other controls of pollution of storm water discharges associated with construction activity.
 - b. For temporary erosion and sediment controls, record the approximate degree of sediment accumulation as percentage of acceptable sediment storage volume. Where

- appropriate, obtain measurements of sediment accumulation to support reasonably accurate estimation of sediment accumulation.
- c. Inspect and record maintenance performed on physical controls for erosion and sedimentation, and for other sources of storm water pollution.
 - d. Inspect (where possible) and verify pollution control management practices performed and practices for managing and maintaining such physical controls.
 - e. Record maintenance performed on physical controls for storm water pollution.
 - f. Observe and record deficiencies relative to implementation of the SWPPP.
- 3. RPR or Engineer will complete Storm Water Inspection Report (on the form attached to this Section).
 - 4. Contractor shall record and submit the following:
 - a. Storm Water Site Plan: On a copy of the Site plan included in the Drawings or other map of the Site acceptable to Engineer, indicate extent of all areas of disturbed ground cover and drainage pathways. Indicate areas expected to undergo initial disturbance of ground cover or significant site work within the next 14 days.
 - b. Indicate on storm water Site plan areas of Site that have undergone temporary or permanent stabilization of ground cover and other erodible materials.
 - c. Indicate on storm water site plan all disturbed areas that have not undergone active site work during the previous 14 days.
 - C. Maintain at the Site a copy of storm water Site plans from each storm water inspection and submit each storm water Site plan to Engineer and RPR. RPR will maintain at the Site a log book with a copy of each Storm Water Inspection Report.
 - D. Cooperate with representatives of authorities having jurisdiction during their periodic visits to the Site, and promptly furnish information requested by authorities having jurisdiction.
 - E. Repair physical controls of storm water pollution, including (but not limited to temporary erosion and sediment controls), in accordance with applicable requirements and to satisfaction of Engineer, within two days of each inspection (unless shorter period is required elsewhere in the Contract Documents).

3.2 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Specifications Section:
 - 1. Forms:
 - a. Storm Water Inspection Report form (two pages).
 - b. Storm Water Permit Certification form (one page).
 - c. SWPPP Revision Form (one page).
 - 2. Permits:
 - a. The Project's storm water permit for storm water discharges associated with construction activity (____ pages).
 - b. The Project's erosion and sediment control permit (____ pages).

END OF SECTION

STORM WATER INSPECTION REPORT

Owner: _____
Site: _____
Project: _____
Contractor: _____

Date of Inspection: _____
Day of Week: S M T W T F S
Sheet No. _____ of _____ sheets

If pertinent to the Operation	
Weather:	
Temperature:	

This inspection and maintenance form is to be used when the Work is subject to a Storm Water General Permit for Construction Activity. Inspections shall be performed not less than once every seven calendar days; for sites that are stabilized and temporarily shut down inspections may be reduced to once per month. Each erosion and sediment control measure installed on the Site is to be inspected and the Contractor must complete all required maintenance within two calendar days from the date of inspection.

- Reason for this inspection:**
- ☐ Pre-construction Site assessment
 - ☐ Seven calendar day inspection
 - ☐ Monthly inspection (when Site is stabilized and shut down)
 - ☐ Post-construction inspection prior to Notice of Termination

Key for erosion and sediment control measures to be inspected: [Use the following designations in the table below] (1) mulch, (2) seed and mulch, (3) check dams, (4) hay bale/straw bales, (5) silt fence, (6) sediment trap, (7) turbidity curtains, (8) pipe slope drains, (9) drainage structure inlet protection, (10) rolled erosion control products, (11) soil stabilizers, (12) construction entrances, (13) pipe inlet/outlet protection, (14) water diversion structures, (15) sedimentation basins, (16) cofferdams, (17) Other_____.

ID	Location	Disturbance		Measure		Remarks (Evaluate integrity of measure, describe evidence of erosion)	Approximate Sediment Accumulation (% of Depth)	Maintenance Required? (Y or N) (If Yes, Describe Below)
		Existing? (Y or N)	Next 14 Days? (Y or N)	Code #	Temp or Perm? (T, P or NA)			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

ID	Location	Disturbance		Measure		Remarks (Evaluate integrity of measure, describe evidence of erosion)	Approximate Sediment Accumulation (% of Depth)	Maintenance Required? (Y or N) (If Yes, Describe Below)
		Existing? (Y or N)	Next 14 Days? (Y or N)	Code #	Temp or Perm? (T, P or NA)			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

DESCRIPTION OF REQUIRED MAINTENANCE AND ANY EXISTING DEFICIENCIES IN THE SWPPP:
Specify for each location using row ID number from the table above.

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein may be punishable by Law.

Signature _____	Prepared _____	Copy to Contractor _____
Resident Project Representative	(Date)	(Date)

Qualified Professional Name _____
(w/Firm Name, if Consultant)

STORM WATER PERMIT CERTIFICATION STATEMENT

Contract Number: _____

Project: _____

Owner _____

Each Contractor and Subcontractor identified in the Storm Water Pollution Prevention Plan (SWPPP) must certify that they understand the permit conditions and their responsibilities. Every Contractor and Subcontractor performing an activity that involves soil disturbance shall sign this certification and submit it to the Engineer prior to performing the Work. This certification shall be signed by an owner, principal, president, secretary, or treasurer of the firm.

I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction Site identified in such SWPPP as a condition of authorization to discharge storm water. I also understand that my firm and its employees and Subcontractors shall comply with the terms and conditions of Owner's general permit for storm water discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards, Laws, or Regulations.

Firm: _____

Address: _____ **City:** _____ **State:** _____ **Zip:** _____

Name (Print): _____ **Signature:** _____ **Date:** _____

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REVISION

Owner: _____

Date of Inspection: _____

Site: _____

Sheet No. _____ of _____ sheets

Project: _____

Contractor: _____

This form shall be used when revisions to the current Storm Water Pollution Prevention Plan (SWPPP) are required by the Storm Water General Permit for Construction Activity or the Contract Documents.

Reason for the Revision(s): Revisions were requested by State: ☐ Yes ☐ No

Describe the Revision(s) to the SWPPP:

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein may be punishable by Law.

Signature: _____ **Prepared:** _____ **Submitted:** _____
(Date) (Date)

Copy to: ☐ Engineer ☐ Contractor: _____

SECTION 01 57 05

TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for temporary controls during construction, including:
 - a. Noise control.
 - b. Temporary pest and rodent controls.
 - c. Pollution control, including solid waste, water pollution, atmospheric pollution, and other types of pollution.
 - d. Odor control.
- B. Scope:
 - 1. Contractor shall provide and maintain materials, equipment, labor, services, and temporary construction as necessary and required to control environmental conditions at the Site and adjacent areas during construction.
 - 2. Contractor shall pay all costs, including fines and civil penalties, if any, for failure to implement and maintain temporary controls in accordance with the Contract Documents and Laws and Regulations. Contractor is not eligible for increase in Contract Price or Contract Times due to failure to comply with requirements for temporary controls.
 - 3. Maintain temporary controls until no longer necessary or required. Provide temporary controls at all times when Contractor is working at the Site.
- C. Related Requirements:
 - 1. Include, but are not necessarily limited to, the following:

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with applicable provisions and recommendations of the following:
 - a. Section 01 41 26 - Stormwater Pollution Prevention Plan and Permit.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Submit the following:
 - a. Shop Drawings:
 - 1) Plan for construction staging and maintenance of the Site relative to erosion and sediment controls. Indicate on a site plan approximate areas of planned disturbance of soils and soil cover over time during the Project. For areas not indicated in the Contract Documents as being disturbed and that Contractor proposes to disturb, Shop Drawing shall include proposed erosion and sediment control measures for the additional areas.
 - 2) Location and details of each temporary settlement basin.
 - b. Product Data:
 - 1) Silt fencing materials.
 - 2) Other materials proposed for temporary erosion and sediment controls, when requested by Engineer.
- B. Informational Submittals:
 - 1. Submit the following:
 - a. Procedural Submittals:
 - 1) Proposed dust control measure, when Submittal is requested by Engineer.
 - b. Field Quality Control:
 - 1) When requested by Engineer, promptly obtain and submit results of field measurements and field test data substantiating compliance of Contractor's temporary controls with the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS FOR TEMPORARY EROSION AND SEDIMENT CONTROLS

- A. Materials for temporary erosion and sediment controls shall be as shown or indicated on the Drawings.

PART 3 - EXECUTION

3.1 NOISE CONTROL

- A. Noise Control – General:
 - 1. Contractor's vehicles, construction equipment, and machinery shall minimize noise emissions to greatest degree practicable. When necessary, provide mufflers and silencers on construction equipment, machinery, and vehicles, and provide temporary sound barriers sound-absorbing blankets, sound-reducing enclosures, modified backup alarms, and other mitigation measures when necessary.
 - 2. Noise threshold levels shall comply with Laws and Regulations, including (a) OSHA requirements and recommendations, and (b) local ordinances or other Laws or Regulations.
 - 3. Noise emissions shall not interfere with the work of Owner, facility manager (if other than Owner), or others. The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning and emergency purposes only.
 - 4. Music or entertainment systems, including personal and vehicle radios, media players, and the like, when used, shall not be audible at the property line and shall not disturb others at the Site.
 - 5. Field Quality Control of Noise:
 - a. If Owner or Engineer believes potential exists that allowable noise levels are being exceeded, Contractor will be required to, and shall promptly perform, appropriate noise monitoring in presence of Owner or Engineer and shall submit written results to Engineer.
 - b. Owner and Engineer reserve the right to perform independent noise monitoring at any time during the Work.
 - 6. If noise level exceeds allowable maximum, Contractor shall immediately cease the activity emitting the excessive noise and promptly implement noise-mitigating measures to comply with noise limitations.

3.2 DUST CONTROL

- A. Dust Control – General:
 - 1. Control objectionable dust caused by Contractor's operation of vehicles and construction equipment and machinery, site clearing, demolition, cleaning, and other actions. To minimize airborne dust, apply water or use other methods subject to acceptance of Engineer and approval of authorities having jurisdiction.
 - 2. Contractor shall prevent blowing and movement of dust from exposed soil surfaces and access roads to reduce onsite and off-Site damage, inconvenience, nuisances, and health hazards associated with dust emissions from Contractor's activities.
- B. Dust Control Methods:
 - 1. Dust control may be accomplished by irrigation in which the dust-prone work activity or area of the Site is sprinkled with water until the surface is moist.
 - 2. Apply dust controls as frequently as necessary or required without creating inconveniences, nuisances, or hazards, such as excessive mud and ponding of water at or adjacent to the Site. Do not use water for dust control when water will cause hazardous or objectionable conditions such as ice, mud, ponds, and pollution.
 - 3. Provide dust control that is non-polluting and does not contribute to tracking-out of dirt, mud, and dust onto pavement.
 - 4. Do not allow water used for dust control to discharge to storm water drainage system or surface waters.
 - 5. Where appropriate, reduce travel speed of construction vehicles and construction equipment to reduce the potential for dust emissions arising from vehicle and equipment passage.
 - 6. Where appropriate, apply gravel or other appropriate binder to access roads and parking areas.
- C. Removal of Dust and Dirt from Pavement and Other Travelled Ways:
 - 1. Remove dust, mud, and dirt from roads, parking areas, and other travelled ways.

2. Perform dust and dirt removal from travelled ways by mechanical wet vacuum sweeping or other method acceptable to Engineer.
 3. Remove mud from roads, parking areas, and other travelled ways by appropriate means, including scraping. Avoid damaging surface of travelled way. Remedy damage to roads, parking areas, and travelled ways resulting from mud removal activities.
- D. Removal of Dust and Dirt from Buildings and Structures:
1. When dust and dirt from Contractor's activities has accumulated to a noticeable or objectionable extent (compared with preconstruction conditions) on buildings or structures, remove the dust and dirt caused by Contractor's operations by appropriate methods, including power-washing using mild detergent. Remedy damage caused by dust, dirt, and power-washing.
 2. Dust in sensitive equipment, such as electrical and control panels, instruments, HVAC systems and other equipment shall be cleaned by a Subcontractor specializing in cleaning such items.
 3. During the Project, remove objectionable and noticeable dust, dirt, and mud in areas occupied by Owner or facility manager, and Contractor's work areas, resulting from Contractor's activities. Owner and facility manager will take reasonable measures to avoid tracking dust, dirt, and mud into their occupied areas.

3.3 PEST AND RODENT CONTROL

- A. Pest and Rodent Control – General:
1. Provide pest and rodent controls as necessary to prevent infestation of the Site, storage areas, and adjacent areas.
 2. Pests and rodents include, but are not limited to: flies, mosquitoes, gnats, midges, stinging insects, other insects and the like, worms, rats, mice, moles, voles, and similar animals, raccoons, skunks, objectionable numbers and species of birds, and others.
 3. Implement appropriate pest and rodent controls when pests, rodents, or both are apparent at the Site or offsite storage, staging, or laydown areas.
 4. Control or remove pests and rodents from adjacent properties when Contractor's activities have fostered or exacerbated pest or rodent problems. For example, ground vibration, such as that associated with horizontal directional drilling, may cause migrations of subterranean animals such as moles and voles. Coordinate with affected property owners regarding appropriate control methods, materials, equipment, and disposal techniques.
- B. Methods, Materials, and Equipment for Pest and Rodent Control during Construction:
1. Employ methods and use materials and equipment for pest and rodent control that do not adversely affect conditions at the Site or on adjacent and nearby properties.
 2. Do not use control methods or poisons injurious to household pets or animals other than targeted pests and rodents.
 3. Avoid control methods that present hazards to humans, including children.
- C. Disposal of Pests and Rodents:
1. In accordance with Laws and Regulations, promptly and properly dispose of pests and rodents trapped or otherwise controlled. Do not bury or dispose of deceased animals at the Site or in adjacent areas.

3.4 WATER CONTROL

- A. Water Control – General:
1. During the Project, provide methods to appropriately control storm water, surface water, water from excavations and structures, groundwater flows altered by Contractor's activities, and groundwater discharges from the Site, to prevent damage to the Work, the Site, adjacent properties, and downstream properties.
 2. Control trenching, filling, and grading to direct water away from excavations, pits, tunnels and other construction areas, and prevent water from entering existing buildings and structures.
 3. Properly manage and control storm water, surface water, and groundwater entering the Site from upstream, where such flows or discharges have potential to affect the Work or to be exacerbated by Contractor's activities.
 4. Avoid ponding of water onsite, except in specially-designated, temporary settlement basins. Where water ponding occurs during construction, perform rough grading to eliminate ponding.
 5. Prevent water from discharging onto roads, parking areas, paved or finished areas, and other travelled ways. Prevent storm water runoff from discharging across access roads and parking areas.

- B. Materials, Equipment, and Facilities for Water Control:
 - 1. Provide, operate, and maintain materials, equipment, and facilities of adequate size, materials, and capacity to control storm water, surface water, groundwater, and discharges from tanks.
- C. Discharge and Disposal of Water during Construction:
 - 1. Discharge storm water, surface water, and groundwater from the Site, and discharges of clean water from tanks, to proper discharge locations, in accordance with Laws and Regulations and the Contract Documents.
 - 2. Prevent damage and nuisances arising from water discharges on the Site and discharges from the Site.
 - 3. Dispose of water in manner that avoids flooding, erosion, sediment transport, and other damage, in accordance with Laws and Regulations.
 - 4. Avoid overland discharges from the Site and construction activities to adjacent properties,
 - 5. Water discharges from the Site and construction activities shall be via a storm water drainage route or conduit with sufficient capacity for the flow under associated weather and flow conditions and in accordance with requirements of authorities having jurisdiction
 - 6. Do not discharge storm water, surface water, groundwater, or clean water from tanks, into sanitary sewers. Obtain consent of sewerage system owner before discharging such flows into existing combined sewers.
 - 7. Obtain sewerage system owner's consent and approval before discharging polluted water to sewerage system.

3.5 POLLUTION CONTROL

- A. Pollution Control – General:
 - 1. Provide means, methods, and facilities necessary and required to prevent contamination of soil, water, and atmosphere caused by accumulation or discharge of substances and materials that are either noxious, polluting, or both, from or caused by construction and related activities.
 - 2. Construction equipment and machinery shall comply with Laws and Regulations.
- B. Spills and Contamination:
 - 1. Perform emergency containment, cleanup, and remedy of spills and contamination resulting from construction and related activities. Promptly remove and properly dispose of contaminated soils and liquids.
 - 2. Excavate contaminated material and properly dispose of off-Site, and replace with suitable compacted fill and appropriate cover.
- C. Protection of Surface Water and Groundwater:
 - 1. Provide and maintain appropriate, temporary measures to prevent harmful substances from entering surface water, groundwater, and drinking water. Prevent disposal of wastes, effluents, chemicals, and the like into or adjacent to groundwater, surface water, drainage routes (including swales, ditches, and storm sewers) and drinking water.
 - 2. Obtain sewerage system owner's consent and approval prior to discharging into sanitary sewers or combined sewers. Do not discharge pollutants not in accordance with Laws and Regulations into combined sewers, or sewers tributary to combined sewers, when wet weather overflows to receiving waters may occur.
- D. Atmospheric Pollutants:
 - 1. Provide and maintain temporary controls for atmospheric pollutants resulting from construction and related activities, whether to outdoor or indoor atmospheres.
 - 2. Prevent harmful dispersal of pollutants into atmosphere.
 - 3. Do not discharge exhaust from internal combustion engines or combustion operations into buildings, structures, or near ventilation intakes for buildings or structures.
 - 4. Prevent toxic and noxious concentrations of chemicals, fumes, and vapors.
- E. Solid Waste:
 - 1. Provide and maintain temporary controls for managing solid waste related to the Work.
 - 2. Prevent solid waste from:
 - a. Becoming airborne or blowing in the wind.
 - b. Being inadvertently transmitted to adjacent, offsite properties, and areas of the Site not part of the Project.
 - c. Being deposited in or discharging to surface waters, and drainage routes..

3. Properly handle and dispose of solid waste. Burning or burying solid waste, including unused materials, at the Site or adjacent areas is prohibited.
4. Cleaning and Disposal of Debris: Comply with applicable requirements of the General Conditions, as may be modified by the Supplementary Conditions.
5. Do not mix or store in the same container solid waste containing Constituents of Concern (and constitutes, or may constitute, a Hazardous Environmental Condition) with solid waste that does not contain Constituents of Concern.
6. Store solid waste in appropriate, covered, containers.
7. Promptly, and at regular intervals, remove solid waste from the Site for transport and disposal in accordance with Laws and Regulations.

3.6 ODOR CONTROL DURING CONSTRUCTION

A. Odors – General:

1. Avoid discharges of unpleasant or noxious odors from construction and related activities. Whether nature of the Work is such that odor generation is unavoidable, provide appropriate temporary controls for odors.
2. Give priority to avoiding odor generation, followed by:
 - a. Counteracting (treating the cause of) odors.
 - b. Containing odors.
 - c. Odor masking as the last resort for odor control.

3.7 EROSION AND SEDIMENT CONTROLS

A. Installation and Maintenance of Temporary Erosion and Sediment Controls – General:

1. General Provisions:
 - a. Provide temporary erosion and sediment controls as shown and indicated on the Drawings and as indicated in this Section and elsewhere in the Contract Documents, and as necessary for compliance with Laws and Regulations.
 - b. Provide erosion and sediment controls as the Work progresses into areas where ground cover was previously undisturbed.
 - c. Use necessary and required methods to appropriately control erosion and sediment transport in storm water runoff, including using soil conservation-oriented construction practices (including scheduling and sequencing), vegetative measures, and temporary physical controls.
 - d. Use best management practices (BMP) in accordance with Laws and Regulations, and regulatory requirements indicated in this Section's "Quality Assurance" Article (unless more-stringent requirement are shown or indicated in the Contract Documents), to control erosion and sediment transport in storm water runoff during the Project.
 - e. Plan and execute disturbances of soils and soil cover, and earthwork by methods to control storm water runoff from exposed soil (including stockpiles, borrow areas, and spoil disposal areas), banks of surface waters affected by the Work, and discharges of groundwater, to prevent erosion and sediment transport.
 - f. Where areas must be cleared for storage of materials or equipment, or for temporary facilities, provide measures for regulating storm water discharges and controlling erosion and sediment transport. Where Owner is a co-permittee with Contractor for applicable permits, or when plans for temporary erosion and sediment controls were sealed and signed by Engineer, such methods are subject to Engineer's approval or acceptance, as applicable.
 - g. Provide erosion and sediment controls, including stabilization of soils, at the end of each workday.
2. Coordination:
 - a. Coordinate temporary erosion and sediment controls with this Section's requirements on water control and Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.
 - b. Coordinate temporary erosion and sediment controls with construction of permanent drainage facilities, permanent erosion controls and soil stabilization (if any), and other Work, to the extent necessary for effective and continuous erosion and sediment controls.
3. Before commencing activities that will disturb soil or soil cover at the Site or other areas to be occupied by Contractor during the Project, provide all appropriate temporary erosion and sediment controls required by the Contract Documents for the areas where soil or soil cover will be disturbed.
4. Vegetation Removal and Disturbance:

- a. Remove only those shrubs, grasses, trees, and other vegetation that must be removed for construction.
- b. Protect undisturbed vegetation. Do not wantonly or unnecessarily drive construction vehicles and equipment over undisturbed vegetation and soil cover.
- c. Promptly stabilize exposed soil where vegetation or soil cover was unnecessarily disturbed. Fill and restore ruts and damage to vegetation and soil cover caused by wanton or unnecessary passage of construction vehicles and equipment.
5. Access Roads and Parking Areas:
 - a. When possible, locate and construct temporary access roads and parking areas to avoid adverse effects on the environment.
 - b. Provide measures to regulate drainage, avoid erosion and sediment transport in storm water runoff, and minimize damage to vegetation and soil cover.
6. Earthwork and Temporary Controls:
 - a. Perform excavation, fill, and related activities in accordance with Section 31 23 00 - Earthwork.
 - b. Temporary erosion and sediment control measures may include, but are not limited to, using berms, swales and ditches, silt fencing, straw bale sediment barriers, gravel or crushed stone, mulching and soil stabilization, slope drains, and other methods. Apply such temporary measures to erodible soils and other erodible materials exposed by construction activities.
 - c. Minimize areas of bare soil exposed at one time. Provide fills and spoil areas by selectively placing fill and spoil materials to reduce or eliminate exposed erodible soils.
 - d. Exercise special care on and above steep slopes, where disturbance of vegetation and soil cover shall be minimized to greatest extent reasonably practicable.
 - e. Protect stockpile storage not in active use by providing suitable, durable covering prevent sediment transport in storm water runoff and windblown transport. Covering shall be suitable for outdoor exposure.
7. Inspection and Maintenance:
 - a. Periodically inspect areas of non-stabilized, erodible soils, including all areas of soil cover disturbance and stockpiles, for evidence of start of erosion and sediment transport. Promptly implement corrective action as necessary and appropriate to control erosion and sediment transport. Continue inspections and corrective action until soils are permanently stabilized and permanent vegetation has been appropriately established.
 - b. Inspect not less often than the frequency indicated in Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.
 - c. Repair or replace damaged erosion and sediment controls within 24 hours of Contractor becoming aware of such damage.
 - d. Periodically remove sediment that has accumulated in or behind sediment and erosion controls. Remove sediment not less often than when sediment is at approximately one-half of storage capacity of associated control element, unless more-frequent interval is indicated elsewhere in the Contract Documents. Properly dispose of sediment.
8. Duration of Temporary Erosion and Sediment Controls:
 - a. Maintain temporary erosion and sediment controls in effective, working condition until soil cover of the associated storm water drainage area has been permanently stabilized.
9. Work Stoppage:
 - a. If the Work is temporarily stopped or suspended for any reason, Contractor shall provide additional temporary controls necessary to prevent environmental damage to the Site and adjacent areas while the Work is stopped or suspended.
 - b. When temporary erosion and sediment controls remain in place during periods of stopped or suspended Work, continue to perform Contractor's obligations relative to periodic inspection and maintenance of temporary erosion and sediment controls, including removal of accumulated sediment.
10. Failure to Provide Adequate Temporary Erosion and Sediment Controls:
 - a. If Contractor repeatedly fails to satisfactorily control erosion and sediment transport in storm water runoff, Owner reserves the right to use Owner's own forces or employ a third-party contractors for temporary erosion and sediment control. Owner's costs for such work, including engineering and inspection costs, will be deducted from amounts due Contractor, as set-offs in accordance with the Contract Documents.

B. Erosion and Sediment Control Permit:

1. Comply with permit requirements indicated in Section 01 41 24 - Permit Requirements.

C. Silt Fencing:

1. Provide and maintain silt fencing in a vertical plane, at the locations shown or indicated in the Contract Documents and where necessary or required.
2. Locations of Temporary Silt Fencing:
 - a. Where possible, provide silt fencing along contour lines, so each run of silt fencing is at the same elevation.
 - b. On slopes, provide temporary silt fencing at intervals that do not exceed the maximum indicated in the following table:

Silt Fence Spacing on Slopes	
Slope (percent)	Maxim Allowable Length of Slope Above Each Silt Fence (feet)
2 and less	150
2.1 to 5	100
5.1 to 10	50
10.1 to 20	25
20.1 to 25	20
25.1 to 40	15
40.1 to 50	10

- c. Provide temporary silt fencing around perimeter of each stockpile of topsoil, general fill material, and excavated spoil material. Install silt fencing before expected soil is subject to precipitation. Maintain until stockpile is removed.
 - d. Do not install temporary silt fencing at the following types of locations:
 - 1) Area of concentrated storm water flows such as ditches, swales, or channels.
 - 2) Where rock or rocky soils prevent full and uniform anchoring of silt fencing.
 - 3) Across upstream or discharge ends of storm water conduits.
 3. Installation:
 - a. Securely fasten wire mesh to posts, and securely fasten filter cloth to wire mesh.
 - b. When two sections of filter cloth are adjacent to each other, fold over edges and overlap by not less than 6 inches and securely fasten to wire mesh.
 - c. Embed posts in the ground to the depth necessary for proper controls; embed posts to not less than 16 inches below ground.
 - d. Filter cloth and wire mesh shall extend not less than 8 inches below ground and not less than 16 inches above ground.
 - e. Remove accumulated sediment from behind silt fencing as necessary or required. Repair and reinstall silt fencing as necessary or required.
 4. Maintenance:
 - a. Do not allow formation of concentrated storm water flows on slopes above temporary silt fencing unless so shown or indicated in the Contract Documents. If unauthorized concentrated storm water flows occur, stabilize the slope via other appropriate stabilization methods as necessary and required to prevent flow of concentrated storm water flows toward temporary silt fencing.

D. Straw Bale Dike.

1. Provide temporary straw bale dikes where shown or indicated and where necessary or required, including in swales, along contours, and along toe of slopes.
2. Provide temporary straw bales in shallow excavation as wide as the bale and approximately 4 to 6 inches below surrounding grade.
3. Ends of straw bales shall tightly abut ends of adjacent straw bales.
4. Securely install each straw bale using two support posts, driven into the ground not less than 1.5 to 2 feet below bottom of straw bale. Top of post shall be flush with top of straw bale. Angle first post for each straw bale toward the previously-installed straw bale.

5. Frequently inspect straw bales and repair or replace as required. Remove accumulated sediment and debris from behind straw bales.
- E. Mulching and Soil Stabilization:
1. Use mulching to temporarily stabilize exposed soil, including spoil and fill materials.
 - a. Immediately following final grading, provide mulch and stabilize with mats or netting, or sprayed soil stabilization emulsion with fiber additive.
 - b. Application of mulching for soil stabilization shall be as follows.
 - 1) Non-Rotted Straw or Salt Hay: Provide 1.5 to two tons per acre.
 - 2) Soil stabilization emulsions, when used, shall be applied in accordance with manufacturer's instructions, and shall be applied with mulch or stabilization fibers.
 - 3) Wood-Fiber or Paper-Fiber Application: Provide 1,500 pounds per acre, installed by hydroseeding.
 - c. Where mats or netting are used:
 - 1) Cover entire area to be stabilized with mats or netting.
 - 2) Provide anchoring trenches at the top and bottom of slopes to receive mats or netting. Bury at least the top and bottom ends of mat or netting, 4 inches or more wide, at top and bottom of slope. Ensure that mesh or netting is secure and will not wash out over time. Tamp trench full of soil. 4 inches from trench, secure mat or netting with appropriate staples at intervals of 10 inches.
 - 3) Overlap adjacent strips of mat or netting by not less than 4 inches.
- F. Protection of Storm Water Drainage Inlets and Catch Basins:
1. Protect each drainage inlet and catch basin that has potential to receive storm water runoff from exposed soils and does not discharge into a storm water settlement basin.
 2. Provide temporary inlet filter bags inside of drainage inlet or catch basin in accordance with inlet filter bag manufacturer's instructions. Secure inlet filter bag with the structure's grate or by other acceptable means.
 3. Inlet filter bags shall not pose any obstruction, above the preconstruction elevation of the drainage inlet or catch basin grate that would necessitate or require temporary barricades or warning lights.
 4. When removing sediment from inlet filter bags, do not dump filter bag's contents into the drainage inlet or catch basin. Promptly remove from drainage inlets and catch basins sediment accidentally dumped into the structure.
 5. Remove sediment from inlet filter bags, or replace inlet filter bags, when inlet filter bag is not more than half-full.
- G. Temporary Settlement Basin:
1. For constructing embankments comply with requirements in Division 31 Specifications on embankments, excavation, and fill.
 2. Overflow Weir and Discharge Pipe:
 - a. Provide piping in accordance with manufacturer's instructions. Where permanent piping will be used for temporary settlement basin, provide piping in accordance with the Contract Documents and fully clean piping prior to Substantial Completion.
 - b. Provide overflow weirs at elevation(s) shown or indicated on the Drawings. When not shown or indicated in the Contract Documents, discharge weir elevation(s) shall be in accordance with design by licensed, professional civil engineer retained by Contractor or Subcontractor. Such design and temporary construction shall avoid overtopping and overfilling of settlement basin without short-circuiting the settlement basin's hydraulic performance.
 - c. Wrap and secure geotextile material specified for temporary silt fencing around discharge structures of temporary settlement basins
 3. Crushed Stone and Riprap: Provide in accordance with Division 31 Specifications on excavation, fill, and riprap. Provide in areas of temporary settlement basin subject to erosion, and at upstream and downstream ends of each settlement basin's discharge piping.
 4. Remove sediment when necessary or required, based on accumulation of material.
 5. When temporary settlement basin is no longer required, remove the temporary settlement basin discharge weir, discharge piping, and spillway, fill the temporary settlement basin to required grade in accordance with requirements of Division 31 Specifications on excavation and fill, and provide landscaping in accordance with the Contract Documents.
- H. Filter Bag on Dewatering Pump Discharge:

1. Provide dewatering of excavations in compliance with Section 31 23 00 - Earthwork.
 2. Locate filter bags and temporary pump discharge lines to avoid interfering with the public, use of private and public property, and Owner's and facility manager's operations. Relocate filter bags and appurtenances when necessary or required.
 3. Filter bag discharge shall be directed to appropriate storm water drainage route. Do not discharge into roads, driveways, access roads, parking areas, other travelled ways, or overland. When temporary settlement basin is used, locate filter bags to discharge to temporary settlement basin when practicable.
 4. Provide filter bag on discharge of each dewatering pump drawing from an excavation or other area with exposed soil.
 5. Securely attach filter bag to pump discharge pipe or hose.
 6. Maintain, clean out, and replace filter bags as necessary or required.
- I. Temporary Stone Construction Entrance:
1. Where shown on the Drawings, and where construction vehicles will regularly transition to paved surfaces from unstabilized surfaces, provide temporary stone construction entrance. Contractor vehicles and mobile construction equipment and machinery shall use temporary stone construction entrances.
 2. Provide temporary stone construction entrances of the width, length, and thickness shown or indicated on the Drawings. When not shown or indicated on the Drawings, temporary stone construction entrance shall be not less than 50 feet long, by 20 feet wide, by 8 inches deep.
 3. Installation:
 - a. Ensure that subgrade under each temporary stone construction entrance is suitably dense for the intended purpose and dry. Suitably prepare subgrade as necessary for temporary stone construction entrance.
 - b. Provide on subgrade a layer of geotextile separation fabric, installed in accordance with geotextile separation fabric manufacturer's recommendations for separation.
 - c. Provide stone on installed geotextile separation fabric. Grade the stone for passage of vehicles.
 4. Maintenance:
 - a. Maintain temporary stone construction entrance at not less than the minimum required thickness. Add stone as required to maintain thickness.
 - b. When upper layer of temporary stone construction entrance becomes contaminated with soil, mud, or other material, remove the contaminated material and replace with clean stone.
 - c. Using water to wash down temporary construction entrance or paved areas onto which soil material has been tracked is unacceptable.

3.8 REMOVAL OF TEMPORARY CONTROLS

- A. Removals – General:
1. Unless otherwise indicated elsewhere in this Section in requirements for respective temporary controls, upon completion of the associated Work and when temporary controls are no longer necessary, remove temporary controls and restore the Site to condition in accordance with the Contract Documents; if condition is not shown or indicated, restore the Site to pre-construction condition.
 2. After soils are permanently stabilized, remove from the Site temporary erosion and sediment controls.

END OF SECTION

SECTION 01 61 03
COMMON WORK RESULTS FOR EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements of this Specification Section apply to all equipment provided on the Project including those found in other Divisions even if not specifically referenced in individual "Equipment" Articles of those Specification Sections.
- B. Related Sections include but are not necessarily limited to:
1. Section 03 15 19 - Anchorage to Concrete.
 2. Section 03 00 05 - Concrete.
 3. Section 05 50 00 - Metal Fabrications.
 4. Section 09 96 00 - High Performance Industrial Coatings.
 5. Division 26 - Electrical.
 6. Division 40 - Process Interconnections.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Bearing Manufacturers Association (ABMA).
 2. American Gear Manufacturers Association (AGMA).
 3. American Petroleum Institute
 - a. API 686 - Recommended Practice for Machinery Installation and Installation Design
 4. ASTM International (ASTM):
 - a. E1934, Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography.
 - b. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 5. Hydraulic Institute (HI):
 - a. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values.
 6. International Electrotechnical Commission (IEC).
 7. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
 8. International Organization for Standardization (ISO):
 - a. 1940, Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances.
 - b. 21940-11, Mechanical Vibration - Rotor Balancing - Part 11: Procedures and Tolerances for Rotors with Rigid Behavior.
 9. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 6, Enclosures for Industrial Control and System.
 - c. MG 1, Motors and Generators.
 10. InterNational Electrical Testing Association (NETA):
 - a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.
 11. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 12. National Institute for Certification in Engineering Technologies (NICET).
 13. National Institute of Standards and Technology (NIST).
 14. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 15. Underwriters Laboratories, Inc. (UL).

- a. 508, Standard for Safety Industrial Control Equipment.
 - b. 508A, Standard for Safety Industrial Control Panels.
 - c. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
- 16. Vibration Institute.
- B. Electrical Equipment and Connections Testing Program:
 - 1. Qualification requirements as specified in other sections.
- C. Miscellaneous:
 - 1. A single manufacturer of a "product" shall be selected and utilized uniformly throughout Project even if:
 - a. More than one manufacturer is listed for a given "product" in Specifications.
 - b. No manufacturer is listed.
 - 2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations shown on Electrical Power Drawings and defined in the Electrical specifications.

1.3 DEFINITIONS

- A. Product: Manufactured materials and equipment.
- B. Major Equipment Supports - Supports for Equipment:
 - 1. Located on or suspended from elevated slabs with supported equipment weighing 2000 pounds or greater, or;
 - 2. Located on or suspended from roofs with supported equipment weighing 500 pounds or greater, or;
 - 3. Located on slab-on-grade or earth with supported equipment weighing 5000 pounds or more.
- C. Equipment:
 - 1. One or more assemblies capable of performing a complete function.
 - 2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
 - 3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.
- D. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- E. Baseplate or equipment base plate or machine base
 - 1. Are fabricated frames of structural shapes and plates with enough strength and sturdiness to serve as the surface to which other equipment is attached to and supported by. Baseplates can be directly mounted and grouted to concrete equipment support bases or machined and bolted to a sole plate.
- F. Sole plate
 - 1. A thick steel machined plate that is attached to and grouted to a concrete equipment support base.
 - 2. Base plates are bolted to a sole plate when a sole plate is specified and/or provide.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. General for all equipment:
 - a. Data sheets that include manufacturer's name and complete product model number.
 - 1) Clearly identify all optional accessories that are included.

- b. Acknowledgement that products submitted comply with the requirements of the standards referenced.
- c. Manufacturer's delivery, storage, handling, and installation instructions.
- d. Equipment identification utilizing numbering system and name utilized in Drawings.
- e. Equipment installation details:
 - 1) Location of anchorage.
 - 2) Anchorage setting templates.
 - 3) Manufacturer's installation instructions.
- f. Equipment area classification rating.
- g. Shipping and operating weight.
- h. Equipment physical characteristics:
 - 1) Dimensions (both horizontal and vertical).
 - 2) Materials of construction and construction details.
- i. Equipment factory primer and paint data.
- j. Manufacturer's recommended spare parts list.
- k. Equipment lining and coatings.
- l. Equipment utility requirements include air, natural gas, electricity, and water.
- m. Ladders and platforms provided with equipment:
 - 1) Certification that all components comply fully with OSHA requirements.
 - 2) Full details of construction/fabrication.
 - 3) Scaled plan and sections showing relationship to equipment.
- 2. Mechanical and process equipment:
 - a. Operating characteristics:
 - 1) Technical information including applicable performance curves showing specified equipment capacity, rangeability, and efficiencies.
 - 2) Brake horsepower requirements.
 - 3) Copies of equipment data plates.
 - b. Piping and duct connection size, type and location.
 - c. Equipment bearing life certification.
 - d. Equipment foundation data:
 - 1) Equipment center of gravity.
 - 2) Criteria for designing vibration, special or unbalanced forces resulting from equipment operation.
 - 3) Type, size, and materials of construction of anchorage.
 - 4) Data required by Section 03 15 19 Anchorage to Concrete for anchor rod design.
- 3. Systems schematics and data:
 - a. Provide system schematics where required in system specifications.
 - 1) Acknowledge all system components being supplied as part of the system.
 - 2) Utilize equipment, instrument and valving tag numbers defined in the Contract Documents for all components.
 - 3) Provide technical data for each system component showing compliance with the Contract Document requirements.
 - 4) For piping components, identify all utility connections, vents and drains which will be included as part of the system.
- 4. For factory painted equipment, provide paint submittals in accordance with Section 09 96 00.
- 5. Qualifications for:
 - a. Electrical equipment and connections testing firm and personnel.
- 6. Equipment Monitoring and Testing plans, in accordance with PART 3 of this Specification Section:
 - a. Electrical equipment and connection testing.
- B. Factory Test Reports:
 - 1. Equipment performance tests.
 - a. As listed in individual equipment specifications.

- C. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- D. Informational Submittals:
 - 1. Certification from equipment manufacturer that all manufacturer-supplied control panels that interface in any way with other controls or panels have been submitted to and coordinated with the supplier/installer of those interfacing systems.
 - 2. Submit sample Manufacturer's Field Service Report (MFSR). Report shall use manufacturer's standard report or use the form in the Exhibits and have at least the following information:
 - a. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.
 - b. Certification for major equipment supports that equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the equipment provided.
 - c. Motor test reports.
 - d. Field noise testing reports if such testing is specified.
 - e. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
 - f. Provide three bound final written reports documenting natural frequency testing, vibration monitoring and testing for specified equipment.
 - 1) Include the acceptance criteria of all equipment tested.
 - 2) Provide individual tabbed sections for information associated with each piece of tested equipment.
 - g. Certification prior to Project closeout that electrical panel drawings for manufacturer-supplied control panels truly represent panel wiring including any field-made modifications.
 - h. Testing and monitoring reports in accordance with PART 3 of this Specification Section.
 - 3. Submit completed Manufacturer's Field Service Report (MFSR) for each piece of equipment supplied.

PART 2 - PRODUCTS

2.1 ACCESSORIES

- A. Anchorage:
 - 1. Cast-in-place anchorage:
 - a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
 - b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.
 - c. Provide two nuts for each bolt.
 - 2. Drilled anchorage:
 - a. Adhesive anchors per Section 03 15 19.
 - b. Epoxy grout per Section 03 00 05.
 - c. Threaded rods same as cast-in-place.
- B. Lifting Eye Bolts or Lugs:
 - 1. Provide on all equipment 50 pounds or greater.
 - 2. Provide on other equipment or products as specified in the narrow-scope Specification Sections.
- C. Platforms and Ladders:
 - 1. Design and fabricate in accordance with OSHA Standards.

2. Fabricate components from aluminum.
3. Provide platform surface: Non-skid checkered plate, unless specified in narrow-scope Specification Sections.

2.2 FABRICATION

- A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.
- B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.
- C. Furnish like parts of duplicate units to be interchangeable.
- D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.
- E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.
 1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.
- F. Provide common, lipped base plate mounting for equipment and equipment motor where said mounting is a manufacturer's standard option.
 1. Provide drain connection for 3/4 inches PVC tubing.
- G. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that cannot be properly prepared and painted.
 1. When such back to back fabrication cannot be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
- H. Equipment Base
 1. Adequate grout and vent openings to allow grout to flow under entire base.

2.3 SHOP OR FACTORY PAINT FINISHES

- A. Electrical Equipment:
 1. Provide factory-applied paint coating system(s) for all electrical equipment components except those specified in Section 09 96 00 to receive field painting.
 - a. Field painted equipment: See Section 09 96 00 for factory applied primer/field paint compatibility requirements.
- B. Field paint other equipment in accordance with Section 09 96 00.
 1. See Section 09 96 00 for factory applied primer/field paint compatibility requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment as shown on the Drawings and other Contract Documents, in accordance with manufacturer's written instructions, and in accordance with Laws and Regulations. Where the Contract Documents, manufacturer's written instructions, or Laws and Regulations conflict, obtain interpretation or clarification from Engineer before proceeding.
- B. Utilize appropriate templates for anchorage placement for equipment installed on concrete.
- C. Equipment Drainage Discharges:
 1. For equipment having drainage requirements, such as seal water, provide 3/4-inch copper, PVC, or clear plastic tubing from drainage discharge at equipment base to nearest floor drain or equipment drain. Do not discharge liquid across floors.
 2. Furnish and install bell up at each equipment base.

3. Route equipment drainage piping clear of major traffic areas, to discharge to locations approved by Engineer. To extent practical, avoid creating tripping hazards.
- D. Coordination of Equipment Supports and Bases with Structures:
 1. Do not construct foundations until major equipment supports are approved by Engineer.
- E. Concrete Equipment Support Bases:
 1. Install level in both directions, with acceptable vertical tolerance of 1/4-inch±.
 2. At anchorage locations, install bases flat and level.
- F. Grouting:
 1. Level onto equipment base with jack screws in accordance with the Contract Documents, provide a dam or formwork around base to contain grout between equipment base and equipment support pad.
 2. Preparation:
 - a. Extend dam or formwork to cover leveling shims and blocks.
 - b. Anchor sleeves:
 - 1) Required for equipment (Pumps, Mixers, Blowers) greater than 50 hp
 - 2) If anchor sleeves were used, fill voids in anchor sleeves with foam or room temperature vulcanizing (RTV) silicone to keep grout from filling sleeves.
 - c. Do not use nuts below the machine base to level the unit.
 - d. Saturate top of roughened concrete surface with water before grouting.
 3. Grout Installation:
 - a. Install grout until entire space under machine base is completely filled to underside of base. Voids are unacceptable.
 - b. Puddle grout by working a stiff wire through the grout and vent holes, to ensure grout is installed properly and to release air entrained in grout or base cavity.
 4. After Grout Installation:
 - a. When grout is sufficiently hardened, remove dam or formwork and finish exposed grout surface to fine, smooth surface.
 - b. Completely cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too-rapid evaporation of water from grout.
 - c. Check for voids by tapping along the top deck of the mounting plate. A solid thud indicates grout-filled areas while a drum-like hollow sound indicates a void requiring filling.
 - 1) Void areas are to be filled by drilling 1/8 inches NPT holes in opposite corners of each void area. Grout to be pumped into one void with a grout gun until grout emerges from the other vent hole.
 - d. When grout is fully hardened (after not less than seven days), remove jack screws, and tighten nuts on anchor bolts and similar anchors to required torque.
 - e. Inspect and verify levelness of machine base and, if not in accordance with requirements, remedy by removing base and reinstalling in accordance with the Contract Documents.
 - f. Inspect driver-driven equipment for proper alignment. When not in accordance with requirements, remedy so that the Work is not defective.

3.2 INSTALLATION CHECKS

- A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.
 1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.
- B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:
 1. Has been properly installed and lubricated.
 2. Is in accurate alignment.

3. Is free from any undue stress imposed by connecting piping or anchor bolts.
4. Has been operated under full load conditions and that it operated satisfactorily.
 - a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.
- C. No separate payment shall be made for installation checks.
 1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

- A. Identify equipment and install hazard warning signs in accordance with Section 10 14 00.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

- A. For required field painting and protective coatings, comply with Section 09 96 00, High Performance Industrial Coatings.

3.5 WIRING CONNECTIONS AND TERMINATION

- A. Clean wires before installing lugs and connectors.
- B. Coat connection with oxidation eliminating compound for aluminum wire.
- C. Terminate motor circuit conductors with copper lugs bolted to motor leads.
- D. Tape stripped ends of conductors and associated connectors with electrical tape.
 1. Wrapping thickness shall be 150 percent of the conductor insulation thickness.
- E. Connections to carry full ampacity of conductors without temperature rise.
- F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

- A. General:
 1. Furnish equipment manufacturer's field quality control services and testing as specified in the individual equipment Specification Sections.
 2. Execute pre-demonstration requirements in accordance with Section 01 75 00.
 3. Perform and report on all tests required by the equipment manufacturer's Operation and Maintenance Manual.
 4. Provide testing for all equipment furnished or installed as part of the Work.
 5. Repair or replace equipment shown to be out of range of the acceptable tolerance until the equipment meets or exceeds acceptable standards.
 6. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
 - a. Contract Drawings and Specifications.
 - b. Related construction change documentation.
 - c. Approved Shop Drawings.
 - d. Approved Operation and Maintenance Manuals.
 - e. Other pertinent information as required.
- B. Equipment Monitoring and Testing Plans:
 1. Approved in accordance with Shop Drawing submittal schedule.
 2. Included as a minimum:
 - a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
 - b. List and description of testing and analysis equipment to be utilized.
 - c. List of all equipment to be testing, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
- C. Instruments Used in Equipment and Connections Quality Control Testing:

1. Minimum calibration frequency:
 - a. Field analog instruments: Not more than 6 months.
 - b. Field digital instruments: Not more than 12 months.
 - c. Laboratory instruments: Not more than 12 months.
 - d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
 2. Carry current calibration status and labels on all testing instruments.
 3. See individual testing programs for additional instrumentation compliance requirements.
- D. and Monitoring Program Documentation:
1. Provide reports with tabbed sections for each piece of equipment tested.
 2. Include all testing results associated with each piece of equipment under that equipment's tabbed section.
 - a. Include legible copies of all forms used to record field test information.
 3. Prior to start of testing, submit one copy of preliminary report format for Engineer review and comment
 - a. Include data gathering and sample test report forms that will be utilized.
 4. In the final report, include as a minimum, the following information for all equipment tested:
 - a. Equipment identification, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
 - b. Date and time of each test.
 - c. Ambient conditions including temperature, humidity, and precipitation.
 - d. Visual inspection report.
 - e. Description of test and referenced standards, if any, followed while conducting tests.
 - f. Results of initial and all retesting.
 - g. Acceptance criteria.
 - h. "As found" and "as left" conditions.
 - i. Corrective action, if required, taken to meet acceptance.
 - j. Verification of corrective action signed by the Contractor, equipment supplier, and Owner's representative.
 - k. Instrument calibration dates of all instruments used in testing.
 5. Provide three (3) bound final reports prior to Project final completion.
- E. Other Testing:
1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.
 2. Subbase that supports the equipment base and that is made in the form of a cast iron or steel structure that has supporting beams, legs, and cross members that are cast, welded, or bolted shall be tested for a natural frequency of vibration after equipment is mounted.
 - a. The ratio of the natural frequency of the structure to the frequency of the disturbing force shall not be between 0.5 and 1.5.

3.7 DEMONSTRATION

- A. Demonstrate equipment in accordance with Section 01 75 00.

3.8 ABBREVIATION TABLE

- A. As indicated on the Drawings.

END OF SECTION

EXHIBIT A

MANUFACTURER FIELD SERVICE REPORT

This field service report is generic in nature. An electronic copy of this form will be furnished upon request from the Engineer. This report is to reflect that all requirements of the Operations and Maintenance Manual and the individual equipment specification requirements have been performed for the installation and operation and also to provide a baseline for amperage draw for each phase, vibration readings, rotation, alignment and all other applicable tests required to insure that the equipment has been installed properly. A MFSR will be required for each individual piece of equipment requiring a MFSR.

Definitions of Reports:

Initial service report: Required for construction preparations. Equipment delivered to site is in good condition and conforms to specification requirements. Anchor bolts, hardware and ancillary items (piping, flanges, conduits, fuel/power supply) are compatible with equipment.

Interim service report: Required for equipment installation onto base or foundation. Piping connections, electrical and control connections or structural attachment are complete. For equipment stored on site over four weeks, interim service report will document that manufacturer's long-term storage procedures have been incorporated and equipment has not been damaged, nor coatings deteriorated.

Final service report is to be completed when equipment can be started, electrical amperage and voltage draw measured, cold and hot alignments performed, vibration testing and monitoring performed and the equipment is found to be in compliance with Manufacturer's operating parameters and the requirements of the individual equipment specifications.

PROJECT: _____

Report Status:

Initial Service Report completed and submitted on _____

Interim Service Report completed and submitted on _____

Final Service Report completed and submitted on _____

Commencement of Warranty _____

I Description

A. Equipment Name and Identification: _____

B. Serial Number: _____

C. Specification Section Number: _____

D. Manufacturer: _____

E. Representative: _____

F. Type of Service: Initial [] Interim [] Final []

II General Review

A. The above referenced equipment/material/supplies have been inspected, checked, and adjusted. Yes [] No []

Summary: _____

B. The above referenced equipment/material/supplies were placed upon properly prepared or suitable substrate. N/A [] Yes [] No []

Summary: _____

C. The above referenced equipment/material/supplies are free from any undue stress imposed by any connected piping, anchor bolts or any other load. N/A [] Yes [] No []

Summary: _____

- D. The above referenced equipment/material/supplies have operated under design conditions.
N/A ☐ Yes ☐ No ☐

Summary: _____

- E. The above referenced equipment/material/supplies have been installed in accordance with the manufacturer's recommendations and the Procurement Documents, require no corrective work, and are hereby approved. Yes ☐ No ☐

Summary: _____

- F. The above referenced equipment/material/supplies are acceptable to the manufacturer as installed providing the following corrective action(s) are performed:

1. _____
2. _____
3. _____
4. _____
5. _____

III Inspection Checklist

Item	Acceptable (Yes/No)	Readings/Comments
Bearings (1)		
Belts (tension reading)		
Lubrication Levels		
Vibration (1) (2) (MILS/SEC)		
Infrared Thermography (1) (2)		
Starting AMPS		
Full Load AMPS		
Volts		
Rotation		
Jacket Temperature (DEGF)		
Seal Water Flow Rate (GPH or GPM)		
Seal Water Pressure (PSI)		
O-rings/Packing		
Alignment (1)		
Anchor Bolts		

Item	Acceptable (Yes/No)	Readings/Comments
Anchor Bolt Torque		
Grout		
Substrate Approval		
Sound level (4 feet from unit) (1) (dB)		
Other		

(1) Inspection or testing reports must be attached.

(2) Provide vibration testing and monitoring procedures for Engineer's review and approval prior to testing.

IV O&M Manuals

- A. The O&M manual as presented contains all information required for proper operation, maintenance, and instruction of this system. N/A ☐ Yes ☐ No ☐

Summary: _____

V Preventive Maintenance

- A. The preventive maintenance summary outlined in the O&M manual is acceptable for operation of the system throughout the warranty period. N/A ☐ Yes ☐ No ☐

Summary: _____

VI Operator Training/Classroom Instruction

- A. Training and instruction have been performed in accordance with the requirements of the Procurement Documents. N/A ☐ Yes ☐ No ☐

- B. Final Training/Classroom Instruction Completed on: _____

Summary: _____

VII Remarks

VIII Certification

I hereby certify, that I, [____], am a duly authorized representative of the manufacturer, that I am empowered by the manufacturer to inspect, approve, and operate his equipment, and that I am authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as modified herein. I also certify that all information contained herein is true and accurate.

By: _____
(Authorized Representative)

For: _____

Date: _____

IX Acknowledgments

By: _____

For: _____
(Contractor)

Date: _____

By: _____

For: _____
(Engineer)

Date: _____

SECTION 01 64 00
OWNER-FURNISHED PRODUCTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements and procedures for Owner-furnished materials and equipment to be installed by Contractor, including:
 - a. Tilted disc check valve.
 - b. Magnetic flow meter.
 - 2. Items purchased by Owner under one or more separate procurement contracts.
 - 3. Administrative requirements.
 - 4. Handling and storage of Owner-furnished items.
- B. Scope:
 - 1. Contractor shall provide labor, materials, tools, equipment, services, and incidentals shown, specified, and necessary for accepting, handling, insuring, storing, and maintaining as required, installing, checking out, starting-up, and completing Owner-furnished materials and equipment in accordance with the Contract Documents.

1.2 OWNER FURNISHED MATERIALS AND EQUIPMENT

- A. Items of equipment and materials to be furnished by Owner for installation by Contractor are indicated below.
 - 1. Materials and equipment currently in Owner's stock or possession to be installed by Contractor:
 - a. Installed by Contractor, currently located at Water Treatment Plant. Install at the location shown on the Drawings.
- B. Availability of Procurement Contract Documents:
 - 1. Procurement Contract is not Assigned: An electronic copy of the procurement contract documents was distributed with the construction Bidding Documents. Should such copy not be available to Contractor, an electronic copy, in portable document format (PDF), of the procurement contract documents is available from Engineer upon request. Contractor is responsible for printing and binding paper copies of the procurement contract documents needed by Contractor.
- C. For Owner-furnished materials and equipment obtained via one or more procurement contracts that are not assigned to Contractor, Engineer will keep Contractor informed of probable delivery dates of the materials and equipment included in the procurement contract.
- D. Owner's Responsibilities:
 - 1. Within 10 days after the Effective Date of the Contract, Owner will arrange for and deliver to Contractor an electronic copy (in portable document format; PDF) of each of seller's shop drawings, of which each will be delivered to Contractor), and other submittals as reviewed by Engineer or Owner. Such submittals, whether approved or otherwise, are not part of the Contract Documents.
 - 2. Owner shall arrange and pay for delivery to the Site of Owner-furnished materials and equipment obtained via procurement contracts.
 - 3. When procurement contract is not assigned to Contractor, upon delivery, Owner (who may be accompanied by Engineer, at Owner's option) shall inspect, jointly with Contractor, the materials and equipment delivered by seller. Where appropriate, Owner will arrange with seller to have seller's representative present at the delivery point to assist in visually inspecting the delivered materials and equipment.
 - 4. When procurement contract is not assigned to Contractor, the Owner will submit to seller claims for damage incurred in transit to the delivery location and shall replace damaged, defective, or nonconforming items of Owner-furnished materials and equipment obtained via procurement contract.
 - 5. When procurement contract is not assigned to Contractor, the Owner shall pay for services of seller's factory-trained representative to furnish consultation and advice during installation of associated Owner-furnished materials and equipment, to inspect, check, and approve installation before

operation, and to furnish technical advice and direction during start-up and field quality control activities for Owner-furnished materials and equipment. Extent to which services of seller's representative will be provided during installation will be in accordance with the procurement contract documents.

6. If services of seller's representative beyond the scope of such services set forth in the procurement contract document is desired by Contractor, or if such services are necessary as a result of defective Work by Contractor, Contractor shall arrange and pay for such services of seller's representative.
7. After Substantial Completion, Owner will operate and maintain the items obtained via procurement contract and coordinate directly with seller regarding matters of routine maintenance. When associated procurement contract is not assigned to Contractor, the Owner will communicate directly with seller regarding warranty-related matters. When procurement contract is assigned to Contractor, the Owner will communicate warranty-related issues to Contractor.

E. Contractor's Responsibilities:

1. Promptly upon Contractor taking custody, visually inspect Owner-furnished materials and equipment for completeness and damage.
 - a. When procurement contract is not assigned to Contractor and when Owner-furnished items are already in Owner's possession (as existing stock or inventory), visual inspection will be jointly with Owner (and others, if any, invited by Owner).
 - b. Regardless of whether procurement contract is assigned to Contractor or whether Owner-furnished items are from Owner's existing stock or inventory, promptly after visual inspection (but in no event later than two days), prepare and furnish to Owner (with copy to Engineer) list of missing, damaged, or nonconforming goods.
2. Builder's Risk Insurance Coverage:
 - a. Where builder's risk insurance for the Work is furnished by Contractor and the procurement contract is not assigned to Contractor, increase the amount of builder's risk insurance to be not less than the Contract Price plus the replacement value of Owner-furnished materials and equipment as indicated in the builder's risk insurance requirements in the Supplementary Conditions.
 - b. Furnish to Owner copies of evidence of such revised builder's risk insurance coverage.
3. Handle, store, protect, and maintain Owner-furnished materials and equipment, as indicated elsewhere in this Section.
4. Remedy of Damage Incurred While in Contractor's Custody:
 - a. For materials and equipment obtained via procurement contract, repair or replace Owner-furnished materials and equipment that are missing, lost, or damaged after receipt by Contractor. Replacements shall be in accordance with the associated Owner-prepared procurement contract documents.
 - b. For existing items already in Owner's inventory or possession at the start of the Work, remedy loss or damage to such items incurred during Contractor's custody. Rehabilitation or refurbishment of such items, when required by the Contract Documents, will be in accordance with the Contract Documents and paid under the Contract.
 - c. Contractor is not entitled to compensation for, or increase in Contract Price or Contract Times, for remedying damage or loss to Owner-furnished items incurred while in Contractor's custody.
5. Coordination with Submittals and Manufacturer Instructions:
 - a. For Owner-furnished materials and equipment obtained via procurement contract, coordinate with seller's shop drawings, samples, and other submittals including seller's written handling and installation instructions, reviewed and approved (or accepted) by Owner or Engineer, as applicable.
 - b. For existing items in Owner's inventory or possession at the start of the Work that are to be handled or installed by Contractor, coordinate with Owner-furnished copies of shop drawings and other submittals (if available), operation and maintenance manuals (if available), as furnished to Contractor for such items. Obtain from item's manufacturer written instructions on handling and installation for the item and comply with such written instructions and the Contract Documents.
6. Install, connect, check out, and start up Owner-furnished materials and equipment in accordance with manufacturer's written instructions, unless otherwise shown or indicated in the Contract Documents.
7. Perform field quality control activities for Owner-furnished items in accordance with the contract Documents. Where such items were obtained under one or more procurement contracts, Contractor shall coordinate with and cooperate with seller in performing field quality control activities.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Review installation procedures for Owner-furnished materials and equipment and coordinate installation of items to be installed with or before Owner-furnished materials and equipment.
- B. Scheduling:
 - 1. Schedule and perform the Work to coordinate with anticipated delivery dates for Owner-furnished materials and equipment, as indicated in Owner's procurement contract(s) therefor.
 - 2. Where Owner will furnish services of a manufacturer's representative for Owner-furnished materials and equipment, schedule and perform the Work in accordance with scheduling constraints of manufacturer's representative.
 - 3. Comply with the Contract Time indicated in the Contract Documents.

1.4 HANDLING AND STORAGE

- A. Handling:
 - 1. Handle Owner-furnished materials and equipment in accordance with the Contract Documents and the item manufacturer's written instructions. Handle so that warranties in effect are not voided.
- B. Storage:
 - 1. Store Owner-furnished materials and equipment in accordance with the Contract Documents and the item manufacturer's instructions. Store so that warranties in effect are not voided.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 71 33

PROTECTION OF THE WORK AND PROPERTY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for protecting the Work and property, including:
 - a. Accessing or entering property.
 - b. Temporary barricades and temporary warning lights and signs.
 - c. Responsibility to remedy damaged property.
 - d. Protecting natural habitats, including trees, plants, lawns and meadows, and wildlife.
 - e. Protecting Underground Facilities.
 - f. Protecting existing surface structures.
 - g. Protecting floors, walls, and roofs.
 - h. Protecting other installed items and landscaping.
- B. Scope:
 - 1. This Section augments requirements of the General Conditions as may be modified by the Supplementary Conditions regarding protection of the Work and property, including Underground Facilities.
 - 2. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required for protecting the Work and property in accordance with the Contract Documents.
- C. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 01 57 05 - Temporary Controls.

1.2 PROTECTION - GENERAL

- A. Contractor shall provide all precautions and programs and perform all actions necessary to protect personnel health and safety, and to protect the Work and all public and private property and facilities from damage, in accordance with the Contract Documents, Laws and Regulations, and other applicable requirements.
- B. To prevent damage, injury, and loss, Contractor's actions shall include the following:
 - 1. Providing measures for safety of all personnel at and adjacent to the Site, whether engaged in performing the Work, operating or maintaining the facility, or performing other functions for Owner or others.
 - 2. Storing construction equipment, machinery, tools, and similar items, materials and equipment to be incorporated into the Work, supplies, and other items in an orderly, safe manner that does not unduly interfere with progress of the Work or work of others, including Owner and facility manager (if other than Owner).
 - 3. Suitably storing materials and equipment to be incorporated into the Work, in accordance with the Contract Documents.
 - 4. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction and facilities.
 - 5. Frequently removing and disposing of rubbish, scrap materials, and debris, in accordance with the Contract Documents resulting from Contractor's operations.
 - 6. Providing temporary controls, including controlling pests and rodents, in accordance with the Contract Documents, including Section 01 57 05 - Temporary Controls.

PART 2 - PRODUCTS

2.1 TEMPORARY BARRICADES

- A. Materials and Construction - General:
 - 1. Temporary barricades shall be of materials that are either new or of good quality and sufficient for the intended purpose, exposure, and duration of use.

2. Provide temporary barricades of sturdy materials of grade, thickness, and durability sufficient for the probable loads to which they will be subject. Temporary barricades intended for fall prevention, such as railings and handrails on temporary stairs and temporary walkways and at openings, shall be in accordance with Laws and Regulations, including the applicable building and safety codes.
 3. Color: Use appropriately colored and reflective barricades, or paint barricades accordingly, to be visible at night and during periods of low visibility.
 4. Where owner of transportation right-of-way or transportation facility having jurisdiction or other authority having jurisdiction requires compliance with standards more stringent than the Contract Documents, comply with both the Contract Documents and requirements of the authorities having jurisdiction.
- B. Temporary Snow Fence-type Barriers:
1. Unless shown or indicated otherwise, temporary barrier shall be not less than snow fence-type, four feet high, orange-colored or other high-visibility color. Polyethylene material or other, similar, durable material. Mesh size 1.25-inch by 1.5-inch.
 2. Supports: Adequately support barriers to protect persons and property. Vertical supports may be timber, metal, or other appropriate material sufficient for the intended use, exposure, and duration of use. Properly secure fencing to supports with appropriate, stout, wire or other fastenings, sufficient to engage fencing for the intended use.

PART 3 - EXECUTION

3.1 ACCESSING OR ENTERING PROPERTY

- A. Accessing or Entering Property - General:
1. Use and occupy only lands and easements furnished by Owner, unless appropriate consent from property owner and occupants is obtained by Contractor.
 2. The foregoing applies to personnel, construction equipment and machinery, tools, vehicles, materials or equipment to be incorporated into the Work, supplies, temporary facilities, and other items or obstructions.

3.2 BARRICADES

- A. Temporary Barricades and Temporary Warning Lights and Signs - General:
1. All Work Areas:
 - a. Provide temporary barricades, warning lights, and warning signs for both indoor and outdoor Work, in accordance with Laws and Regulations and requirements of owners of affected property and facilities.
 - b. Warning Lights and Signage: From 30 minutes before terrestrial sunset to 30 minutes after terrestrial sunrise, provide and maintain not less than one temporary flashing light at each vehicle barricade and at other barriers and barricades as necessary.
 - c. Provide temporary barriers where shown or indicated, and where necessary to protect persons and property. At minimum, provide temporary barriers for all excavations that remain open during non-working hours.
 - d. Promptly replace temporary barricades that are damaged or are otherwise no longer capable of serving their intended function.
 2. Where the Work is performed on or adjacent to roadway, access road, other area travelled by motor vehicles, railroad, or similar transportation right-of-way, or public place:
 - a. Provide temporary barricades, temporary fences, temporary guard rails, temporary lights and warning signs, temporary danger signals, and other precautions for protecting persons, property, vehicles, and the Work.
 - b. Provide sufficient temporary barricades to keep vehicles from being driven on or into excavations and the Work under construction.
 3. Temporary Barriers for Areas Not Subject to Vehicular Traffic:
 - a. Provide temporary barriers around:
 - 1) Openings.
 - 2) Scaffolding.
 - 3) Temporary stairs and ramps.
 - 4) Around excavations.
 - 5) Around elevated walkways, slabs, and platforms.

- 6) Other areas that may present a fall-hazard or hazard to persons and property.
- b. Provide appropriate temporary barriers, warning signs and, where necessary, warning lights, at ground level and other low elevations, and at higher elevations. Protect persons and property from fall-hazards and protect persons and property at lower elevations from falling objects.
- 4. Duration of Temporary Barriers, Barricades, Signs, and Warning Lights:
 - a. Contractor's responsibility for maintaining temporary barriers, barricades, signs, and warning lights shall continue until the associated Work is substantially complete in accordance with the Contract Documents, unless other provision for protection are agreed to by the parties.
 - b. After Substantial Completion, protect Work and property during periods when Contractor is onsite: completing the remaining Work, performing correction period work, and performing warranty work.
- B. Temporary Snow Fence-type Barriers:
 - 1. Establish temporary barriers around excavations and other areas as necessary for the protection of persons and property.
 - 2. Install snow fence-type barriers vertical for entire height of barrier.
 - 3. Maintenance:
 - a. Maintain temporary snow fence-type barriers as necessary.
 - b. Repair or replace when damaged, when barrier (or any section thereof) is no longer vertical, or when barrier (or any section thereof) is no longer properly supported for its full height and .
 - c. Reinstall barriers promptly following temporary removals for performing work and where barrier installation has degraded over original temporary barrier installation.
 - 4. Removal:
 - a. Remove temporary barriers from the Site when associated excavation is properly filled and the area is sufficiently safe for persons and other property.

3.3 RESPONSIBILITY TO REMEDY DAMAGED PROPERTY

- A. Contractor to Remedy Damage:
 - 1. Contractor has full responsibility for preserving public and private property and facilities on and adjacent to the Site.
 - 2. Direct or indirect damage done by, or on account of, any act, omission, neglect (including inadvertent acts), or misconduct by Contractor (including any person or entity for whom contractor is responsible) in performing the Work, shall be promptly remedied by Contractor, at Contractor's expense, in accordance with the Contract Documents.
 - 3. If the Contract Documents do not show or indicate the required restoration, or remedy, restore or remedy the damage to condition equal or better than that existing before damage was done.
- B. Owner May Remedy:
 - 1. Should Contractor fail to protect and safeguard property and the Work after requests from Engineer or Owner, Owner reserves the right to implement measures to protect property and the Work.
 - 2. Cost of such Owner-implemented measures shall be paid by Contractor. Owner may deduct from payments due Contractor such amounts as set-offs in accordance with the Contract Documents.
 - 3. Such right, however, does not obligate Owner or Engineer to continuously monitor or have responsibility for protection of property and the Work, which responsibility is exclusively Contractor's.
 - 4. In exercising its rights under this provision, Owner will endeavor to give Contractor sufficient notice to allow Contractor to remedy the damage or defect within a reasonable time. However, if Owner or Engineer deems that the situation requires prompt remedy, Owner may act as quickly as Owner deems appropriate, without infringing on or mitigating Owner's rights under this provision and elsewhere in the Contract Documents

3.4 PROTECTION OF NATURAL HABITATS

- A. Tree and Plant Protection – General:
 - 1. Protect existing trees, shrubs, and plants on or adjacent to the Site, against unnecessary cutting, breaking, damage, and skinning of trunk, branches, bark, and roots.
 - 2. Protect irrigation servicing existing trees, shrubs, and plants on or adjacent to the Site that remain in place.
 - 3. Do not store materials or equipment or park construction equipment, machinery, or vehicles within foliage drip lines.

4. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.
 5. Burning is not allowed at or adjacent to the Site, including burning, in open fires or otherwise, trees, plants, debris, or other combustible materials.
 6. Within the limits of the Work, water trees and plants that are to remain, to maintain their health during construction operations.
 7. Cover exposed roots with burlap, and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by storm water runoff, erosion, flooding, and noxious materials in solution.
- B. Coordinate the Work in this Article with the following Specifications:
1. Section 31 10 00 - Site Clearing.
- C. Remedy of Damaged Trees:
1. If branches are damaged, prune branches immediately and protect as indicated below.
 2. If bark on trunk or major branches is scraped or damaged, using a sharp knife or other suitable cutting implement, clean the edge of the wound, leaving the bark smooth and tight against the wood. Avoid exposing more live tissue and do not remove too much healthy bark. Apply material indicated below.
 3. After pruning and cutting back damaged wood and bark, protect cut or damaged wood by applying emulsified asphaltic sealant specifically manufactured for sealing pruned and damaged trees. Apply sealant in accordance with sealant manufacturer's instructions, in manner acceptable to Engineer and tree owner.
 4. When directed by Engineer, remove and dispose of (at location away from the Site) damaged trees and plants (and parts thereof) that die or suffer permanent injury, and replace each such damaged tree and plant with new tree or plant of equal or better species and quality.
- D. Protection of Lawns and Meadows:
1. Protect lawns and meadows from unnecessary damage during performance of the Work.
 2. To extent practicable, do not drive vehicles, construction equipment, machinery, or wheeled items such as carts and wheelbarrows, across lawns and meadows.
 3. When existing lawn or meadow areas are disturbed, promptly stabilize exposed soil in accordance with Section 01 57 05 - Temporary Controls.
 4. Remedy damaged lawns and meadows in accordance with the Contract Documents. If not otherwise addressed in the Contract Documents, restore to preconstruction condition or better with the same or substantively similar species.
- E. Protection of Wildlife:
1. To extent practicable, avoid harming wildlife and damaging or destroying wildlife habitats, except for areas where the Work is to be located.
 2. In the event a threatened or endangered species is discovered at the Site for which provisions was not otherwise provided, stop work in the vicinity and immediately orally advise Engineer by telephone or in-person, promptly followed by written notice in accordance with the Contract's provisions for notice for differing Site conditions. If species is not threatened or endangered, promptly resume work; no change in Contract Price or Contract Times is due for misidentification of threatened or endangered species.
 3. Contractor is not responsible for wholesale inventorying or Site-wide evaluation of wildlife at the Site, except as indicated in the paragraph immediately above this paragraph.

3.5 PROTECTION OF UNDERGROUND FACILITIES

- A. Underground Facilities – General:
1. Underground Facilities known to Owner and Engineer, except laterals or services to individual structures or properties, such as water, wastewater, storm water, gas and fuel, hydronic, steam, electric, and communications laterals or services, are shown on the Drawings. Information shown for Underground Facilities is the best available to Engineer but, in accordance with the General Conditions, as may be modified by the Supplementary Conditions, is not guaranteed to be correct or complete.
 2. Comply with Laws and Regulations regarding notification of utility owners prior to performing the Work, including necessary “call before you dig” notifications.

3. Contractor shall explore ahead of trenching and excavating Work and shall sufficiently uncover Underground Facilities that will or may interfere with the Work to determine their location, to prevent damage to Underground Facilities, and to prevent service interruption to structures and properties served by Underground Facilities.
 4. If Contractor damages an Underground Facility, Contractor shall promptly restore the damaged Underground Facility in accordance with requirements of the owner of the damaged facility and the Contract Documents. If the Contract Documents do not address repair or remedy of the damaged facility, restore to not less than preconstruction condition.
 5. Necessary changes in the location of the Work may be directed by Engineer to avoid Underground Facilities not shown or indicated on the Contract Documents.
 6. If permanent relocation of an existing Underground Facility is required and is not otherwise shown or indicated in the Contract Documents, Contractor may be directed in writing to perform the required work. When such relocation Work results in a change in the Contract Price, Contract Times, or both, the associated Contract modification procedures and payment for such Work shall be in accordance with the Contract Documents.
- B. Protection of Underground Facilities under Roads and Parking Areas:
1. Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and other Underground Facilities near to, or visible at, the ground surface.
 2. Avoid imparting heavy loads, especially transitory loading (such as heavy truck traffic), vibration forces, and impact loads on Underground Facilities that are close to the ground surface and below-grade work areas. Provide temporary bridging or other appropriate protection where traffic must pass over Underground Facilities in close proximity to the ground surface.
- C. Temporary Support of Underground Facilities:
1. Where Contractor exposes or excavates around or under one or more existing Underground Facilities, provide appropriate and adequate temporary supports for the associated Underground Facilities.
 2. Do not allow Underground Facilities exposed by Contractor's operations to remain exposed without temporary support necessary to properly protect the Underground Facility. Where joint of Underground Facility is exposed by excavation, provide temporary support for each exposed joint and other temporary support as necessary.
 3. Design of Temporary Supports:
 - a. Where necessary or where expressly required by the Contract Documents, retain services of professional engineer to design the temporary supports. Such professional engineer shall be experienced with the type and size of subject Underground Facility, structural engineering, and geotechnical engineering sufficient for the foundations of the temporary supports.
 - b. Temporary supports are not delegation of professional design responsibility unless expressly so indicated in the Contract Documents.
 - c. Responsibilities of Contractor's professional engineer shall include, but are not necessarily limited to, the following:
 - 1) Advising Contractor on investigations necessary to obtain information for design of temporary supports. Reviewing and considering results of such investigations in the design of temporary supports.
 - 2) Visiting the Site to make personal observations as needed.
 - 3) Identify appropriate design criteria for temporary supports.
 - 4) Preparing necessary calculations, design drawings, and design specifications (sealed and signed when required by Contract or Laws or Regulations), appropriately based on the associated soil conditions and subsurface conditions, considering the consequences of failure of the temporary supports and associated potential for damage or failure of the existing subject Underground Facility.
 - 5) Design temporary supports with a safety factor of not less than 2.0.
 - 6) Review and approve or take other appropriate action on submittals of shop drawings and product data for the temporary supports and related materials.
 - 7) Make periodic visits to the Site during erection of the temporary supports and at appropriate intervals thereafter to inspect the temporary supports during performance of other, adjacent Work.
 - 8) Issue to Contractor written recommendations for repairs and improvements necessary for the proper protection of the associated Underground Facility.

- 9) Submit to Contractor detailed, written recommendations for backfilling the excavation underneath and adjacent to the Underground Facility and for removing the temporary supports.
- d. Contractor shall comply with the professional engineer's design of the temporary supports.
- e. Owner may require and, in such event, Contractor shall submit, design documents, shop drawings, product data, and reports by Contractor-hired professional engineer. Do not submit such documents to Engineer. When such documents are furnished to Owner, the Owner has no obligation to perform any review of such documents and Owner's possession of such documents does not impart on Owner or Engineer any responsibility for or professional liability associated with design of such temporary supports and consequences of implementing such designs. Owner and Engineer are not obligated in any way to implement recommendations of Contractor's professional engineer.

3.6 PROTECTION OF EXISTING SURFACE STRUCTURES

A. Surface Structures – General:

1. Surface structures are existing buildings, structures, and other facilities at or extending above ground surface, including their foundations and any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage routes, exposed piping and utilities, poles, exposed wires and cabling, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.
2. Protect surface structures as necessary and promptly remedy damage and defects resulting or arising from Contractor's operations. Unless expressly shown or indicated otherwise in the Contract Documents, protect such items regardless of whether shown or indicated on the Drawings or elsewhere in the Contract Documents.
3. Protection of Overhead Utilities:
 - a. Protect visible, overhead utilities, including electrical power, communications, and piped utilities, and related supports, regardless of whether such items are shown or indicated in the Contract Documents.
 - b. When required by the Contract Documents or when acceptable to owner of such utility or facility, temporarily relocate overhead utilities or facilities as necessary perform the Work.
 - c. Provide temporary barriers, barricades, and warning signs identifying overhead utilities within reach of Contractor's construction equipment, machinery, or operations.

B. Temporary Removals of Surface Structures:

1. Existing surface facilities, including but not limited to guard rails, handrails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored promptly after the associated Work is performed.
2. Replace and restore such items in accordance with the Contract Documents. If not addressed in the Contract Documents, replace and restore such items to preconstruction condition or better.
3. Remedy damage to all items temporarily removed and later replaced and restored.
4. All such temporary relocations, replacement, and restoration is at Contractor's cost.

C. Protection of Surface Structures:

1. Sustain in their original location and protect from direct and indirect injury all surface structures located within or adjacent to the Site. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.
2. Before proceeding with the Work of sustaining and supporting such structure or facility, Contractor shall, upon Engineer's request, promptly satisfy Engineer that methods and procedures to be used have been approved by party owning the surface structure or facility.
3. Regardless of approval or acceptance by owner of property, structure, or facility, responsibility for protecting the Work and property is solely Contractor's.

3.7 PROTECTION OF FLOORS, WALLS, AND ROOFS

A. Protection of Floors, Walls, and Roofs – General:

1. Use proper protective covering when moving equipment, handling materials or other loads, when painting, handling mortar or grout, and when cleaning walls, ceilings, or structure contents.
2. Use metal pans to collect oil and cuttings from piping, conduits, and rod threading machines, and under metal cutting machines.
3. Maintain at the Site and use spill kits and absorbent pads for remedying spills.

4. Do not load concrete floors less than 28 days after concrete placement without Engineer's written permission.
5. Do not load slabs, floors, walls, or roofs in excess of design loading.
6. Do not load roofs without Engineer's written permission.
7. Restrict access to roofs, and keep Contractor's workers and personnel off existing roofs, except as necessary for the Work.
8. If access to roofs is necessary, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood, barricades, or other appropriate means.

3.8 PROTECTION OF INSTALLED MATERIALS, EQUIPMENT, AND LANDSCAPING

A. General:

1. Protect existing facilities and installed Work to prevent damage from subsequent operations.
2. Remove protective items when no longer needed, prior to Substantial Completion of the associated Work.
3. Where work will continue in adjacent area(s) after Substantial Completion of a portion of the Work, protect the substantially completed Work until all work in the area is complete.

B. Control traffic (foot traffic, wheeled items such as carts, vehicles, and other traffic) to prevent damage to equipment, materials, and surfaces.

C. Coverings:

1. Provide temporary coverings to protect materials and equipment from damage.
2. Cover: projections, wall corners and jambs, sills, and soffits of openings, in areas used for traffic and for passage of materials and equipment in subsequent work.
3. Fasten protective items without harming the Work. Use tape or adhesives that do not leave residue when removed.

END OF SECTION

SECTION 01 73 20
OPENINGS AND PENETRATIONS IN CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Methods of installing and sealing openings and penetrations in construction.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 05 50 00 - Miscellaneous Metals.
 - 2. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - d. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - e. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - f. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - g. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - h. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - i. A995, Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts.
 - 2. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 - 1) Article 501, Class I Locations.
 - b. 90A, Standard for Installation of Air Conditioning and Ventilating Systems.
 - c. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

1.3 DEFINITIONS

- A. Hazardous Areas: Areas shown in the Contract Documents as having Class I or Class II area classifications.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. For each structure provide dimensioned or scaled (minimum 1/8 inches = 1 foot) plan view drawings containing the following information:
 - a. Vertical and horizontal location of all required openings and penetrations.
 - b. Size of all openings and penetrations.
 - c. Opening type.
 - d. Seal type.
 - 2. Manufacturer's installation instructions for standard manufactured products.

1.5 PROJECT CONDITIONS

- A. For purposes of this Project, water table level is ground surface elevation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe Sleeves:
 - 1. All Areas:
 - a. Steel, painted in accordance with Specification Section 09 96 00.
 - b. Penetrations 24 inches diameter or less: ASTM A53, Schedule 40.
 - c. Penetrations larger than 24 inches diameter: ASTM A36, Minimum 1/4 inches thickness.
- B. Modular Mechanical Seals:
 - 1. Products and Manufacturers: Subject to compliance with the Contract Documents, the following items and manufacturers are acceptable in the Work:
 - a. Link-Seal, by Garlock.
 - b. PipeSeal, by Flexicraft Industries.
 - c. Or equal.
 - 2. Materials:
 - a. Modular Links: EPDM rubber.
 - b. Hardware: 316 Type stainless steel.
- C. Commercial Wall Castings:
 - 1. Ductile iron, ASTM A536.
 - 2. Grade equal to connecting piping system.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Fabricate pipe sleeves in accordance with Specification Section 05 50 00.
- B. Provide waterstop plate/anchor flange for piping, ducts, castings and sleeves cast-in-place in concrete.
 - 1. For fabricated units, weld plate to sleeve, pipe, or ductwork.
 - 2. For commercial castings, cast water stop/anchor with wall pipe.
 - 3. Plate is to be same thickness as sleeve, pipe, casting or ductwork.
 - 4. For fabricated units, diameter of plate or flange to be 4 inches larger than outside diameter of sleeve, pipe or ductwork.
 - 5. For commercial castings, waterstop/anchor size to be manufacturer standard.
 - 6. Provide continuous around entire circumference of sleeve, pipe, or ductwork.
- C. Factory or shop-coat painted components in accordance with Specification Section 09 96 00.

3.2 INSTALLATION AND APPLICATION

- A. Obtain prior approval from Engineer when any opening larger than 100 square inches must be made in existing or newly completed construction.
- B. Perform electrical penetrations in accordance with NFPA 70, Article 501.
- C. When mechanical or electrical work cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves, insets, fixtures or devices necessary to permit installation later.
 - 1. Lay out chases, holes or other openings which must be provided in masonry, concrete or other work.
- D. Size sleeves, blockouts and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.
- E. For insulated piping and ducts, size sleeves, blockouts and cutouts large enough to accommodate full thickness of insulation.
- F. Field Cutting and Coring:
 - 1. Saw or core drill with non-impact type equipment.
 - 2. Mark opening and drill small 3/4 inches or less holes through structure following opening outline.
 - 3. Sawcut opening outline on both surfaces.
 - a. Knock out within sawcuts using impact type equipment.
 - b. Do not chip or spall face of surface to remain intact.
 - c. Do not allow any overcut with saw kerf.

- G. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.
- H. Where area is blocked out to receive pipe penetration at a later date:
 - 1. If blockout size is sufficient to allow placement, utilize dowels for interface of initially placed concrete and sleeve encasement concrete which is placed later.
 - a. Size blockout based on sleeve size required plus 4 to 6 inches each side of sleeve for concrete encasement.
 - b. Provide #4 dowels at 12 inches spacing along each side of blockout with minimum of two dowels required per side.
 - 2. If blockout size is not sufficient to allow placement of dowels, provide keyway along all sides of blockout.
 - a. Size blockout based on sleeve size required plus 2 to 4 inches each side of sleeve for concrete encasement.
- I. Do not make duct or conduit penetrations below high-water levels when entering or leaving tankage, wet wells, or other water holding structures.
- J. Modular Mechanical Seals:
 - 1. Utilize one seal for concrete thickness less than 8 inches and two seals for concrete, 8 inches thick or greater.
 - 2. Utilize two seals for piping 16 inches diameter and larger if concrete thickness permits.
 - 3. Install seals such that bolt heads are located on the most accessible side of the penetration.

3.3 SCHEDULES

- A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Ductwork, Piping, and Conduit:
 - 1. Provide the following opening and penetration types:
 - a. Type A - Block out 2 inches larger than outside dimensions of duct, pipe, or conduits.
 - b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.
 - c. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.
 - d. Type D - Commercial type casting or fabrication.
 - e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, duct or conduit spools.
 - f. Type F - Integrally cast pipe, duct or conduit.
 - g. Type G - Saw cut or line-drill and remove area 1 inch larger than outside dimensions of duct, pipe or conduit.
 - h. Type H - Core drill.
 - i. Type I - Block out area. At later date, place new concrete with integrally cast sheet metal or pipe sleeve.
 - j. Type J - Grating Banding for any field cut openings.
 - 2. Provide seals of material and method described as follows.
 - a. Category 1 - Modular Mechanical Seal.
 - b. Category 2 - Roof curb and flashing according to SMACNA specifications unless otherwise noted on Drawings.
 - c. Category 3 - 12 GA sheet metal drip sleeve set in bed of silicon sealant with backing rod and sealant used in sleeve annulus.
 - d. Category 4 - Backer rod and sealant.
 - e. Category 5 - Full depth compressible sealant with escutcheons on both sides of opening.
 - f. Category 6 - Full depth compressible sealant and flanges on both sides of opening. Flanges constructed of same material as duct, fastened to duct and minimum 1/2 inches larger than opening.
 - g. Category 7 - Full depth compressible sealant and finish sealant or full depth expanding foam sealant depending on application.
 - h. Category 8 - Banding for all grating openings and banding and cover plate of similar materials for abandoned openings.
 - 3. Furnish openings and sealing materials through new floors, roofs, grating, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.

4. Furnish openings and sealing materials through existing floors, grating, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.

**SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE
FOR NEW CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through exterior wall	C F I	7 Not Req 7	C D F I ⁽¹⁾	1 WS Collar WS Collar WS Collar	F I ⁽¹⁾	Not Req 7

**SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE
FOR EXISTING CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	B E	7 Not Req	B ⁽¹⁾ E ⁽³⁾ H ⁽²⁾	7 Not Req 7	B ⁽¹⁾ E ⁽³⁾ H ⁽²⁾	7 Not Req 7
Through floors on grade above water table	B	7	B	7	B	7
Through slab on grade below water table	E	Not Req	E	Not Req	E	Not Req
Through floors in washdown areas	G	3	G H ⁽²⁾	3 3	G H ⁽²⁾	3 3
Through walls where one side is a hazardous area	B E	7 Not Req	B ⁽¹⁾ B ⁽³⁾ E H ⁽²⁾	7 1 Not Req 7	B ⁽¹⁾ ⁽³⁾ E H ⁽²⁾	7 Not Req 7
Through exterior wall below grade above water table	B	7	B ⁽¹⁾ B ⁽³⁾ H ⁽²⁾	7 1 7	B ⁽¹⁾ ⁽³⁾ H ⁽²⁾	7 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	B E	7 Not Req	B E H ⁽²⁾	1 Not Req 1	B ⁽¹⁾ ⁽³⁾ E H ⁽²⁾	7 Not Req 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	E	Not Req	E	Not Req	E	Not Req
Through exterior wall above grade	G	6	G ⁽¹⁾ ⁽³⁾ H ⁽²⁾	5 5	G ⁽¹⁾ ⁽³⁾ H ⁽²⁾	5 7
Roof penetrations	G	2	G ⁽¹⁾ ⁽³⁾ H ⁽²⁾	2	G	2
Through interior walls and slabs not covered by the above applications	G	4	G ⁽¹⁾ ⁽³⁾ H ⁽²⁾	4 4	G ⁽¹⁾ ⁽³⁾ H ⁽²⁾	4 4
Grating openings and penetrations	J	8	J	8	J	8

- (1) Multiple piping 3 inches and smaller or multiple conduits.
(2) Single pipe 3 inches and smaller or single conduit.
(3) Single pipe or conduit larger than 3 inches.

END OF SECTION

SECTION 01 75 00

CHECKOUT AND START-UP PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for checkout and startup of equipment, systems, and facilities.
- B. Scope:
 - 1. Contractor shall initially check out, start up, and place equipment and systems installed under the Contract into successful operation, in accordance with the material and equipment manufacturers' written instructions, Suppliers' recommendations at the Site, and the Contract Documents.
 - 2. Provide the following:
 - a. All labor, tools, materials, and equipment required to complete equipment and system checkout and startup.
 - b. Chemicals, lubricants, and other required operating fluids necessary for checkout, startup, and initial operation of the Work.
 - c. Filters and other temporary or consumable items necessary for checkout, startup, and initial operation of the Work.
 - d. Fuel, electricity, water, and other temporary utilities and temporary facilities necessary for checkout and startup of equipment and systems, unless otherwise specified.
 - 3. The General Conditions, as may be modified by the Supplementary Conditions, and Section 01 77 19 - Closeout Requirements, address requirements for documenting Substantial Completion.
- C. Related Sections include but are not necessarily limited to:
 - 1. Section 01 78 23 - Operation and Maintenance Data
 - 2. Section 01 61 03 - Common Work Results for Equipment.
 - 3. Section 01 77 19 - Closeout Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate checkout and startup with other contractors, as necessary.
 - 2. Do not start up equipment or system(s) for continuous operation until all components of that equipment item or system, including instrumentation and controls, have been tested to the extent practicable and proven to be operable as intended by the Contract Documents.
 - 3. Subject to the constraints of this Specifications section, Owner will furnish sufficient personnel to assist Contractor in starting up equipment and system(s), but responsibility for proper operation of the Work is Contractor's.
 - 4. Supplier shall be present during checkout, startup, and initial operation, unless otherwise acceptable to Engineer or otherwise required by the Contract Documents.
 - 5. For startup of heating equipment, air conditioning equipment, and other equipment and systems that provide temperature control, that are dependent upon the time of year, return to the Site at beginning of next heating or cooling season (as applicable) to recheck and start the appropriate equipment and system(s).
 - 6. Do not start up equipment and system(s), without submitting acceptable preliminary operations and maintenance manuals by Contractor in accordance with the Contract Documents.
- B. Checkout and Startup Planning Meeting:
 - 1. Contractor, with appropriate Subcontractors and Suppliers, shall attend and participate in a meeting with Owner, facility manager, and Engineer to discuss planning, scheduling, and coordination of checkout and startup activities.
 - 2. Meeting shall be held by the earlier of: (1) not less than 60 days prior to first scheduled training session for the equipment and system(s) to be checked out and started-up, and (2) not less than 60 days prior to the checkout and startup of the associated equipment and system(s).
 - 3. Attend meeting prepared to knowledgeably and effectively discuss:

- a. Status of the Work and schedule-to-complete for requirements prerequisite to checkout and startup.
 - b. Schedule for and status of training required for each equipment item and system.
 - c. Schedule for checkout, startup, and field quality control activities for the subject Work.
 - d. Status and quantities of required consumables, lubricants, and utility services necessary for checkout and startup.
- 4. Meeting will be chaired by Engineer. Engineer will prepare and distribute a record of topics discussed and decisions made during the meeting.
- 5. Comply with decisions made at the meeting and the Contract Documents.
- C. Sequencing:
 - 1. Comply with Section 01 14 16 - Coordination with Owner's Operations, regarding staging (phasing) of the Work and allowable shutdowns.
- D. Scheduling:
 - 1. Progress Schedule:
 - a. Clearly indicate in the Progress Schedule planned and actual dates for checkout, startup, and field quality control activities, including all demonstration testing activities addressed in this Specifications section and elsewhere in the Contract Documents. Separately indicate checkout, startup, and field quality control activities for each equipment item and system.
 - b. Perform startup and field quality control activities on the associated, scheduled dates, unless otherwise acceptable to Owner, facility manager, and Engineer.
 - 2. Restrictions for Scheduling:
 - a. Checkout of materials, equipment, and systems by Contractor that do not involve or require Owner's or facility manager's personnel may be performed at any time during normal working hours. Where required by the Contract Documents or requested by Engineer, perform checkout in the presence of Engineer or Resident Project Representative (RPR).
 - b. Startup, including initial operation of materials, equipment, and systems, shall not be initiated on: Monday, Friday, Saturday, Sunday, Owen's holidays, the day immediately prior to a holiday, or the day immediately following a holiday, unless otherwise acceptable to Owner, facility manager, and Engineer.
 - c. Unless otherwise indicated in the Contract Documents or acceptable to Owner, facility manager, and Engineer, perform all startup during normal working hours of the day shift.
 - d. To the extent practicable, where extended-duration startup or field quality control activities are required by the Contract, avoid having such activities extend into evening, night, weekend, or holiday hours.
 - e. Owner reserves the right to require a minimum seven days' notice of rescheduled startup when Contractor cannot perform the associated activities as scheduled.
 - 3. Operation and Maintenance Data:
 - a. Comply with Section 01 78 23 - Operation and Maintenance Data.
 - b. A preliminary copy of all operation and maintenance manuals shall be received by Engineer prior to the start of the demonstration period.
 - 4. Spare Parts, Tools, and Extra Materials.
 - a. Deliver to Owner or facility manager (as applicable) all required spare parts, tools, and extra materials prior to commencing the demonstration period, unless earlier delivery is required elsewhere in the Contract Documents.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Do not start up equipment or systems or place into initial operation until required operating permits are obtained from authorities having jurisdiction.
 - 2. Where Owner (with or without assistance of Engineer) has applied for and obtained initial approvals or permits necessary for operation, Contractor shall furnish information and assistance to Owner or Engineer for Owner to secure final approvals from authorities having jurisdiction for required operating permits.
- B. Qualifications:

1.4 DEFINITIONS

- A. The following defined terms are used in this Specifications Section:

1. Instrumentation Supplier: Entity retained by Contractor, Subcontractor, or Supplier to furnish instrumentation or controls that will be part of the completed Work, including manufacturers, manufacturer representatives, wholesalers, retailers, and others, including entities retained to perform systems integration Work.
2. Project Classified System (PCS): An established, distinct part of the Project, consisting of an arrangement of items, such as equipment, structures, components, piping, cabling, materials, and incidentals, so related or connected to form an identifiable, unified, functional, operational, safe, and independent system. PCSs may be specifically indicated in this Specifications section or elsewhere in the Contract Documents, such as Section 01 14 16 - Coordination with Owner's Operations, and others.
3. Pre-Demonstration Period: The period of time, of unspecified duration after initial construction and installation activities during which Contractor, with assistance from manufacturer's representatives, performs in the following sequence:
 - a. Finishing type construction work to ensure the Project has reached a state of Substantial Completion.
 - b. Equipment start-up.
 - c. Personnel training.
4. Demonstration Period: A period of time, of specified duration, following the Pre-Demonstration Period, during which the Contractor initiates process flow through the facility and starts up and operates the facility, without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the facility as evidence of Substantial Completion.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Data collection and reporting log for each required Demonstration Period.
- B. Informational Submittals: Submit the following:
 1. Progress Schedules indicating dates for checkout, startup, and field quality control activities.
 2. Completed checkout and startup log required in Paragraph 3.2.C of this Specifications section.
 3. Manufacturer's installation check letters (also known as Manufacturer's Field Services Report) required in Paragraph 3.2.C of this Specifications section.
 4. Instrumentation Supplier's Instrumentation Installation Certificate, required in Paragraph 3.2.C of this Specifications section.
 5. Letter verifying completion of all pre-demonstration startup activities, required in Paragraph 3.2.C of this Specifications section.
 6. Report of data collected during each required Demonstration Period.
 7. Qualifications Statements:
 - a. Qualifications, including resume' and copy of license, of Contractor-retained licensed operator.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 CHECKOUT AND STARTUP – GENERAL

- A. Facility Startup Divided into Two Periods:
 1. Pre-Demonstration Period including:
 - a. Obtain Engineer's approval or acceptance (as applicable) of Submittals required prior to checkout and startup, including all Shop Drawings, Samples, source quality control (shop testing) Submittals, preliminary operation and maintenance manuals, and other Submittals required by the Contract Documents, other than Submittals that cannot be furnished until after startup.
 - b. Complete the Work to a point ready for checkout and startup, including operation available in all manual, automatic, and other modes.
 - c. Checkout and initial field quality control activities that can be performed prior to startup of the equipment or system.
 - d. Startup of the associated Work.

- e. Field quality control activities for the subject Work as indicated elsewhere in the Specifications and other Contract Documents, other than this section.
- f. Training of operations and maintenance personnel.
- 2. Demonstration Period, including:
 - a. Demonstration of functional integrity of equipment, system, or PCS.

3.2 PRE-DEMONSTRATION PERIOD

- A. Prior to the Pre-Demonstration Period, complete the Work to the point where it is ready for checkout and startup.
- B. Checkout.
 - 1. Comply with Section 01 61 03 - Common Work Results for Equipment, including provisions concerning installation checks
- C. Startup:
 - 1. Comply with requirements for startup of materials, equipment, and systems indicated in the associated Specification sections and elsewhere in the Contract Documents.
 - 2. Prepare the Work so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
 - 3. Perform startup to extent possible without introducing process flow.
 - 4. Introduce process flow to complete startup for the following:
 - a. Magnetic flow meter.
 - 5. Procedures include but are not necessarily limited to the following:
 - a. Test or check and correct deficiencies of:
 - 1) Power, control, and monitoring circuits for continuity prior to connection to power source.
 - 2) Voltage of all circuits.
 - 3) Phase sequence.
 - 4) Cleanliness of connecting piping systems.
 - 5) Alignment of connected machinery.
 - 6) Vacuum and pressure of all closed systems.
 - 7) Lubrication.
 - 8) Valve orientation and position status for manual operating mode.
 - 9) Instrumentation and control signal generation, transmission, reception, and response.
 - 10) Tagging and identification systems.
 - 11) Proper connections, alignment, calibration and adjustment.
 - b. Calibrate safety equipment.
 - c. Manually rotate or move moving parts to assure freedom of movement.
 - d. "Bump-start" electric motors to verify proper rotation.
 - e. Perform other tests, checks, and activities required to make the Work ready for Demonstration Period.
 - f. Checkout and Startup Log:
 - 1) Prepare a log showing each equipment item and system requiring checkout and startup. Indicate in the log activities to be accomplished during checkout and startup.
 - 2) Provide a place for Contractor to record date and person performing required checkout and startup. Indicate associated date(s), personnel, and employer of each.
 - 3) Submit completed checkout and startup log to Engineer and obtain Engineer's acceptance.
 - 6. Obtain Suppliers' certifications of the installed and operational Work, without restrictions, and submit to Engineer:
 - a. Manufacturer's installation check letters (sometimes referred to as Manufacturer's Field Services Report).
 - b. Instrumentation Supplier's Instrumentation Installation Certificate.
 - 7. Letter verifying completion of all pre-demonstration startup activities including receipt of all specified items from Suppliers as final item prior to initiation of Demonstration Period.
 - 8. Personnel Training:

3.3 DEMONSTRATION PERIOD

- A. Demonstration Period – General:

1. Demonstrate the operation and performance of mechanical, electrical, instrumentation, and control interfaces of the Work undergoing the Demonstration Period, in accordance with the Contract Documents.
 2. Duration of Demonstration Period: 120 consecutive hours.
 3. If, during the Demonstration Period, the aggregate time used for repair, alteration, or unscheduled adjustments to any part of the Work that renders the affected Work inoperative or operation outside of recommended ranges exceeds 10% of the Demonstration Period, the demonstration of operation and performance will be deemed unacceptable and Contractor shall provide appropriate adjustments and remedies and re-perform the Demonstration Test, at no additional cost to Owner or facility manager, until acceptable results are obtained. Re-performance of the Demonstration Period shall comply with the same requirements as the original Demonstration Period.
 4. Perform the demonstration of operation and performance of the Work under full operational conditions.
 5. Owner's or Facility Manager's Personnel:
 - a. Owner or facility manager (as applicable) will make available operations personnel to make process decisions affecting facility performance and compliance with applicable operating permits.
 - b. Owner's or facility manager's assistance will be available only for process decisions.
 - c. Contractor will perform all other functions associated with the Demonstration Period including but not limited to equipment operation and maintenance until successful completion of the Demonstration Period in accordance with the Contract Documents.
 6. Owner or facility manager reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, and similar actions and events during the Demonstration Period to verify the operation and performance of the Work in automatic, manual, and other types of operating modes, backup systems, and alternate operating modes.
 7. Prior to Starting Demonstration Period:
 - a. Prepare data collection and reporting log for sampling, analytical data, and data to be obtained by manually recording data from field or panel indicators. Not less than 30 days prior to the start of the Demonstration Period, submit the data collection and reporting log to Engineer for acceptance.
 8. Timing of Start and End of Demonstration Period:
 - a. Schedule the end of the Demonstration Period at a convenient time such as midnight, so the Owner or facility manager can assume operational responsibility on a new day beginning immediately after completion of the Demonstration Period.
 - b. Time of beginning and ending Demonstration Period shall be agreed upon by Contractor, Owner (and facility manager, if other than Owner), and Engineer in advance of initiating Demonstration Period.
- B. Demonstration Period, Evaluation, and Acceptance:
1. Throughout the Demonstration Period, provide knowledgeable personnel to answer Owner's or facility manager's questions, provide final field instruction on select systems (where appropriate) and to respond to problems or failures of the Work.
 2. Responsibilities for Sampling and Data Collection:
 - a. Use the data collection and reporting log format accepted by Engineer. Indicate data clearly and legibly.
 3. Responsibilities for Data Reporting:
 - a. Submit data collected to Engineer for evaluation of acceptability of results.
 4. Data Evaluation:
 - a. Engineer, in consultation with Owner and facility manager (as applicable) as necessary, will evaluate the data collected during the Demonstration Period and other information obtained during the Demonstration Period for compliance with the Contract Documents.
 - b. Engineer will advise Contractor in writing of whether the data and information obtained indicate that the Demonstration Period was successfully completed.

END OF SECTION

SECTION 01 77 19

CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for:
1. Substantial Completion.
 2. Final inspection.
 3. Request for final payment and acceptance of the Work.

1.2 SUBSTANTIAL COMPLETION

- A. Substantial Completion – General:
1. Prior to requesting inspection for Substantial Completion, perform the following for the substantially completed Work:
 - a. Materials and equipment for which Substantial Completion is requested shall be fully ready for their intended use, including full operating and monitoring capability in automatic, manual, and other operating modes set forth in the Contract Documents.
 - b. Permanent provisions for safety and protection, shown and indicated in the Contract Documents and associated with the substantially completed Work or for personnel accessing and using the substantially completed Work, shall be in place and ready for their intended use.
 - c. Complete field quality control Work, including inspections and testing at the Site, indicated in Specifications sections for individual materials and equipment items and related Contract Documents. Submit results of, and obtain Engineer's acceptance of, field quality control tests and inspections required by the Contract Documents.
 - d. Complete checkout and startup in accordance with Section 01 75 00 - Checkout and Startup Procedures, requirements of the Specifications for the various materials and equipment in the substantially completed Work, and related Contract Documents.
 - e. Cleaning for Substantial Completion shall be completed.
 - f. Spare parts, tools, and extra materials shall be delivered and accepted in accordance with the Contract Documents and documentation of Owner's acceptance thereof has been submitted to Engineer.
 - g. Training of the facility's operations and maintenance personnel shall be completed in accordance with the Contract Documents.
 - h. Submit and obtain Engineer's acceptance of final operations and maintenance manuals in accordance with Section 01 78 23 - Operation and Maintenance Data.
 - i. Obtain and submit to Engineer all required permits, inspections, and approvals of authorities having jurisdiction for the substantially completed Work to be occupied and used by Owner.
 - j. Complete other tasks that the Contract requires be completed prior to Substantial Completion.
 2. Procedures for requesting and documenting Substantial Completion are in the General Conditions, as may be modified by the Supplementary Conditions.
 3. Sample letter for Contractor's request for inspection for Substantial Completion is attached to this Specifications section. Use the model language of the sample letter, modified to suit the Project and the needs of Contractor's request.
 4. Unless decided otherwise by Owner and Engineer, form of certificate of Substantial Completion will be EJCDC C-625, "Certificate of Substantial Completion" (2018 edition or later), prepared by Engineer.
 5. Refer to the Agreement for requirements regarding consent of surety to partial release of or reduction in retainage.

1.3 FINAL INSPECTION

- A. Final Inspection – General:
 - 1. Prior to requesting final inspection, verify that all the Work is fully complete and ready for final payment. Partial checklist for this purpose is attached to this Specifications section.
 - 2. Sample letter for Contractor to request final inspection is attached to this Specifications section. Use the model language of the sample letter, modified to suit the Project.
 - 3. Procedures for requesting and documenting the final inspection are in the General Conditions, as may be modified by the Supplementary Conditions, and as augmented in this Specifications section.

1.4 REQUEST FOR FINAL PAYMENT AND ACCEPTANCE OF THE WORK

- A. Procedure:
 - 1. After successful completion of the final inspection, submit request for final payment in accordance with the Agreement and General Conditions, as may be modified by the Supplementary Conditions, and using procedure specified in this Specifications section.
 - 2. Acceptance of the Work:
 - a. Upon Engineer's concurrence that the Work is complete and ready for final payment (as a result of the final inspection and other communications between the parties and Engineer) and receipt of the final Application for Payment, accompanied by other required Contract closeout documentation, all in accordance with the Contract Documents, Engineer will issue to Owner and Contractor a notice of acceptability of the Work, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - b. Unless decided otherwise by Owner and Engineer, form of acceptance will be EJCDC C-626, "Notice of Acceptability of Work", (2018 edition or later).
 - c. Nothing other than receipt of such notice of acceptability from Engineer constitutes acceptance of the Work.
 - d. Receipt of Engineer's notice of acceptability of the Work does not relieve Contractor of Contractor's continuing obligations under the Contract, including correction period obligations, warranty obligations, indemnification obligations, insurance requirements, and Contractor's other obligations following acceptance of the Work by Engineer and final payment. Such obligations shall commence and remain in effect as indicated elsewhere in the Contract Documents.
- B. Request for final payment shall include:
 - 1. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.
 - 2. List, on Contractor's letterhead, of all Change Proposals, Claims, and disputes that Contractor believes are unsettled. If there are no such Change Proposals, Claims, or disputes, so indicate in writing.
 - 3. Consent of Surety to Final Payment:
 - a. Acceptable form includes AIA G707, "Consent of Surety to Final Payment" (1994 or later edition), or other form acceptable to Owner.
 - 4. Releases of Liens:
 - a. Submit complete and legally effective releases (satisfactory to Owner) of all Liens filed in connection with the Work, regardless of whether such Lien was filed by Contractor, Subcontractor, or Supplier.
 - b. Each release of Lien shall be signed by an authorized representative of the entity submitting the release of Lien, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
 - 5. Waivers of Lien Rights:
 - a. Submit legally-binding waivers of rights to file Liens, acceptable to Owner, as required in the General Conditions (as may be modified by the Supplementary Conditions) from Contractor and each Subcontractor and Supplier that furnished or provided labor, material, or equipment totaling \$1,000 or more for the Work.

- b. Furnish final list of Subcontractors and Suppliers indicating final amount of the associated subcontract or purchase order for each. Include on the list all lower-tier Subcontractors and Suppliers retained by higher-tier Subcontractors and Suppliers.
- c. Each waiver of Lien rights shall be signed by an authorized representative of the entity submitting waiver of Lien rights, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
- d. Waiver of Lien rights may be conditional upon receipt of final payment.
- e. Required Affidavits: Submit the following:
 - 1) Affidavit of payment of debts and claims, submitted by Contractor. Acceptable form includes AIA G706, "Contractor's Affidavit of Payment of Debts and Claims" (1994 or later edition), or other form acceptable to Owner, and;
 - 2) Affidavit of release of Liens, submitted by Contractor. Acceptable form includes AIA G706A, "Affidavit of Release of Liens" (1994 or later edition).
 - 3) Each affidavit shall be signed by an authorized representative of Contractor and shall bear Contractor's corporate seal, as applicable.
- f. In the event Contractor is unable to obtain one or more required waivers of Lien rights, recourse is set forth in the General Conditions, as may be modified by the Supplementary Conditions.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Specification section's "End of Section" designation, are part of this Specifications section:
 - 1. Sample letter for Contractor's use in requesting inspection for Substantial Completion (two pages).
 - 2. Sample partial checklist to identify readiness for final inspection (four pages).
 - 3. Sample letter for Contractor's use in requesting final inspection (one page).
- B. In the model language of the attached sample letters for Contractor to request inspection for Substantial Completion and the final inspection, italicized language in brackets, e.g., "[insert date]" indicates instructions to the drafter of the letter and often indicates specific information to be inserted by Contractor; do not include bracketed, italicized text in the final version of the letter(s) prepared for the Project. Non-italicized language in brackets is optional language; use the appropriate language to complete the actual letter for the Project and edit where required to suit the specific circumstances.

END OF SECTION

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING INSPECTION FOR SUBSTANTIAL COMPLETION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[Date]

[Name of Engineer's contact person]

HDR

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Inspection for Substantial Completion

Dear [addressee]:

In our opinion, [all of] [or] [a portion of] the Work under the above-referenced Contract is substantially complete as of [insert month, day, year on which Substantial Completion was achieved]. [The specific portion of the Work that we believe is substantially complete is [insert identification of that portion of the Work that is substantially complete].]

Enclosed is our listing of uncompleted Work items ("punch list"). In accordance with Paragraph 15.03.A of the General Conditions, we hereby request: (1) That the Engineer schedule and perform the inspection for Substantial Completion as soon as possible, and (2) Issuance of the certificate of Substantial Completion.

In accordance with Paragraph 15.03.D of the General Conditions, upon Substantial Completion, we propose the following relative to apportionment of responsibilities between the Owner and the Contractor:

1. Security, Protection, Insurance:
 - a. Site Security: [insert proposal; address whether Owner or Contractor will be responsible for security of the Site].
 - b. Protection of the Substantially Completed Work: [insert proposal; address whether Owner or Contractor will be responsible for protection].
 - c. Property Insurance: [insert proposal; typically Owner assumes responsibility for property insurance upon Substantial Completion]
2. Operation and Maintenance:
 - a. Operation: [insert proposal; address whether Owner or Contractor will be responsible for operating the substantially completed Work].
 - b. Maintenance: [insert proposal; address whether Owner or Contractor will be responsible for maintaining the substantially completed Work].
3. Utilities: [for each of the following, indicate whether Owner or Contractor will be responsible for utilities and services, or whether responsibility will be shared; if shared, indicate proposed cost-sharing]
 - a. Electricity: [insert proposal].
 - b. Natural Gas/Fuel/Heating: [insert proposal].
 - c. Water Supply: [insert proposal].

- d. Wastewater: [insert proposal].
- e. Communications (Telephone, Internet, Video): [insert proposal].

In accordance with Paragraph 15.08.A of the General Conditions, we understand that the Contract's correction period for the Work covered by the certificate of Substantial Completion commences on the Substantial Completion date documented in said certificate. [Drafter: Also see Paragraph 15.04 ("Partial Utilization") of the General Conditions and, where necessary, edit this paragraph of the letter accordingly.]

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] [insert other contact person's name], at [insert telephone number and e-mail address].

Sincerely,

[Contractor's company name]

[Signatory name]
[Signatory's title]

Attachments:

Preliminary list of uncompleted Work items ("punch list"; [##] pages)

Copies:

[Owner's project manager]

SAMPLE PARTIAL CHECKLIST TO IDENTIFY READINESS FOR FINAL INSPECTION

Project: []
 Contract: []
 Contractor: []

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
1. All Submittals, including all Shop Drawings and Samples, approved or accepted by Engineer	☐	☐	☐	☐		
Remarks:						
1. Final services completed by Suppliers, including submittal of "Manufacturer Field Service Report" in Section 01 61 03 - Common Work Results for Equipment	☐	☐	☐	☐		
Remarks:						
2. Final Work completed by Subcontractors	☐	☐	☐	☐		
Remarks:						
3. Permits closed out and regulatory compliance transitioned from construction to operations	☐	☐	☐	☐		
Remarks:						
4. All outstanding change issues are addressed and all Change Proposals submitted	☐	☐	☐	☐		
Remarks:						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
5. All Change Proposals and Claims are resolved	☐	☐	☐	☐		
Remarks:						
6. All defective Work of which Contractor is aware has been corrected in accordance with the Contract Documents	☐	☐	☐	☐		
Remarks:						
7. Issues related to Constituents of Concern and potential Hazardous Environmental Condition have been fully addressed	☐	☐	☐	☐		
Remarks:						
8. All spare parts, tools, and extra materials have been furnished in accordance with the Contract Documents, and documentation thereof submitted to Engineer	☐	☐	☐	☐		
Remarks:						
9. All final operations & maintenance manuals have been submitted and accepted by Engineer	☐	☐	☐	☐		
Remarks:						
10. Manufacturer warranties and software license(s) furnished	☐	☐	☐	☐		
Remarks:						
11. Instruction and training of operations and maintenance	☐	☐	☐	☐		

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
personnel is complete and records of training submitted						
Remarks:						
12. MBE/WBE/DBE/VBE compliance report(s) submitted (when applicable)	☐	☐	☐	☐		
Remarks:						
13. All field engineering Submittals, including survey data, furnished	☐	☐	☐	☐		
Remarks:						
14. All Work on "punch list" is complete in accordance with the Contract Documents	☐	☐	☐	☐		
Remarks:						
15. All record documents submitted to and accepted by Engineer	☐	☐	☐	☐		
Remarks:						
16. Contractor is fully demobilized from the Site	☐	☐	☐	☐		
Remarks:						
17. All Site restoration is complete	☐	☐	☐	☐		
Remarks:						
18. Final cleaning of all work areas is complete	☐	☐	☐	☐		
Remarks:						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
19. Releases of Liens and waivers of Lien rights (or acceptable alternative) obtained from Subcontractors and Suppliers	☐	☐	☐	☐		
Remarks:						
20. Evidence of Contractor liability insurance furnished for correction period	☐	☐	☐	☐		
Remarks:						
21. All other required Contract closeout documents obtained	☐	☐	☐	☐		
Remarks:						
Remarks:						
22. All other Work and documentation required prior to final payment is complete and provided in accordance with the Contract Documents	☐	☐	☐	☐		
Remarks:						

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING FINAL INSPECTION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[Date]

[Name of Engineer's contact person]

HDR

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Final Inspection

Dear [addressee]:

The Work under the above-referenced Contract is complete and ready for final payment as of [insert month, day, year on which final completion was achieved]. In accordance with Paragraph 15.05 of the General Conditions, we hereby request that the Engineer schedule and perform the final inspection as soon as possible. Upon successful completion of the final inspection, we will submit our final Application for Payment accompanied by the required Contract closeout documentation in accordance with the Contract Documents.

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] [insert other contact person's name], at [insert telephone number and e-mail address].

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

None

Copies:

[Owner's project manager]

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for Contractor-furnished, manufacturers' operation and maintenance (O&M) data, including:
 - a. Required operation and maintenance data groupings into operation and data manuals and timing of such Submittals.
 - b. Requirements for paper copies of operation and maintenance data and related Electronic Documents.
 - c. Content of operation and maintenance data Submittals.
- B. Scope:
1. Contractor shall submit operation and maintenance data, and related information, in accordance with this Section and requirements elsewhere in the Contract Documents, as instructional and reference information for use by: (a) Owner's operation and maintenance personnel, and (b) others retained by or working for Owner.
 2. In addition to operation and maintenance data expressly required elsewhere in the Contract Documents, also submit operation and maintenance data for:
 - a. All equipment and systems, including facility equipment, plumbing equipment, electrical equipment, communications equipment, utility equipment, and process equipment, and other equipment.
 - b. Valves, gates, actuators, and related accessories.
 - c. Instrumentation and control devices and systems.
- C. Related Requirements:
1. Section 01 33 00 - Submittal Procedures.
 2. Section 01 75 00 - Checkout and Startup Procedures.

1.2 SUBMITTALS

- A. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
 - a. Submit operation and maintenance data, required by the Contract Documents, grouped into operation and maintenance manual Submittals indicated in Table 01 78 23-A.
 - b. Where operation and maintenance data required by the Contract Documents, is not expressly indicated in table 01 78 23-A, obtain written clarification or interpretation from Engineer prior to preparing and transmitting such Submittal.
 - c. For each required operation and maintenance manual Submittal, furnish preliminary Submittal and final Submittal. Timing of preliminary and final operation and maintenance manual Submittals, and differences between preliminary and final Submittals, are indicated in this Section.

Table 01 78 23-A
Required Groupings of Operation and Maintenance Data Submittals

Name of O&M Manual/Data	For Materials or Equipment Specified in Section(s)

Name of O&M Manual/Data	For Materials or Equipment Specified in Section(s)

B. Timing of Submittals and Quantity Required:

1. Preliminary Operation and Maintenance Manual Submittals:
 - a. Paper Copies: None, exclusive of copies required for Contractor's use.
 - b. Submit to entity indicated in Section 01 33 00 – Submittal Procedures, by the earlier of: 90 days following approval of Shop Drawings and product data Submittals, or 14 days prior to starting training of operation and maintenance personnel, or 14 days prior to field quality control testing at the Site.
 - c. Do not perform checkout, startup, and training without Engineer's acceptance of preliminary operation and maintenance data Submittals for the associated Work.
2. Final Operation and Maintenance Manual Submittals: Furnish final Submittal prior to Substantial Completion of the associated Work, unless submittal is required prior to an interim Milestone.
 - a. Paper Copies: Three copies, exclusive of copies required for Contractor's use.
 - b. Work will not be eligible for Substantial Completion until associated, required final operation and maintenance data Submittals are accepted by Engineer.
 - c. If Contractor (whether or not via Subcontractor or Supplier), revises program code or configuration files between acceptance of Submittal by Engineer and end of the Contract's correction period and Contractor's general warranty obligation, furnish updated program code and configuration files to Owner. Before modifying program code and configuration files after Substantial Completion, verify with facility manager that Owner- or facility manager modifications of program code or configuration files were incorporated into the modified files, subject to the provisions of this Section.

1.3 PAPER COPIES OF O&M MANUALS

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy, as necessary.
2. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be same size and color.
3. Binders shall be locking three-ring ("D"-ring) type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front and back of each volume.
4. Do not overfill binders.
5. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
6. Indicate the following information on cover of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, if more than one volume is submitted, listed as "Volume [] of []", with appropriate volume-designating numbers filled in.
 - d. Name of Project and, when applicable, Contract name and number.
 - e. Name of building or structure, as applicable.
7. Provide the following information on spine of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.

- b. Name or type of material or equipment covered in the manual.
 - c. Volume number, when more than one volume is submitted, listed as “Volume []” of []”, with appropriate volume-designating numbers filled in.
 - d. Project name and building or structure name.
- B. Pages:
 - 1. Print pages in paper copies of operation and maintenance manuals on 30-pound (minimum) paper, 8.5-inch by 11-inch size.
 - 2. Reinforce binding holes in each individual paper sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of manuals, reinforcing of pages within booklet or pamphlet is not required.
 - 3. Furnish each page with binding margin not less than 3/4-inch wide.
 - 4. Properly punch each paper page with holes suitable for associated binding. Provide not less than 3/8-inch of paper between outer edge of punched holes and edge of paper. Manuals with improperly punched holes will be returned to Contractor as unacceptable.
 - 5. In paper copies of manuals, each page in each copy shall be properly bound-through by the binder’s rings or posts. Paper manuals where some pages are not so bound will be returned to Contractor as unacceptable.
- C. Drawings:
 - 1. Bind into operation and maintenance manuals drawings, diagrams, and illustrations up to and including 11-inch by 17-inch size, with reinforcing and punched holes specified for paper pages.
 - 2. Drawings or sheets larger than 11-inch by 17-inch shall be:
 - a. Paper Copies: Neatly folded and inserted into clear plastic pockets bound into the manual. Neatly and permanently label each pocket with printed text indicating content and drawing numbers. Include not more than two drawings or sheets per pocket.
 - b. Electronic Documents Copies: Included in electronic file at appropriate location.
- D. Copy Quality and Document Clarity:
 - 1. Provide original-quality copies. Documents in operation and maintenance manuals shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals with copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable.
 - 2. Clearly mark, using ink, to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished and cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.
- E. Organization:
 - 1. Indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 ELECTRONIC DOCUMENTS O&M MANUALS

- A. Electronic Documents of Operation and Maintenance Manuals:
 - 1. Each Electronic Document copy of operation and maintenance data shall include all information included in the corresponding paper copy.
 - 2. Submit Electronic Documents operation and maintenance data.
 - 3. File Format:
 - a. Unless otherwise required by Section 01 33 00 - Submittal Procedures, operation and maintenance data Electronic Documents shall be “portable document format” (PDF) files.
 - b. Electronic Documents shall be electronically searchable upon delivery.

- c. Electronic Documents shall not be password-protected and shall not be protected against Owner's or facility manager's copying and printing such files for Owner's or facility manager's use in operating and maintaining the facility.
- d. Electronic Documents shall open to its first page.
- e. Submit each operation and maintenance manual as a single Electronic Document file, unless file size is over-large, in which case divide into as few separate files, each with similar filename, as possible.
- f. Within each Electronic Document, provide bookmarks for the following:
 - 1) Each chapter and subsection indicated in the corresponding printed copy document's table of contents.
 - 2) Each figure.
 - 3) Each table.
 - 4) Each appendix and attachment.

1.5 CONTENT OF OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manual Content – General:

- 1. Prepare each operation and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-constructed drawings as applicable, bills of materials, technical information, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.
- 2. Provisions of this Article were written for equipment. Where operation and maintenance data are required for building products, such as finishes, openings, thermal and moisture protection, and similar items, comply with this Article to the extent practical and reasonable for the associated item.
- 3. Completeness and Accuracy:
 - a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
 - b. Operation and maintenance manuals shall be complete and accurate.
 - c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.
- 4. Provide dividers and Include manufacturer's information, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where published documents, included in operation and maintenance data, pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
- 5. Identify each equipment item consistent with names and identification numbers shown or indicated in the Contract Documents, rather than manufacturer's model numbers.
- 6. Neatly type data not furnished in computer-printed text. Handwriting, except for strikeouts, arrows, and the like, is unacceptable.
- 7. Include copy of warranty in accordance with the Contract Documents.
- 8. Include copy of proposed service contract, when applicable.
- 9. When copyrighted material is used in operation and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

B. Differences Between Preliminary and Final Operation and Maintenance Manuals:

1. In preliminary operation and maintenance manuals, include flysheet or placeholder for information to be included in final operation and maintenance manual Submittal.
 2. In final operation and maintenance manuals, include information such as the following, as applicable for the associated materials and equipment:
 - a. Equipment data that requires collection after startup, for example: (1) system and equipment balancing reports, including those for HVAC systems; and (2) final settings for electrical switchgear, automatic transfer switches, and circuit breakers; and (3) materials and equipment field testing results.
 - b. Equipment startup reports and Suppliers' field service reports (the latter on form in Section 01 75 00 - Checkout and Startup Procedures).
- C. Initial Documents in Operation and Maintenance Manuals:
1. Table of Contents:
 - a. Provide table of contents in each volume of each operation and maintenance manual.
 - b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identifying items is unacceptable.
 2. Equipment Record:
 - a. Provide "Equipment Record" section of operation and maintenance manual immediately following the table of contents. "Equipment Record" section is not required for operation and maintenance data for other than equipment (such as building materials and finishes).
 - b. Provide "Equipment Record" on forms included as this Section's Attachments 1, 2, and 3.
 - c. For instrumentation and control equipment, International Society of Automation (ISA) data sheets are acceptable in lieu of the forms included as this Section's Attachments 1, 2, and 3.
 - d. This Section's Attachments 1, 2, and 3 are available from Engineer as "fillable PDF forms".
 - e. Complete in detail each section of "Equipment Record". Merely referencing the associated equipment's operation and maintenance data for nameplate, maintenance, spare parts, lubricants, or other required information, is unacceptable.
 - f. For equipment or systems with multiple, separate components (for example, motor and gearbox), fully completed "Equipment Record" is required for each component.
 - g. Operation and maintenance data Submittals without complete and accurate "Equipment Record" sheets are unacceptable.
 3. Supplier's Field Service Reports:
 - a. Include in final operation and maintenance manuals copies of associated Supplier's field services reports in accordance with Section 01 75 00 - Checkout and Startup Procedures.
 - b. Include Supplier's completed field service reports in operation and maintenance manual in section immediately following "Equipment Record" section.
- D. Operation and Maintenance Instructions:
1. Safety Considerations:
 - a. Submit written descriptions of safety considerations relating to operation and maintenance procedures for materials and equipment.
 - b. Describe safety devices and alarms provided with materials and equipment and proper operation and use.
 - c. Indicate procedures for proper, safe operating and maintenance of materials and equipment furnished, including manufacturer's recommended personal protection equipment, apparatus, and devices not furnished under the Contract.
 - d. Describe recommended safety-related training for personnel operating and maintaining the subject materials or equipment.

- e. Include in appendix to operation and maintenance manual manufacturers' relevant "safety data sheets" (SDS), formerly "material safety data sheets" (MSDS).
 - f. Engineer's review of operation and maintenance data expressly does not extend to adequacy, completeness, and accuracy of SDS or other safety and protection practices and procedures indicated in the operation and maintenance data.
2. Operation:
- a. Include in operation and maintenance data Submittals complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; and regulation and control. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
 - b. Include pre-startup instructions and checklists and complete startup instructions for each material and equipment item.
 - c. Indicate recommended operating instructions for all operating modes and conditions, with associated recommendations for safe operation.
 - d. Explain available controls and instrumentation and associated function(s).
 - e. Indicate required shutdown checklists and procedures for: normal shutdown, emergency shutdown, and long-term shutdowns.
 - f. Troubleshooting instructions.
3. Maintenance – General:
- a. Include in operation and maintenance data complete, written instructions for necessary and recommended maintenance, including mechanical maintenance and electrical/instrumentation and controls maintenance, as applicable.
 - b. Include in operation and maintenance data complete instructions for necessary assembly, disassembly, installation, re-installation, storage, and shipping for materials and equipment.
 - c. Tools: Include list of required maintenance tools and equipment.
 - d. Spare Parts and Extra Materials:
 - 1) Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
 - 2) Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
 - 3) Also refer to this Article's provision, "Bills of Materials", below, for additional requirements regarding ordering replacement parts.
4. Routine and Preventative Maintenance:
- a. Submit complete, detailed, written instructions for routine and preventive maintenance including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
 - 1) Written explanations with illustrations for each routine and preventive maintenance task such as inspection, adjustment, anchor bolt torque checks, lubrication, calibration, cleaning, replacement of filters, and the like.
 - 2) Recommended schedule for each routine and preventive maintenance task.
 - 3) Lubricants:
 - a) Provide lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
 - b) Table of alternative lubricants.
5. Major Maintenance:

- a. Include detailed, written instructions and illustrations for required periodic (non-routine, non-preventative) maintenance.
 - b. Indicate relative level of training and expertise required to perform such maintenance and recommended tools and equipment.
- 6. Special Maintenance:
 - a. Include maintenance instructions for long-term shutdowns and storage.
- E. Bills of Materials:
 - 1. Include in operation and maintenance manuals complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
 - 2. Manufacturer's name, physical address, telephone number, internet website address.
 - 3. Manufacturer's local service representative's or local parts supplier's name, physical address, telephone number, internet website address, and e-mail addresses.
 - 4. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
 - 5. For each part or piece include the following information:
 - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - b. Part name or description.
 - c. Manufacturer's part number.
 - d. Quantity of each part used in each assembly.
 - e. Current unit price of the part at the time the operation and maintenance manual is submitted. Price list shall be dated.
- F. Record Copy of Shop Drawings, Product data, and Other Previously Approved and Accepted Submittals:
 - 1. Submit original-quality copies of each approved and accepted (as applicable) Shop Drawing, product data Submittal, written results of source quality control activities, and other Submittals, updated to indicate as-installed condition. Do not include prior Submittals that were not approved or were not accepted. Reduced drawings are acceptable only when reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- G. Electrical Schematics, Diagrams, and Information:
 - 1. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
 - 2. Include as-constructed drawings of layouts of electrical panels (such as switchgear and motor control centers) and control panels.
- H. NFPA 70 (National Electric Code) Documentation:
 - 1. Include in operation and maintenance manuals for electrically-powered equipment documented calculations of: (1) arc-fault current, equipment available fault current and (2) short-circuit current rating (SCCR), provided as part of equipment Submittals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Section:
 - 1. Attachment 1 - Equipment Data and Spare Parts Summary form (one page)
 - 2. Attachment 2 - Recommended Maintenance Summary form (one page)
 - 3. Attachment 3 - Lubrication Summary form (one page)

END OF SECTION



Equipment Data and Spare Parts Summary

Project Name			Specification Section:		
Equipment Name			Year Installed:		
Project Equipment Tag No(s).					
Equipment Manufacturer			Project/Order No.		
Address			Phone		
Website		Web Site		E-mail	
Local Representative/Service Center					
Address			Phone		
Website		E-mail			

MECHANICAL NAMEPLATE DATA

Equip.		Serial No.			
Make		Model No.			
ID No.	Frame No.	HP	RPM	Cap.	
Size	TDH	Imp. Size	CFM	PSI	
Other:					

ELECTRICAL NAMEPLATE DATA

Equip.		Serial No.						
Make		Model No.						
ID No.	Frame No.	HP	V.	Amp.	Hertz	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

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Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).	
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[illegible]

* D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual Hours = Run Time Interval

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Lubrication Summary

Equipment Description	Project Equip. Tag No(s).
-----------------------	---------------------------

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

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DIVISION 02

EXISTING CONDITIONS



SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General provisions applicable to all demolition and removals.
 - 2. Civil/site demolition and removals.
 - 3. Disposal of demolition debris, materials, and equipment.
- B. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 03 00 05 - Concrete.
 - 2. Section 31 10 00 - Site Clearing.
 - 3. Section 31 23 00 - Earthwork.

1.2 REFERENCES

- A. Reference Standards: Standards referenced in this section include, but are not necessarily limited to, the following:
 - 1. National Fire Protection Association (NFPA):
 - a. 241 - Safeguarding Construction, Alteration, and Demolition Operations.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Review procedures under this and other Sections and coordinate the Work that will be performed with, or before, demolition and removals.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of authorities having jurisdiction and relevant permits, if any, required and obtained for demolition Work.

1.5 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Procedure Submittals:
 - a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.
 - 2) General indication of intended approach for performing demolition Work, including how proposed demolition will affect Owner and others, including owners and occupants of properties at and adjacent to the Site and the public.
 - 3) Disposal and recycling facilities proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 4) Planned demolition operating sequences, relative to their effect on Owner and others, including owners and occupants of properties at and adjacent to the Site and the public.
 - 5) Detailed schedule of demolition Work in accordance with the Progress Schedule accepted by Engineer.
 - 6) Copy of demolition permit (when required) obtained from authorities having jurisdiction.
 - b. Engineer's review, comments upon, and acceptance of Contractor's procedure Submittals for demolition are only for the limited purposes indicated in the Contract Documents. Engineer's review, comments upon, action, or inaction concerning such Submittals, shall not, in any way, reduce or mitigate Contractor's sole responsibility for construction means, methods, techniques, procedures, and sequences, or associated safety and protection measures.
 - 2. Notification of Intended Demolition Start: Submit in accordance with Paragraph 3.1.B of this Section.
 - 3. Field Quality Control Test Results:

- a. Results of megger-testing of existing motors that will remain Owner's property.
- 4. Qualifications Statements:
 - a. Name and qualifications of entity performing electrical removals, including copy of licenses required by authorities having jurisdiction.
 - b. Name and qualifications of entity performing plumbing removals.

1.6 FIELD CONDITIONS

- A. Existing Conditions:
 - 1. Owner and Engineer make no representation of condition or structural integrity of areas to be demolished or where removals are required by the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notification:
 - 1. Not less than 48 hours prior to commencing demolition or removal, advise Engineer in writing of planned start of demolition Work. Do not start removals when either Owner or Engineer furnishes reasonable objection in a timely manner.
 - 2. Where demolition or removal has potential to affect adjacent properties, occupants, streets, or other public thoroughfare, transportation facilities, utilities, water courses, or any combination thereof, furnish required notices to owners and occupants of properties, buildings, and structures that may be affected by the demolition or removal.
 - 3. In accordance with Laws and Regulations, and applicable permits, furnish to authorities having jurisdiction, including emergency services as necessary, appropriate notices of planned demolition and removals.
 - 4. Submit to Engineer copies of notices furnished to adjacent property owners, occupants, and authorities having jurisdiction.
- B. Protection of In-Place Conditions:
 - 1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, buildings, structures, and properties, unless allowed by the Contract Documents or otherwise allowed in writing by Owner.
 - 2. Closing or obstructing roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Perform the Work with minimum interference to vehicular and pedestrian traffic.
 - 3. Provide temporary partitions between demolition work areas and (a) areas that will be occupied during demolition and removals, and (b) areas accessible to the public or visitors. Temporary partitions shall be sturdy, braced plywood in good condition, of dimensions sufficient to adequately screen demolition work from view of occupants, public, and visitors. Maintain temporary partitions in place until demolition and removal Work in the subject area is complete or until other work requires removal of temporary partitions.
 - 4. Provide appropriate temporary barriers, lighting, sidewalk sheds, and other necessary protection.
 - 5. Repair damage to facilities not subject to demolition or removal when such damage results from Contractor's action or inaction.
- C. Existing Utilities: In addition to requirements of the General Conditions, as may be modified by the Supplementary Conditions, Section 01 71 33 - Protection of the Work and Property, and other Division 01 Specifications, perform the following:
 - 1. Should unforeseen, unknown, or incorrectly shown or indicated Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions, as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
 - 2. Sanitary Sewerage: Before proceeding with demolition, locate and cap all sewer lines and service laterals discharging from the building or structure being demolished.

3. Storm Water Sewerage: Existing storm water system shall remain in place until demolition of existing building or structure is complete. Upon completing demolition, cut and cap storm sewerage at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities in accordance with the Contract Documents.
4. Water Piping and Related Facilities: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished. Ensure compliance with Laws and Regulations regarding water quality.
5. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; compressed air; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
6. Coordinate with utility owners relative to demolition and removal Work. Where utility owner requires that only the associated utility owner modify, disconnect, cap, or any combination thereof, its associated utility service, pay the utility owner for performing such modification, disconnection, capping, or other necessary work.
7. Shutdown of utility services shall be coordinated by Contractor, assisted by Owner as required relative to contacting utility owners.

D. Remediation:

1. If unanticipated Hazardous Environmental Condition is believed to be encountered during demolition and removals, comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

3.2 DEMOLITION - GENERAL

A. General, Common Requirements for Demolition and Removal Work:

1. Contractor shall provide all labor, materials, construction equipment and machinery, tools, services (including professional services when necessary), and incidentals as shown, specified and required for demolition, removals, and disposal Work.
2. The Work under this Section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of piping and similar existing materials, equipment, and items. Retain the optional text paragraphs, below, as necessary for the Project.
3. Demolition and removals indicated in other Sections shall comply with requirements of this Section.
4. Perform demolition Work as shown or indicated on the Drawings and as indicated elsewhere in the Contract Documents.
5. Pay for transporting and, as applicable, disposing of materials and equipment resulting from demolition and removals Work.
6. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.

B. Pollution Controls:

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level. Comply with Section 01 57 05 - Temporary Controls, and Laws and Regulations.
2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions.

C. Building or Structure Demolition and Removals:

1. Unless otherwise acceptable to Engineer, proceed with demolition from top of building or structure to the ground. Complete demolition Work above each floor or tier before disturbing supporting members of lower levels.
2. Demolish concrete and masonry in small sections.
3. Remove structural framing members and lower to ground using hoists, cranes, or other suitable methods. Do not throw or drop to the ground.
4. Break up and remove foundations, mats, and slabs-on-grade unless otherwise shown or indicated as remaining in place.
5. Temporary Bracing and Supports:

- a. Provide temporary bracing and supports sufficient to maintain safety, stability, and resist all loads to which the structure may be subject during demolition and removals, until entirety is permanently removed or permanently stabilized.
 - b. Temporary bracing and supports shall be sufficient for associated dead load, live load, transient loading, and dynamic loads such as wind, seismic, and other loads to which the temporary bracing or support may be subject.
 - c. Where appropriate, retain a professional structural engineer to design temporary bracing and supports.
- D. Salvage and Ownership:
- 1. The following applies to materials and equipment to remain Owner's property:
 - a. Contractor shall carefully remove and appropriately handle materials and equipment to remain Owner's property in manner avoids damaging and invalidating warranties in effect for such items. Brace motors attached to flexible mountings until reinstallation or delivery to Owner's storage location. Fully remedy to pre-construction condition or replace items damaged during removal, handling, or storage by Contractor.
 - b. Remove, as functional units, together with all appurtenances required for operation.
 - c. Clean and tag for storage, items to remain Owner's property, and maintain comprehensive, detailed listing of such items. Update such listing when items are relocated.
 - d. Protect from damage.
 - e. Deliver to designated storage location at the Site, or other site, indicated in the Contract Documents, at place designated by Engineer or Owner.
 - 2. Preparation of Owner's existing equipment for storage:
 - a. Where appropriate, identify each component with markings or tags to indicate its position in the assembly and the assembly of which it is part.
 - b. Place small parts in appropriate, durable boxes and clearly mark contents on the outside of box or container.
 - c. Remove oil from oil-lubricated bearings and gear boxes and replace with storage oil.
 - d. Provide grease for grease-lubricated bearings.
 - e. Replace breather plugs with solid plugs.
 - f. Megger-test motor windings: Attach report of the test results to the associated motor and submit copy to Engineer.
 - g. Attach unit to suitable crate bottom.
 - h. Enclose unit in polyethylene film and seal all seams and the film to the base of the unit with tape.
 - i. Construct crate of wood slats around top and sides of unit.
 - j. Attach permanent instruction tag to outside of crate stating: "This unit has been prepared for storage. Replace oil, vent plugs, and lubricant in accordance with manufacturer's instructions before start-up."
- E. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.3 STRUCTURAL REMOVALS

- A. Remove structures to lines and grades shown or indicated, unless otherwise directed by Engineer. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's risk and expense and such excess removals shall be reconstructed to satisfaction of Engineer without additional cost to Owner.
- B. Recycling and Reuse of Demolition Materials:
 - 1. All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in, or upon, building or structure to be demolished, shall be removed, transported, and disposed of away from the Site, unless otherwise approved by Engineer.
 - 2. Do not use demolished materials as fill or backfill adjacent to buildings and structures, in pipeline trenches, or as subbase under buildings, structures, or pavement.

- C. After removing concrete and masonry walls or portions thereof, mats, slabs, and similar construction that ties in to the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.
- D. Where parts of existing structures are to remain in service following demolition:
 - 1. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.
 - 2. Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners, resulting in neat joints with new construction and be satisfactory for the purpose intended.
 - 3. Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.
 - 4. Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 inches below the final surface. Repair resulting hole, with repair mortar (for concrete), or grout (for masonry), so that filled hole is flush with adjacent surface.
 - 5. Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.
- E. Removal of Anchorages and Protruding Metals:
 - 1. Where equipment or material anchored to concrete or masonry are removed, and anchors are not to be re-used, and where existing metals (and to be removed) protrude from concrete, remove anchors and other metal to not less than 1.5 inches beneath surface of concrete or masonry member. Repair resulting hole, with repair mortar (for concrete), or grout (for masonry), so that filled hole is flush with adjacent surface.
 - 2. At Contractor's option, when anchor is stainless steel, anchor may be cut flush with surface of concrete or masonry, when so approved by Engineer.
- F. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Section, unless specified elsewhere in the Contract Documents.

3.4 DEMOLITION OF SITE IMPROVEMENTS

- A. Fencing, Guardrails, and Bollards:
 - 1. Remove to the limits shown or indicated on the Drawings.
 - 2. Completely remove below-grade posts and concrete.
- B. Manholes, Vaults, Chambers, and Handholes:
 - 1. Remove to the limits shown or indicated on the Drawings.
 - 2. If not shown or indicated on the Drawings, remove to not less than three feet below finished grade indicated on the Drawings.
 - 3. Where a portion of manhole, vault, handhole, or similar structure remains in-place, backfill portion of item that will remain with material as indicated in the "Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes" provision, below, of this Article.
- C. Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes:
 - 1. Remove to the extent shown or indicated on the Drawings.
 - 2. Unless otherwise shown or indicated, cap ends of piping to remain in place in accordance with the "Mechanical Removals" Article of this Section.
 - 3. Completely fill, with flowable fill (controlled low-strength material), the following Underground Facilities that will be abandoned in-place:
 - a. Portions of manholes, vaults, handholes, and similar items that will remain in-place.
 - b. Buried piping eight inches in diameter and larger.
 - c. Lime sludge piping.
 - 4. Provide flowable fill in accordance with Section 03 00 05 - Concrete and Section 31 23 00 - Earthwork. Where other material is allowed for backfilling Underground Facilities, provide such material in accordance with Section 31 23 00 - Earthwork.
- D. Landscaping: Comply with Section 31 10 00 - Site Clearing.

- E. Other Site Improvements: When the Contract Documents require removal of other site improvements not addressed above, comply with Contract requirements for removal of buildings or structures.

3.5 DISPOSAL OF DEMOLITION DEBRIS

- A. Disposal – General:
 - 1. Promptly remove from the Site all debris, waste, rubbish, material, and equipment resulting from demolition and removal Work. Promptly upon completion of demolition and removal Work, remove from the Site construction equipment used in demolition Work.
 - 2. Do not sell at, or adjacent to, the Site demolition materials or removed equipment and items. If materials, equipment or debris will be sold by Contractor, remove the items from the Site and adjacent areas, and perform the sale or transaction elsewhere, in accordance with Laws and Regulations.
 - 3. Cleaning and Removal of Debris: Comply with the General Conditions and Supplementary Conditions.
- B. Transportation and Disposal:
 - 1. Non-Hazardous Materials, Equipment, and Debris: Properly transport and dispose of non-hazardous demolition materials, equipment, and debris at appropriate landfill or other suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Constituents of Concern such as (but not limited to) asbestos, PCBs, petroleum, hazardous waste, radioactive material, or other material designated as hazardous in Laws or Regulations.
 - 2. Hazardous Materials, Equipment, and Debris: When handling and disposal of items containing Constituents of Concern is included in the Work, properly transport and dispose of such items in accordance with the Contract Documents and Laws and Regulations.
- C. Submit to Engineer information required in this Section on proposed facilities where demolition materials, equipment, and debris will be recycled. Upon request, Engineer or Owner, shall be allowed to visit recycling facilities to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and Owner.

END OF SECTION



DIVISION 03

CONCRETE

SECTION 03 00 05 CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete and grout.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 03 15 19 - Anchorage to Concrete.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 232.2R, Use of Fly Ash in Concrete.
 - e. 301, Specifications for Concrete Construction.
 - f. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - g. 304.2R, Placing Concrete by Pumping Methods.
 - h. 305.1, Hot Weather Concreting.
 - i. 306.1, Cold Weather Concreting.
 - j. 318, Building Code Requirements for Structural Concrete.
 - k. 347, Guide to Formwork for Concrete.
 - l. CT-13, Concrete Terminology.
 - 2. ASTM International (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.
 - e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - f. C33, Standard Specification for Concrete Aggregates.
 - g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - h. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
 - k. C150, Standard Specification for Portland Cement.
 - l. C172, Standard Practice for Sampling Freshly Mixed Concrete.
 - m. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - n. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - o. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - p. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - q. C494, Standard Specification for Chemical Admixtures for Concrete.
 - r. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - s. C1218, Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 - t. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
 - u. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

- v. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheet.
 - w. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - x. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - y. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - z. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - aa. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - bb. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
 - 3. Corps of Engineers (COE):
 - a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
 - 4. National Ready Mixed Concrete Association (NRMCA).
 - 5. National Sanitation Foundation (NSF):
 - a. 61, Drinking Water System Components - Health Effects.
- B. Quality Control:**
- 1. Concrete testing agency:
 - a. Contractor to employ and pay for services of a testing laboratory to:
 - 1) Perform materials evaluation.
 - 2) Design concrete mixes.
 - 3) Perform testing of concrete placed during construction.
 - b. Concrete testing agency to meet requirements of ASTM E329 and ASTM C94.
 - 2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.
 - a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
 - 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - a. Do not use revised concrete mixes until submitted to and approved by Engineer.
 - 4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- C. Qualifications:**
- 1. Ready mixed concrete batch plant certified by NRMCA.
 - 2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state of Missouri.

1.3 DEFINITIONS

- A. Per ACI CT-13 except as modified herein:**
- 1. Concrete fill: Non-structural concrete.
 - 2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
 - 3. Exposed concrete: Exposed to view after construction is complete.
 - 4. Indicated: Indicated by Contract Documents.
 - 5. Nonexposed concrete: Not exposed to view after construction is complete.
 - 6. Required: Required by Contract Documents.
 - 7. Specified strength: Specified compressive strength at 28 days.
 - 8. Submitted: Submitted to Engineer.

1.4 SUBMITTALS

- A. Shop Drawings:**
- 1. Concrete mix designs proposed for use.
 - a. Concrete mix design submittal to include the following information:
 - 1) Sieve analysis and source of fine and coarse aggregates.
 - 2) Test for aggregate organic impurities.
 - 3) Test for alkali-silica reactivity per ASTM C1293.
 - 4) Proportioning of all materials.

- 5) Type of cement with mill certificate for cement.
 - 6) Brand, quantity and class of fly ash proposed for use along with other submittal data as indicated Paragraph 2.2.B. of this Section.
 - 7) Slump.
 - 8) Air content.
 - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
 - 10) Total water-soluble chloride ion concentration in hardened concrete from all ingredients determined per ASTM C1218.
 - 11) 28-day cylinder compressive test results of proposed mix design(s).
 - 12) Standard deviation value for concrete production facility for proposed mix design(s).
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Bonding and patching mortar.
 - 4) Construction joint bonding adhesive.
 - 5) Nonshrink grout with cure/seal compound.
 - 6) Waterstops.
 3. Reinforcing steel:
 - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
 - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
 - c. Obtain approval of Shop Drawings by Engineer before fabrication.
 - d. Mill certificates.
 4. Strength test results of in place concrete including slump, air content and concrete temperature.
 5. Certifications:
 - a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
 - b. Certification that the material and sources submitted in the mix design will be used in the concrete for this project.
 - c. Testing Agency qualifications.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage of Material:

1. Cement and pozzolan:
 - a. Store in moistureproof, weathertight enclosures.
 - b. Do not use if caked or lumpy.
2. Aggregate:
 - a. Store to prevent segregation and contamination with other sizes or foreign materials.
 - b. Obtain samples for testing from aggregates at point of batching.
 - c. Do not use frozen or partially frozen aggregates.
 - d. Do not use bottom 6 inches of stockpiles in contact with ground.
 - e. Allow sand to drain until moisture content is uniform prior to use.
3. Admixtures:
 - a. Protect from contamination, evaporation, freezing, or damage.
 - b. Maintain within temperature range recommended by manufacturer.
 - c. Completely mix solutions and suspensions prior to use.
4. Reinforcing steel: Support and store all rebars above ground.

B. Delivery:

1. Concrete:
 - a. Prepare a delivery ticket for each load for ready-mixed concrete.
 - b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.
 - c. Ticket to show:
 - 1) Mix identification.
 - 2) Quantity delivered.
 - 3) Amount of each material in batch.

- 4) Outdoor temp in the shade.
 - 5) Time at which cement was added.
 - 6) Time of delivery.
 - 7) Time of discharge
 - 8) Amount of water that may be added at the site without exceeding the specified water-cement ratio..
 - 9) Amount of any approved water added at the site.
2. Reinforcing steel:
 - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
 - b. Mark numbers to match Shop Drawing mark number.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 1. Epoxy grout:
 - a. Master Builders Solutions "Brutem MPG."
 - b. Euclid Chemical Company, "E3 Flowable."
 - c. Fosroc, "Conbextra EPHF".
 2. Waterstops, PVC:
 - a. Greenstreak Plastic Products, Inc.
 - b. W R Meadows .
 - c. Vinylex Corporation.

2.2 MATERIALS

- A. Cement:
 1. Conform to ASTM C150, Type IL.
 2. Cement type used shall correspond to that upon which selection of concrete proportions was based in the mix design.
- B. Fly Ash:
 1. ASTM C618, Class F or Class C.
 - a. Nonstaining.
 - b. Hardened concrete containing fly ash to be uniform light gray color.
 2. Maximum loss on ignition: 4 %.
 - a. Compatible with other concrete ingredients and having no deleterious effects on the hardened concrete.
 - b. Evaluate and use in accordance with ACI 232.2R.
 3. Cement and SCM type used shall correspond to that upon which selection of concrete proportions was based in the mix design.
- C. Admixtures:
 1. Air entraining admixtures: ASTM C260.
 2. Water reducing, retarding, and accelerating admixtures:
 - a. ASTM C494 Type A through E.
 - b. Conform to provisions of ACI 212.3R.
 - c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.
 - d. Follow manufacturer's instructions.
 3. Use chloride free admixtures only.
 4. Maximum total water-soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
 - a. 0.10 all concrete.
 5. Do not use calcium chloride.
 6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water:

1. Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
1. Normal weight concrete.
 - a. Fine aggregate:
 - 1) Clean natural sand.
 - 2) No manufactured or artificial sand.
 - b. Coarse aggregate:
 - 1) Crushed rock, natural gravel, or other inert granular material.
 - 2) Maximum amount of clay or shale particles: 1%.
 - c. Gradation of coarse aggregate:
 - 1) Lean concrete and concrete topping: Size #7.
 - 2) All other concrete: Size #57 or #67.
 2. Use only washed aggregates.
- F. Concrete Grout:
1. Epoxy grout:
 - a. 3-component epoxy resin system.
 - 1) Two liquid epoxy components.
 - 2) One inert aggregate filler component.
 - b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
1. Reinforcing bars: ASTM A615, Grade 60.
- H. Forms:
1. Prefabricated or job built.
 2. Wood forms:
 - a. 5/8 or 3/4 inches 5-ply structural plywood of concrete form grade.
 - b. Built-in-place or prefabricated type panel.
 3. Metal forms:
 - a. Metal forms may be used except for aluminum in contact with concrete.
 - b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
 4. Chamfer strips: Clear white pine, surface against concrete planed.
- I. Form Ties:
1. Commercially fabricated for use in form construction.
 - a. Field fabricated ties are unacceptable.
 2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
 3. Embedded portion of ties to be not less than 1-1/2 inches from face of concrete after ends have been removed.
 4. Cone size:
 - a. 3/4 inches minimum diameter cones on both ends.
 - b. Depth of cone not to exceed the concrete reinforcing cover.
 5. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.
- J. Waterstops:
1. Construction joints:
 - a. Ribbed: 6 inches wide by 3/8 inches.
 - b. Sika Greenstreak Plastic Products Style #679, or equal.
 2. Plastic: COE CRD-C572.
 3. Provide factory made waterstop fabrications at all changes of direction, intersections and transitions leaving only straight butt splices for the field.
- K. Chairs, Runners, Bolsters, Spacers, and Hangers:
1. Stainless steel, epoxy coated, or plastic coated metal.
 - a. Plastic coated: Rebar support tips in contact with the forms only.
- L. Membrane Curing Compound:
1. ASTM C309, Type 1D, Class A or B.

2. Fugitive dye shall dissipate over time and exposure.
3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.
4. Curing compound film shall be removed prior to application of any coverings, coatings or finishes to ensure adequate bond to the concrete.
5. Curing compounds used in water treatment plant or water storage construction to be NSF 61 approved.

2.3 CONCRETE MIXES

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94/C94M.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.
4. Provide pozzolan content for all cast-in-place construction.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
Lean concrete	Normal weight	3000 psi
All other concrete	Normal weight	4500 PSI

*Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE SIZE	TOTAL AIR CONTENT PERCENT
1 inches or 3/4 inches	6 ±1-1/2
<3/4 inches	6-1/2 ±1-1/2

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 inches maximum, 1 inch minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. 8 inches maximum after addition of superplasticizer (if used).
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Pumped concrete:
 - a. Provide additional water at batch plant to allow for slump loss due to pumping.
 - b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ratio is not exceeded.
5. Slump may be adjusted in the field through the use of water reducers.
 - a. Coordinate dosage and mixing requirements with concrete supplier.
6. Determine slump per ASTM C143.

E. Selection of Proportions:

1. General:
 - a. Proportion ingredients to:
 - 1) Produce proper workability, durability, strength, and other required properties.
 - 2) Prevent segregation and collection of excessive free water on surface.
2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	MAXIMUM AGGREGATE SIZE			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	1/2 inches	3/4 inches	1 inches	

3000	---	517	517	0.45
4500	611	611	--	0.42

3. Fly ash:
 - a. For cast-in-place concrete only, a maximum of 25% by weight of Portland cement content per cubic yard may be replaced with fly ash at rate of 1 pound fly ash for 1 pound of cement.
 - b. When fly ash is used, the water to cementitious materials ratio shall not exceed the maximum value specified herein.
4. Concrete mix proportioning methods for normal weight concrete:
 - a. Proportion mixture to provide desired characteristics using one of methods described below:
 - 1) Method 1 (Trial Mix):
 - a) Per ACI 301, Chapter 4, except as modified herein.
 - b) Air content within range specified above.
 - c) Record and report temperature of trial mixes.
 - d) Proportion trial mixes per ACI 211.1.
 - 2) Method 2 (Field Experience):
 - a) Per ACI 301, except as modified herein:
 - b) Field test records must be acceptable to Engineer to use this method.
 - c) Test records shall represent materials, proportions and conditions similar to those specified.
5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Chapter 5 of ACI 318 using the standard deviation of the proposed concrete production facility.

PART 3 - EXECUTION

3.1 FORMING AND PLACING CONCRETE

- A. Formwork:
 1. Contractor is responsible for design and erection of formwork.
 2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
 - a. Allowable tolerances: As recommended in ACI 117.
 3. Provide slabs of minimum indicated depth when sloping foundation base slabs or elevated floor slabs to drains.
 - a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.
 4. Openings:
 - a. Provide openings in formwork to accommodate work of other trades.
 - b. Accurately place and securely support items built into forms.
 5. Chamfer strips: Place 3/4 inches chamfer strips in forms to produce 3/4 inches wide beveled edges on permanently exposed corners of members.
 6. Clean and adjust forms prior to concrete placement.
 7. Tighten forms to prevent mortar leakage.
 8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.
 - a. Do not allow excess form release material to stand in puddles in forms nor in contact with hardened concrete against which fresh concrete is to be placed.
- B. Reinforcement:
 1. Position, support and secure reinforcement against displacement.
 2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
 3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
 4. Lap splice lengths: Class B splice meeting the requirements of ACI 318.
 5. Extend reinforcement to within 2 inches of concrete perimeter edges.
 - a. If perimeter edge is earth formed, extend reinforcement to within 3 inches of the edge.
 6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
 7. Do not weld reinforcing bars.

- C. Construction, Expansion, and Contraction Joints:
1. Locate joints as indicated on Contract Drawings or as shown on approved Shop Drawings.
 - a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph below, submit proposed construction joint location in conformance with this Specification Section.
 2. Unplanned construction joints will not be allowed.
 3. Locate wall vertical construction joints at 30 feet maximum.
 4. Locate construction joints in floor slabs and foundation base slabs so that concrete placements are approximately square and do not exceed 4000 SQFT.
 5. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.
 6. At least 72 hours shall elapse between placing of adjoining concrete construction.
 7. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.
 8. Before new concrete is placed, dampen concrete surfaces.
- D. Embedments:
1. Set and build in anchorage devices and other embedded items required for other work that is attached to or supported by concrete.
 2. See Specification Section 03 15 19 - Anchorage to Concrete.
 3. Use setting diagrams, templates and instructions for locating and setting.
 4. Secure waterstops in correct position using hog rings or grommets spaced along the length of the waterstop and wire tie to adjacent reinforcing steel.
- E. Waterstops, General:
1. Lap all types of waterstop to create continuous watertight joints.
 2. Do not mix different types of waterstop materials in the same structure without specific approval from the Engineer.
 3. Contractor is responsible for waterstop selection and installation to provide leak-tight joints, to the minimum standard shown in the Contract Documents.
 4. Waterstop manufacturer's representative shall provide on-site training of waterstop installation, splicing, welding and inspection procedures prior to construction, and at no additional cost.
- F. Placing Concrete:
1. Place concrete in compliance with ACI 304R and ACI 304.2R.
 2. Place in a continuous operation within planned joints or sections.
 3. Begin placement when work of other trades affecting concrete is completed.
 4. Place concrete by methods which prevent aggregate segregation.
 5. Do not allow concrete to free fall more than 4 feet.
 6. Where free fall of concrete will exceed 4 feet, place concrete by means of tremie pipe or chute.
- G. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.
- H. Protection:
1. Protect concrete from physical damage or reduced strength due to weather extremes.
 2. In cold weather comply with ACI 306.1 except as modified herein.
 - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
 - b. Minimum concrete temperature at the time of mixing:

OUTDOOR TEMPERATURE AT PLACEMENT (IN SHADE)	CONCRETE TEMPERATURE AT MIXING
Below 30 degrees F	70 degrees F
Between 30-45 degrees F	60 degrees F
Above 45 degrees F	50 degrees F

- c. Do not place heated concrete that is warmer than 80 degrees F.
- d. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 degrees F for seven days or 70 degrees F for 3 days.

- e. Do not allow concrete to cool suddenly.
- 3. In hot weather comply with ACI 305.1 except as modified herein.
 - a. At air temperature of 90 degrees F and above, keep concrete as cool as possible during placement and curing.
 - b. Do not allow concrete temperature to exceed 90 degrees F at placement.
 - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
 - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 pounds/SF/HR as determined from ACI 305.1, Figure 2.1.5.
- I. Curing:
 - 1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
 - 2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
 - 3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
 - 4. Provide curing for minimum of seven days.
 - 5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
 - 6. In hot weather follow curing procedures outlined in ACI 305.1.
 - 7. In cold weather follow curing procedures outlined in ACI 306.1.
 - 8. Curing vertical surfaces with a curing compound:
 - a. Cover vertical surfaces with a minimum of two coats of the curing compound.
 - b. Allow the preceding coat to completely dry prior to applying the next coat.
 - c. Apply the first coat of curing compound immediately after form removal.
 - d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.
- J. Form Removal:
 - 1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.
 - 2. Where no reshoring is planned, leave forms and shoring used to support concrete until it has reached its specified 28-day compressive strength.

3.2 CONCRETE FINISHES

- A. Tolerances:
 - 1. Class A: 1/8 inches in 10 feet.
 - 2. Class B: 1/4 inches in 10 feet.
- B. Surfaces Exposed to View:
 - 1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
 - a. To be covered with a coating or covering material applied directly to concrete.
 - b. Scheduled for grout cleaned finish.
 - 2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
- C. Surfaces Not Exposed to View:
 - 1. Patch voids, air pockets and honeycomb areas with cement grout.
 - 2. Fill tie holes with nonshrink, nonmetallic grout.
- D. Slab Float Finish:
 - 1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
 - 2. Do not use water to aid in finishing.
 - 3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.
 - 4. During or after first floating, check planeness of entire surface with a 10 feet straightedge applied at not less than two different angles.
 - 5. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
 - 6. Refloat slab immediately to a uniform sandy texture.

- E. Troweled Finish:
 - 1. Float finish surface.
 - 2. Next power trowel, and finally hand trowel.
 - 3. Do not use water to aid in finishing.
 - 4. Produce a smooth surface which is relatively free of defects with first hand troweling.
 - 5. Perform additional trowelings by hand after surface has hardened sufficiently.
 - 6. Final trowel when a ringing sound is produced as trowel is moved over surface.
 - 7. Thoroughly consolidate surface by hand troweling.
 - 8. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
 - 9. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.

3.3 GROUT

- A. Preparation:
 - 1. Epoxy grout: Apply only to clean, dry, roughened, sound surface.
- B. Application:
 - 1. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Completely fill all cavities and spaces around dowels and anchors without voids.
 - c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

3.4 FIELD QUALITY CONTROL

- A. Employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
- B. Concrete Quality Control During Construction:
 - 1. Strength tests:
 - a. Secure concrete samples in accordance with ASTM C172.
 - b. Obtain each sample from a different batch of concrete on a random basis.
 - c. For each strength test mold and cure three cylinders from each sample in accordance with ASTM C31.
 - 1) Record any deviations from requirements on test report.
 - d. Test cylinders in accordance with ASTM C39.
 - e. Field cure (1) cylinder for the seven-day test.
 - f. Test cylinders in accordance with ASTM C39.
 - 1) 6 inches diameter cylinders:
 - a) Test (2) cylinders at 28 days for strength test result and the (1) field cured sample at seven days for information.
 - b) Hold remaining cylinder in reserve.
 - 2) 4 inches diameter cylinders:
 - a) Test (3) cylinders at 28 days for strength test result and the (1) field cured cylinder at seven days for information.
 - 2. Provide strength tests as follows:
 - a. One strength test consisting of either 6 inches diameter x 12 inches high or 4 inches diameter x 8 inches high cylinders shall be taken:
 - 1) Not less than one test each day concrete placed.
 - 2) Not less than one test for each 50 cubic yards or fraction thereof placed in 1 day.
 - 3) Not less than one test for each type of concrete poured.
 - 4) Not less than one test for each concrete structure exceeding 2 cubic yards in volume.
 - 3. Determine slump of concrete sample for each strength test.
 - a. Additional slump tests shall be taken if consistency of concrete appears to vary.
 - b. Determine slump in accordance with ASTM C143.
 - 4. Determine air content of concrete sample for each strength test in accordance with either ASTM C231, ASTM C173, or ASTM C138.
 - 5. Determine temperature of concrete sample for each strength test.
 - 6. Submit results of all concrete strength tests to Engineer in writing as soon as tests are completed.
- C. Evaluation of Tests:

1. Strength test results:
 - a. Average of 28-day strength of two 6 inches diameter x 12 inches high or three 4 inches diameter x 8 inches high from each sample.
 - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder(s) will be test result.
 - 2) If multiple cylinders show any of above defects, test will be discarded.
- D. Acceptance of Concrete:
 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
 - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
 - b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.
 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.
 - a. Perform additional tests and/or corrective measures at no additional cost to Owner.
- E. Concrete tolerances per ACI 117.

3.5 SCHEDULES

- A. Form Types:
 1. Surfaces exposed to view:
 - a. Prefabricated or job-built wood forms.
 - b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
 - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
 - d. Construct forms sufficiently tight to prevent leakage of mortar.
 2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
 3. Other types of forms may be used:
 - a. For surfaces not restricted to plywood or lined forms.
 - b. As backing for form lining.
- B. Concrete:
 1. Normal weight concrete: All concrete.
- C. Concrete Finishes:
 1. Slab finishes:
 - a. Use following finishes as applicable, unless otherwise indicated:
 - 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.
 - 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.

END OF SECTION

SECTION 03 15 19

ANCHORAGE TO CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for anchorages in concrete including: cast-in-place anchor bolts, anchor rods, reinforcing anchorage adhesive, and post-installed concrete anchors required for the Project but not specified elsewhere in the Contract Documents.
 2. Contractor delegated design requirements for concrete anchors not expressly shown or indicated on the Drawings or elsewhere in the Contract Documents, including, but not limited to, anchorages in concrete for the following structural and nonstructural components:
 - a. Structural members and accessories.
 - b. Metal, fabrications.
 - c. Mechanical and electrical Work, including process-mechanical Work, site and infrastructure Work, electrical Work, communications Work, electronic safety and security systems Work, and others.
 - d. Other components requiring anchorages to concrete.
- B. Related Requirements: Include but are not necessarily limited to:
1. Section 01 61 03 - Common Work Results for Equipment.
 2. Section 03 00 05 - Concrete.

1.2 REFERENCES

- A. Definitions and Terminology:
1. This provision presents definitions and terminology, which have the meanings indicated in this provision, applied to the singular or plural thereof, and without regard to use of initial capital letters.
 - a. Adhesive Anchors:
 - 1) Post-installed anchors developing their strength primarily from chemical bond between the concrete and the anchor.
 - 2) Includes anchors using acrylics, epoxy and other similar adhesives.
 - b. Anchor Bolt: Any cast-in-place anchorage that is made of a headed (i.e. bolt) material.
 - c. Anchor Rod: Any cast-in-place or post-installed anchorage made from unheaded, threaded, rod or deformed bar material.
 - d. Concrete Anchor: Generic term for either an anchor bolt or an anchor rod.
 - e. Galvanizing: Hot-dip galvanizing in accordance with ASTM A123, ASTM A153 or ASTM F2329 with minimum coating of 2.0 ounces of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by reference standard.
 - f. Hardware: As defined in ASTM F2329.
 - g. MPII: Manufacturer's printed installation instructions.
 - h. Mechanical Anchors:
 - 1) Post-installed anchors developing their strength from attachment other than thru adhesives or chemical bond to concrete.
 - 2) Includes expansion anchors, expansion sleeve, screw anchors, undercut anchors, specialty inserts and other similar types of anchorages.
 - 3) Drop-in anchors and other similar non-ICC ES approved anchors are unacceptable.
 - i. Post-Installed Anchor: Adhesive or mechanical anchor installed into previously placed and adequately cured concrete.
- B. Reference Standards:
1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete and Commentary.
 2. American Concrete Institute/Concrete Reinforcing Steel Institute (ACI-CRSI):
 - a. Adhesive Anchor Installation Certification Program: Adhesive Anchor Installer.
 3. American Institute of Steel Construction (AISC):
 - a. 303, Code of Standard Practice for Steel Buildings and Bridges.

- b. 355.2, Seismic Testing of Post-Installed Concrete and Masonry Anchors in Cracked Concrete.
- c. 355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
- 4. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - c. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - d. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - e. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - f. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - g. A563, Standard Specification for Carbon and Alloy Steel Nuts.
 - h. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - i. F436, Standard Specification for Hardened Steel Washers.
 - j. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - k. F594, Standard Specification for Stainless Steel Nuts.
 - l. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 - m. F2329, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
- 5. International Code Council Evaluation Service (ICC-ES):
 - a. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - b. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Code-required Special Instructions:
 - a. Special Inspection is required in accordance with the building code for all concrete anchorages.
 - b. Notify the Special Inspector that an inspection is required prior to concrete placement (or during post-installed anchorage installation).
 - c. See the “Field Quality Control” Article in “Part 3 – Execution” of this Section for additional requirements.
- B. Qualifications:
 - 1. Anchor designer for Contractor-designed post-installed anchors and cast in place anchorage shall be a professional engineer licensed in the State of Missouri.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Submit schedule (table or listing) of types, sizes (diameter, length, embedment length), material, finish, and proposed manufacturers of anchorages to concrete to be provided. Apportion by Project-specific application (for example, “Anchorage for cooling water pumps in basement”) and indicate where anchorages are fully-designed by Engineer and those for which final design was prepared by delegated design professional.
 - b. Engineer’s approval of such Shop Drawing will be only for anchorages fully designed by Engineer. For anchorages for which final design is by delegated design professional, include on such Shop Drawing delegated design professional’s approval stamp.
 - 2. Product Data: Submit as Action Submittals product data for anchorages to concrete fully designed by Engineer. For anchorages to concrete for which final design is by delegated design professional, submit as Informational Submittals bearing approval stamp of delegated design professional.
 - a. Manufacturer’s express, written acknowledgement that proposed items comply with referenced standards indicated in this Section and, as applicable, by delegated design professional.
 - b. Manufacturer published data and information for each anchor.
 - 1) Clearly indicate items that are proposed for the Work. Neatly strike out or obscure materials and products not proposed.
 - c. Manufacturer’s published installation instructions and instructions for code-required special inspections and tests.
 - d. Post-Installed Anchors: In addition, submit for each post-installed anchor system current ICC-ES report, indicating the following:

- 1) Manufacturer's certification that anchors comply with requirements indicated in the Contract Documents.
- 2) Performance data indicating that anchor is approved by its manufacturer for use in cracked concrete.
- 3) Seismic design categories for which anchor system is approved by ICC-ES report.
- e. Anchorage layout drawings and details:
 - 1) Drawings showing location, configuration, spacing and edge distance.
3. Contractor furnished anchorage design: Submit the following for each anchorage to concrete:
 - a. Indicate design tension and shear loads used for anchor design.
 - b. Delegated design professional's drawings.
 - c. Post-Installed Anchors Submittal shall also include the following for post-installed anchors:
 - 1) Show diameter, embedment depth and edge distance of each anchor.
 - 2) Indicate compliance with ACI 318 Chapter 17.
 - 3) Type of post-installed anchor system used.
 - a) Provide manufacturer's ICC-ES report for the following:
 - (1) Mechanical anchorage per ICC-ES AC193.
 - (2) Adhesive anchorage per ICC-ES AC308.
- B. Informational Submittals: Submit the following:
 1. Shop Drawings and Product Data Approved by Delegated Design Professional:
 - a. Submit with delegated design professional's approval stamp those Shop Drawings and product data Submittals indicated in this Article but for which final design was performed by delegated design professional.
 2. Calculations by Delegated Design Professional:
 - a. Submit sealed and signed calculations for sizing and determining embedment length of anchorages to concrete not fully designed by Engineer.
 - b. Post-Installed Anchors Designed by Delegated Design Professional: In addition, also submit design calculations:
 - 1) Indicate design load to each anchor.
 - 2) When design load is not indicated on the Drawings, include calculations to develop anchor forces based on performance and design criteria indicated in this Section.
 3. Supplier's Instructions:
 - a. Submit manufacturer's published instructions for installation.
 4. Field Quality Control Submittals:
 - a. Submit written results of required field quality control activities indicated in this Section.

PART 2 - PRODUCTS

2.1 MATERIALS – ALL ANCHORAGES

- A. Materials – General:
 1. This Article applies to all anchorages to concrete, regardless of whether fully designed by Engineer or delegated design professional. Requirements for delegated designs are in the following Article.
 2. Additional requirements for anchorages fully designed by Engineer are indicated in the Article following requirements for delegated design anchorages.
 3. For structural applications, do not use powder actuated fasteners and other types of bolts or fasteners not specified in this Section unless approved by Engineer or otherwise required by the Contract Documents.
- B. Description:
 1. Provide anchorages to concrete, of the types shown or indicated, to secure to concrete materials, equipment, and appurtenances installed as part of the Work.
 2. Locations where anchorages are required are generally shown or indicated on the Drawings. Where not shown or indicated on the Drawings provide anchorages or the types required for materials, equipment, and systems where such materials, equipment, and systems are shown on the Drawings.
 3. Anchorages required include those for materials, equipment, and systems shown on the structural Drawings and Drawing other than the structural Drawings.
 4. Design loads for concrete anchorages are shown or indicated on the Drawings for anchorages where design responsibility is delegated to Contractor's delegated design professional. For such anchorages, embedment depths are not shown or indicated.

- C. Cast-in-place Concrete Anchors:
 - 1. All cast-in-place concrete anchors:
 - a. Stainless steel with matching nut and washer.
- D. Post-Installed Mechanical and Adhesive Concrete Anchors:
 - 1. ASTM F593, Type 304 or Type 316, minimum yield strength of 45,000 psi with matching nut and washer.
 - 2. Post-installed anchors and related materials shall be listed by ICC-ES or Engineer-approved equivalent.
- E. Reinforcing:
 - 1. Comply with Section 03 00 05 – Concrete.
- F. Washers:
 - 1. ASTM F436 unless indicated otherwise, finish to match bolt.
 - 2. When stainless steel anchorage is provided for cast-in-place anchorages, provide washers of the same material and alloy as in the associated anchorage.
 - 3. Plate washers: Minimum 1/2 inch thick fabricated ASTM A36 square plates as required.
 - 4. Comply with manufacturer's written instructions for all post-installed anchorages.
- G. Nuts:
 - 1. When stainless steel anchorages are provided for cast-in-place anchorages, nuts shall comply with ASTM F594 and shall match material and alloy of the associated anchorage.
 - 2. Follow manufacturer's requirements if using post-installed anchorage.
- H. Dissimilar Materials Protection:
 - 1. Comply with Section 09 96 00 - High-Performance Industrial Coatings.

2.2 DELEGATED DESIGN ANCHORAGES TO CONCRETE

- A. Manufacturers:
 - 1. Post-installed anchor systems for indicated manufacturers are acceptable only when a current ICC-ES evaluation report is furnished as a Submittal and the subject anchorage system is approved by delegated design professional.
 - a. Hilti.
 - b. Dewalt.
 - c. Simpson Strong-Tie.
 - d. Or equal.
- B. Description: Perform delegated design for anchorages when one or more of the following applies:
 - 1. Design load for concrete anchorage is shown or indicated on the Drawings and anchorage embedment depth is not shown or indicated.
 - 2. When specifically required by the Contract Documents.
 - 3. When an anchorage is necessary but is not shown or indicated on the Drawings.
 - 4. Anchorages shown on the Drawings other than the structural Drawings.
- C. Performance and Design Criteria for Delegated Design Anchorages:
 - 1. Determine design loads, including wind and seismic loads, in accordance with applicable building code and other Laws and Regulations.
 - 2. For anchorage of equipment and non-structural components, use actual dead load and operating loads obtained by Contractor or delegated design professional from manufacturer. Design loads shall include operating conditions when equipment or element of the Work is in operation, dynamic loads, and other loads as appropriate or required by the building code or other Laws or Regulations.
 - 3. Additional Support Requirements for Piping and Utilities: Comply with applicable Specifications.
 - 4. Design assuming cracked concrete.

2.3 ANCHORAGES FULLY DESIGNED BY ENGINEER

- A. When size, length, and details of anchorage are shown or indicated on the structural Drawings, such anchorages are considered as fully designed by Engineer and delegated design of such anchorage is not required.
- B. Manufacturers:

1. For post-installed anchor systems regardless of whether proposed manufacturer is indicated below, furnish as Submittal current evaluation agency report and anchor system is certified by ICC-ES for cracked concrete conditions.
2. Mechanical Anchors:
 - a. Hilti:
 - 1) Kwik Bolt TZ (ICC-ES ESR-1917).
 - b. Dewalt:
 - 1) Power-Stud+ SD1 (ICC-ES ESR-2818).
 - c. Simpson Strong-Tie:
 - 1) Strong-Bolt 2 (ICC-ES ESR-3037).
 - d. Or equal.
3. Adhesive Anchors for Concrete:
 - a. Hilti:
 - 1) HIT RE 500 V3 (ICC ESR-3814).
 - b. Dewalt:
 - 1) PURE110+ (ICC-ES ESR-3298).
 - c. Simpson Strong-Tie:
 - 1) SET-3G (ICC ES 4057)
 - d. Or equal.
4. Screw Anchors for Concrete:
 - a. Hilti:
 - 1) Kwik HUS-EZ Screw (ICC-ES ESR-3027).
 - b. Dewalt:
 - 1) Screw-Bolt+ (ICC-ES ESR-3889).
 - c. Simpson Strong-Tie:
 - 1) Titen HD (ICC-ES ESR-2713).
 - d. Or equal.
5. Requests, if any, for Engineer's approval of "or-equals" or substitutes shall indicate proposed anchor has at least the same tension and shear strength as the associated anchorage products indicated by name in this Article.

PART 3 - EXECUTION

3.1 PREPARATION

- A. For cast-in-place concrete anchorages, allow adequate time for proper installation, inspection, and observation prior to placing concrete.
- B. Prior to installation, inspect and verify areas and conditions under which concrete anchorages will be installed.
 1. Notify Engineer of conditions detrimental to proper and timely completion of the Work.
 2. Do not proceed with the Work until unsatisfactory conditions are properly remedied.

3.2 INSTALLATION

- A. Installation Requirements - General:
 1. Install items in accordance with the Contract Documents, manufacturer's written instructions, and Laws and Regulations. Where such requirements conflict, obtain interpretation or clarification from Engineer prior to commencing the associated Work.
 2. Perform the following unless shown or indicated otherwise:
 - a. Provide stainless steel anchorages for connecting aluminum and steel members to concrete and masonry. Provide dissimilar materials protection in accordance with Section 09 96 00 – High-Performance Industrial Coatings.
 - b. Provide washers for all anchorages.
 - c. Where exposed, extend threaded anchorage a maximum of 0.75 inch and a minimum of 0.5 inch above top of fully-engaged nut. If anchorage is cut off to required maximum height, dress the threads to allow nuts to be removed without damage to nuts.
 3. Tightening of nuts: Do the following after nuts are snug-tightened down:
 - a. Upset anchorage threads to prevent nuts from backing off. Provide double nut or lock nut in lieu of upset threads for items that may require future removal.

- b. For cast-in-place anchorages (excluding post-installed anchorages), tighten nuts an additional 1/8 turn beyond snug tight to prevent nuts from backing off.
 - c. When two nuts are used per concrete anchor above the base plate, tighten top nut an additional 1/8 turn to "lock" the two nuts together.
 - d. For post-installed anchorages, comply with MPII.
- 4. Secure architectural components to avoid aesthetic distortion and to avoid overstressing fasteners from expansion, contraction, or installation.
- B. Cast-in-Place Anchorages:
 - 1. Provide where anchor rods or anchor bolts are indicated on the Drawings, unless another anchor type is approved by Engineer.
 - 2. Provide concrete anchorages as shown on the Drawings or as required to secure the Work to concrete.
 - 3. Tie cast-in-place anchorage in position to embedded reinforcing steel using wire.
 - 4. Tack welding of anchorage is prohibited.
 - 5. Chase threads as required and coat projected portion of carbon steel anchors and nut threads with a heavy coat of clean grease after concrete has cured.
 - 6. Anchorage location Tolerance: in accordance with AISC 303.
 - 7. Provide steel or durable wood templates for all column and equipment anchorages. Place templates above top of concrete; do not impede proper concrete placement and consolidation.
- C. Mechanical Anchorages:
 - 1. Use only where specifically indicated on the Drawings or when approved for use by the Engineer.
 - 2. Do not use where subjected to vibration.
 - 3. May be used in overhead applications.
 - 4. Contact Engineer for clarification when anchors will not be installed in compliance with manufacturer's printed installation requirements.
- D. Post-installed Anchorages:
 - 1. For post-installed anchors, comply with MPII regarding hole diameter and depth required to fully develop the tensile strength of anchor or reinforcing bar.
 - 2. Use hammer drills to create holes.
 - 3. Properly clean out holes in accordance with the associated ICC-ES report using non-metallic, fiber bristle brush and compressed air, or as otherwise necessary to remove all loose material from each hole prior to installing anchor in the presence of Special Inspector.
 - 4. Adhesive Anchorages:
 - a. Provide only where specifically indicated on the Drawings or when approved for use by Engineer.
 - b. May be provided where subjected to vibration or at buried or submerged locations.
 - c. Do not install for overhead applications or sustained tension loading conditions such as utility hangers.
 - d. Install adhesive anchors in concrete aged not less than 21 days.
- E. Finishes:
 - 1. Coat aluminum surfaces in contact with dissimilar materials in accordance with Section 09 96 00 – High-Performance Industrial Coatings.
 - 2. Repair of damaged galvanized surfaces:
 - a. Prepare damaged surfaces by abrasive blasting or power sanding.
 - b. Repair damaged galvanized surfaces in accordance with ASTM A780.
 - c. Apply galvanizing repair paint to not less than 6 mils dry film thickness in accordance with galvanizing repair material manufacturer's instructions and ASTM A780.
- F. Ensure that embedded items are protected from damage and are not filled in with concrete or related materials.

3.3 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 - 1. Comply with Section 03 00 05 – Concrete.
 - 2. Tests and inspections of anchorages shall comply with ACI 355.2 and/or ACI 355.4 as applicable.
 - 3. Owner reserves the right to inspect and test completed anchorages at a minimum of 10 to 50 percent of provided anchorages.

B. Supplier's services:

1. Post-installed anchor manufacturer's representative shall demonstrate and observe the proper installation procedures for the post-installed anchors.

C. Defective Work:

1. Anchorages that do not successfully pass required field tests and inspections or that are otherwise deemed defective by Engineer shall be remedied, in accordance with the Contract Documents, at no cost to Owner.

3.4 CLEANING

- A. After concrete has been placed, remove protection and clean all anchorage of all concrete, dirt, and other foreign matter.

END OF SECTION



DIVISION 05

METALS



SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Design of all temporary bracing not indicated on Drawings.
 - 2. Delegated design systems and components by contractor, including but not limited to:
 - a. Ladders.
 - b. Handrails and gates.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 03 15 19 - Anchorage to Concrete.
 - 2. Section 09 96 00 - High Performance Industrial Coatings.

1.2 REFERENCES

- A. Definitions
 - 1. Fasteners: As defined in ASTM F1789.
 - 2. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 oz of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
 - 3. Hardware: As defined in ASTM A153/A153M.
 - 4. Installer or Applicator:
 - a. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - b. Installer and applicator are synonymous.
 - 5. PQR: Procedure Qualification Record
- B. Referenced Standards: Standards referenced in this section include, but are not necessarily limited to, the following:
 - 1. Aluminum Association (AA):
 - a. ADM 1, Aluminum Design Manual.
 - 2. American Association of State Highway and Transportation Officials (AASHTO):
 - a. HB, Standard Specifications for Highway Bridges.
 - 3. American Institute of Steel Construction (AISC):
 - a. 325, Manual of Steel Construction.
 - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 - 4. The American Ladder Institute (ALI):
 - a. A14.3, Ladders - Fixed - Safety Requirements.
 - 5. American Society of Civil Engineers (ASCE):
 - a. 7, Minimum Design Loads for Buildings and Other Structures.
 - 6. ASTM International (ASTM):
 - a. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - b. A36, Standard Specification for Carbon Structural Steel.
 - c. A47, Standard Specification for Ferritic Malleable Iron Castings.
 - d. A48, Standard Specification for Gray Iron Castings.
 - e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - f. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 - g. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - h. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - i. A197, Standard Specification for Cupola Malleable Iron.
 - j. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

- k. A276, Standard Specification for Stainless Steel Bars and Shapes.
- l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- m. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- n. A380/A380M, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- p. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- q. A536, Standard Specification for Ductile Iron Castings.
- r. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
- s. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- t. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- u. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- v. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
- w. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- x. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- y. A992, Standard Specification for Steel for Structural Shapes.
- z. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- aa. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- bb. B26, Standard Specification for Aluminum-Alloy Sand Castings.
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- ee. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ff. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- gg. B632, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
- hh. F436, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
- ii. F467, Standard Specification for Nonferrous Nuts for General Use.
- jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
- kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- ll. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
- mm. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
- nn. F1789, Standard Terminology for F16 Mechanical Fasteners.
- oo. F3125, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
- 7. American Welding Society (AWS):
 - a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. B2.1, Specification for Welding Procedure and Performance Qualification
 - c. D1.1, Structural Welding Code - Steel.
 - d. D1.2, Structural Welding Code - Aluminum.
 - e. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
- 8. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 555, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).
 - b. MBG 531, Metal Bar Grating Manual.
- 9. NACE International (NACE).

10. Nickel Development Institute (NiDI):
 - a. Publication 11 007, Guidelines for the Welded Fabrication of Nickel-Containing Stainless Steels for Corrosion Resistant Services.
11. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Shop Drawings:
 - a. Fabrication and/or layout drawings and details:
 - 1) Submit drawings for all fabrications and assemblies.
 - a) Include erection drawings, plans, sections, details and connection details.
 - 2) Identify materials of construction, shop coatings and third party accessories.
 2. Product technical data (for fabrications not delegated design) including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Provide manufacturer's standard allowable load tables for the following:
 - 1) Grating.
 3. Delegated Design Professional's "Instruments of Service" Submittals:
 - a. Design drawings sealed and signed by delegated design professional, including:
 - 1) Design drawings deemed appropriate and necessary by delegated design professional.
 - 2) Show or indicate necessary details establishing the method of fastening throughout system and attachments to supporting primary structure including anchorage to concrete as required.
 - 3) Coordinate drawings and details with delegated design professional's calculations required in this Section.
 - 4) At option of Contractor or fabricator, design drawings may be combined with the Shop Drawings required in this Section, although delegated design professional's seal and signature is required on the Shop Drawings in the event of a combined Submittal.
 - b. Design specifications, sealed and signed by delegated design professional.
- B. Informational Submittals:
 - a. .
 2. Supplier's Instructions:
 - a. Fabricator's instructions for handling, storing, and installing structural elements furnished.
 3. Qualifications Statements:
 - a. Delegated design professional.
 - b. Fabricator, when requested by Engineer, including:
 - 1) Qualifications of welders to be employed in fabricating the structural elements for the Project.
 - c. Installer, when requested by Engineer, including fabricator's approval of installer.
 4. Delegated design Shop Drawings approved by delegated design professional:
 - a. Detailed structural elements erection drawings, shop details, erection detail.
 - b. Indicate member type, location, spacing, size, and gauge of members; method of attachment to supporting members; and necessary erection details.
 - c. Show and indicate supplemental bracing, strapping, splices, bridging, accessories, and details necessary for proper installation.
 - d. Structural element Placement Diagram: Diagram showing and indicating assumed location of each structural element and references the corresponding structural element design drawing.
 5. Delegated design product data approved by delegated design professional:
 - a. Fabricator's published product data for each type of structural element and accessory required.
 - b. Expressly indicate compliance with applicable reference standards. If not addressed in fabricator's published information, submit as special certification addressing compliance with reference standards indicated in this Section.
 - c. Published product data for galvanizing repair paint.
 6. Delegated design calculations:
 - a. Complete set of design calculations, indicating:
 - 1) Basis of design, including a list of codes and standards used for design.
 - 2) List of design loads and load combinations.

- 3) Design moments, shear forces, and axial compression/tension forces.
- 4) Design of connections, including splices, if required.
- 5) Bridging and bracing design, including attachments to trusses and anchorage to supporting structural elements, if required.
- 6) Special requirements, if any.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Welders:
 - a. Each welder employed on the Work shall possess current, valid certification in accordance with AWS D1.1/D1.1M and AWS B2.1/B2.1M.
 - b. Upon Engineer's request, submit documentation of welders' qualifications, in accordance with requirements of this provision.
2. Engineer for contractor-designed systems and components: Professional structural engineer licensed in the State of Missouri.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle fabrications to avoid damage.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Mechanical anchor bolts:
 - a. See Section 03 15 19.
 2. Epoxy adhesive anchor bolts:
 - a. See Section 03 15 19.
 3. Concrete screw anchors:
 - a. See Section 03 15 19.
 4. Aluminum ladders:
 - a. Any manufacturer capable of meeting the requirements of this Specification Section.
 5. Galvanizing repair paint:
 - a. Aervoe Industries, Inc.
 - b. ZRC Products.
 6. Modular framing system:
 - a. Unistrut Building Systems.
 - b. B-Line Systems.
 - c. Kindorf.

2.2 MATERIALS

- A. Steel:
 1. Structural:
 - a. W-shapes and WT-shapes: ASTM A992, Grade 50.
 - b. All other plates and rolled sections: ASTM A36.
 2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
 3. Structural tubing:
 - a. ASTM A500, Grade B (46 ksi minimum yield).
 4. Bolts, high strength:
 - a. ASTM F3125, Grade A325.
 5. Nuts, high strength:
 - a. ASTM A563.
 6. Washers (hardened):
 - a. ASTM F436.
 - b. Provide two (2) washers with all bolts.
 7. Bolts and nuts (unfinished):

- a. ASTM A307, Grade A.
- 8. Welding electrodes: AWS D1.1, E70 Series.
- 9. Steel forgings: ASTM A668.
- B. Stainless Steel:
 - 1. Stainless steel in welded applications: Low carbon 'L' type.
 - 2. Minimum yield strength of 30,000 psi and minimum tensile strength of 75,000 psi.
 - a. Bars, shapes: ASTM A276, Type 304.
 - b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 304 or 316.
 - c. Strip, plate and flat bars: ASTM A666, Type 304 or 316.
 - d. Bolts and nuts: ASTM F593, Type 304 or 316.
 - 3. Minimum yield strength of 25,000 psi and minimum tensile strength of 70,000 psi.
 - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 304L or 316L.
 - 4. Welding electrodes: In accordance with AWS for metal alloy being welded.
- C. Aluminum:
 - 1. Alloy 6061-T6 or Alloy 6061-T6, 32,000 psi tensile yield strength minimum.
 - a. ASTM B221 and ASTM B308 for shapes including beams, channels, angles, tees and zees.
 - b. Weir plates, baffles and deflector plates, ASTM B209.
 - 2. Alloy 6063-T5 or T6, 15,000 psi tensile yield strength minimum.
 - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
 - 3. ASTM B26 for castings.
 - 4. ASTM F468, alloy 2024 T4 for bolts.
 - 5. ASTM F467, alloy 2024 T4 for nuts.
 - 6. Electrodes for welding aluminum: AWS D1.2, filler alloy 4043 or 5356.
- D. Washers: Same material and alloy as found in accompanying bolts and nuts.
- E. Embedded Anchor Bolts:
 - 1. See Specification Section 03 15 19.
- F. Mechanical Anchor Bolts and Adhesive Anchor Bolts:
 - 1. See Specification Section 03 15 19.
- G. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 psi and a minimum tensile strength of 60,000 psi.
- H. Deformed Bar Anchors: ASTM A1064 with a minimum yield strength of 70,000 psi and a minimum tensile strength of 80,000 psi.
- I. Iron and Steel Hardware: Galvanized in accordance with ASTM A153/A153M when required to be galvanized.
- J. Galvanizing Repair Paint:
 - 1. High zinc dust content paint for regalvanizing welds and abrasions.
 - 2. ASTM A780.
 - 3. Zinc content: Minimum 92% in dry film.
 - 4. ZRC "ZRC Cold Galvanizing" or Aervoe " Crown Cold Galvanize Coating 93% Zinc Rich."
- K. Dissimilar Materials Protection: See Specification Section 09 96 00.

2.3 MANUFACTURED UNITS

- A. Ladders:
 - 1. General:
 - a. Fully welded type.
 - 1) All welds to be full penetration welds, unless otherwise specified.
 - b. All ladders of a particular material shall have consistent construction and material shapes and sizes unless noted otherwise on the Drawings.
 - c. Design ladder in accordance with OSHA Standards, ANSI A14.3, ASCE 7 and the building code.
 - d. Ladders shall be designed to support a minimum concentrated live load of 300 pounds at any point to produce the maximum stress in the member being designed.
 - 1) Apply additional 300 pound loads for each section of ladder exceeding 10 feet.

- e. Maximum allowable stresses per AA ADM 1.
 - f. Maximum lateral deflection: Side rail span/240 when lateral load of 100 pounds is applied at any location.
 - 2. Material:
 - a. Aluminum.
 - b. Finish:
 - 1) Mill.
 - 3. Rails:
 - a. Round pipe or rectangular tubing:
 - 1) Round pipe:
 - a) 1-1/2 inches nominal diameter.
 - b) Schedule 80.
 - 2) Rectangular tubing:
 - a) Cross-section: 3 by 2 inches maximum.
 - b) Thickness: 0.125 inches minimum.
 - b. Spacing:
 - 1) Minimum clear distance between rails to be 18 inches.
 - 2) Step-through ladder extensions: 24 inches, clear minimum, 30 inches maximum.
 - 3) Ladders equipped with ladder safety system: 36 inches clear.
 - c. Provide cap at exposed top and bottom of side rails.
 - 1) Provide weep holes as necessary to prevent the accumulation of moisture within hollow members.
 - d. Extend side rails of step-through ladders a minimum of 42 inches above the landing.
 - 4. Rungs:
 - a. Minimum 1 inch diameter or 1 inch square solid bar.
 - 1) Integral non-slip finish on all sides.
 - a) Non-slip finish: Coarse knurling or extruded serrations.
 - b) Shop or field-applied grit tape and cap type non-slip finishes are not acceptable.
 - b. Rungs shall penetrate inside wall of side rails.
 - 1) Do not extend rungs beyond the outside face of the side rail.
 - 2) Provide fillet weld all around rung at inside face of side rail and plug weld at outside face of side rail.
 - c. Rung spacing:
 - 1) Equally spaced not less than 10 inches and not more than 14 inches as measured between the centerlines of the rungs.
 - 2) Top rung shall be level with landing or platform.
 - a) Where top of ladder terminates at grating cover, floor access door, roof hatch or similar condition; locate top rung as close as practicable to, but not more than 6 inches below, adjacent walking surface.
 - 5. Brackets:
 - a. Angle or bent plate brackets welded to side rails:
 - 1) 3/8 inches by 2-1/2 inches by length required.
 - 2) Provide punched holes for 3/4 inches bolts or anchors.
 - 3) Minimum distance from centerline of rung to wall or any obstruction: 7 inches.
 - 4) Maximum spacing: 4 feet OC.
 - 6. Ladder Gates:
 - a. Constructed of same material and sizes as the railing system.
 - b. Hinges:
 - 1) Stainless steel.
 - 2) Heavy-duty, self-closing.
 - c. Gate stop:
 - 1) Aluminum.
 - 7. Deflector plate:
 - a. For aluminum ladders: Minimum 0.0625 inches aluminum plate, ASTM B209.
 - b. Fabricate to shapes and sizes required to meet OSHA Standards.
- B. Aluminum Grating:
- 1. NAAMM MBG 531.

2. Bearing bars: Rectangular, 1-1/2 by 3/16 inches at 1-3/16 inches on-center spacing OR I-bar, 1-1/2 inches deep with minimum 1/16 inches thick bar and minimum 1/4 inches flange width at 1-3/16 inches on-center spacing (unless noted otherwise on Drawings).
 3. Cross bars:
 - a. Welded, swaged or pressure locked to bearing bars:
 - b. Maximum 4 inches/OC spacing.
 4. Top edges of bars: Grooved or serrated.
 5. Finish: Mill, standard.
 6. Clips and bolts: Stainless steel.
 7. Seat angles: Aluminum or stainless steel
- C. Modular Framing System:
1. Materials:
 - a. Steel: ASTM A1011, carbon steel, Grade 33.
 - 1) Hot-dipped galvanized, ASTM A123 or ASTM A153.
 - b. Aluminum: ASTM B221 or ASTM B209.
 - c. Stainless steel: ASTM A666.
 2. Channels and inserts:
 - a. Steel or stainless steel: Minimum 12 GA.
 - b. Aluminum: Minimum 0.080 inches.
 - c. Channels to have one side with a continuous slot with in-turned lips.
 - 1) Width: 1-5/8 inches.
 - 2) Depth and configuration as necessary for loading conditions.
 3. Fittings: Same material as system major components.
 4. Fasteners:
 - a. Nuts: Toothed grooves in top of nuts to engage the in-turned lips of channel.
 - b. Bolts: Hex-head cap screws.
 - c. Same material as system major components.
 5. End caps:
 - a. At each exposed end of each piece mounted on walls, or guardrails, or suspended from framing 7 feet or less above the floor or platform.
 - a) Plastic for all exposed ends 7 feet or more above floor or platform.
 - b) Plastic or metallic for all other exposed ends.
 6. Provide dissimilar materials protection in accordance with Specification Section 09 96 00.
 7. Repair all cut ends or otherwise damaged areas of galvanized steel in accordance with ASTM A780.

2.4 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves.
 1. Grind smooth all rough welds and sharp edges.
 - a. Round all corners to approximately 1/32 - 1/16 inches nominal radius.
- C. Provide drilled or punched holes with smooth edges.
 1. Punch or drill for field connections and for attachment of work by other trades.
- D. Weld Shop Connections:
 1. Connections subject to the following visual and welding requirements:
 - a. Fabricator
 - 1) Fabricator shall have QC program and procedures in place to avoid cross contamination of stainless-steel products with carbon steel products and material if shop fabricates products other than stainless steel.
 - b. Weld Procedures
 - 1) Weld procedures shall be qualified for all positions that will be welded, qualified by testing in accordance with applicable welding codes AWS D1.1, D1.2 and D1.6 requirements.
 - 2) Procedure Qualification Record (PQR) shall document all essential variables to perform consistent quality welds. PQR shall include maximum heat input per pass and shall be tested for CVN properties, macro hardness, and macro/micro hardness testing.
 2. Welds shall be continuous fillet type unless indicated otherwise.
 3. Full penetration butt weld at bends in stair stringers and ladder side rails.

4. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1/A5.1M.
 5. Weld aluminum in accordance with AWS D1.2.
 6. Weld stainless steel in accordance with AWS D1.6.
 7. All headed studs to be welded using automatically timed stud welding equipment.
 8. Grind smooth welds that will be exposed.
 9. Make provisions to prevent carbon steel/free iron contamination of stainless steel surfaces (i.e., contact between carbon steel or iron and stainless steel component). Do not use cutting/grinding/drilling tools, wire brushes, or wire wheels on stainless steel that have been previously used on carbon steel or iron. Do not support or hang stainless steel weldments or fixtures with carbon steel cables or dunnage.
 10. Passivate stainless steel items and stainless steel welds after they have been ground smooth, in accordance with ASTM A380/A380M.
 11. Passivation Requirements:
 - a. For components/assemblies to be used only in indoor conditioned spaces:
 - 1) No post-fabrication passivation treatments are required for external corrosion control.
 - b. Components for use in environments other than indoor conditioned spaces, shall be subjected to a post-fabrication passivation treatment in accordance with ASTM A380. Following cleaning/passivation, the passivated area shall be evaluated for the effectiveness of cleaning/passivation per one of the Tests for Free Iron shown in Section 7 of ASTM A380 (e.g., Water-Wetting and Drying test, Copper Sulfate test, etc.).
 - 1)
- E. Conceal fastenings where practicable.
- F. Fabricate work in shop in as large assemblies as is practicable.
- G. Tolerances:
1. Rolling:
 - a. ASTM A6.
 - b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specification.
 2. Fabrication tolerance:
 - a. Member length:
 - 1) Both ends finished for contact bearing: 1/32 inches.
 - 2) Framed members:
 - a) 30 feet or less: 1/16 inches.
 - b) Over 30 feet: 1/8 inches.
 - b. Member straightness:
 - 1) Compression members: 1/1000 of axial length between points laterally supported.
 - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
 - c. Specified member camber (except compression members):
 - 1) 50 feet or less: -0/+1/2 inches.
 - 2) Over 50 feet: -0/+1/2 inches (+1/8 inches per 10 feet over 50 feet).
 - 3) Members received from mill with 75% of specified camber require no further cambering.
 - 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
 - 5) Camber shall be measured in fabrication shop in unstressed condition.
 - d. At bolted splices, depth deviation shall be taken up by filler plates.
 - 1) At welded joints, adjust weld profile to conform to variation in depth.
 - 2) Slope weld surface per AWS requirements.
 - e. Finished members shall be free from twists, bends and open joints.
 - 1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
- H. Fabricate grating, checkered plate, stairs, ladders and accessories using aluminum unless shown otherwise on Drawings.
1. Finish:
 - a. Mill, unless noted otherwise.

- b. Coat surfaces in contact with dissimilar materials.
 - 1) See Specification Section 09 96 00.
- I. Fabricate grating in accordance with NAAMM MBG 531.
 - 1. Maximum tolerance for difference in depth between grating depth and seat or support angle depth: 1/8 inches.
 - 2. Distance between edge of grating and face of embedded seat angle or face of wall or other structural member: 1/4 inches.
 - a. Tolerance: NAAMM MBG 531.
 - 3. Ends and perimeter edges: Banded, with alternate bearing bars welded to band.
 - a. Provide full depth banding unless noted otherwise.
 - b. Banding at trenches and sumps to be 1/4 inches less than grating depth to allow for drainage.
 - 4. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 inches high toe plate.
 - 5. Provide joints at openings between individual grating sections.
 - 6. Fabricate grating so that bearing bars and cross bars in adjacent sections are aligned.
- J. Fabricate checkered plate and miscellaneous metals in accordance with NAAMM AMP 555.
 - 1. Workmanship: Class 2 unless noted otherwise.
- K. See Specification Section 09 96 00 for preparation and painting of ferrous metals and other surfaces.

2.5 SOURCE QUALITY CONTROL

- A. Surface Preparation:
 - 1. Refer to Specification Section 09 96 00 for surface preparation requirements.
- B. Shop Applied Coating Application:
 - 1. Refer to Specification Section 09 96 00 for coating requirements.
 - 2. After surface has been accepted in writing by NACE certified coatings inspector, fabricator may proceed with application of coatings.
 - 3. Application of coatings shall be observed and certified by NACE certified coatings inspector.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide items to be built into other construction in time to allow their installation.
 - 1. If such items are not provided in time for installation, cut in and install.
- B. Prior to installation, inspect and verify condition of substrate.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.
 - 1. Field welding aluminum is not permitted unless approved in writing by Engineer.

3.2 INSTALLATION

- A. Set metal work level, true to line, plumb.
 - 1. Shim and grout as necessary.
- B. Contractor is solely responsible for safety.
 - 1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
 - 2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, and diagonal bracing or rigid connections are installed.
 - 3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
 - 4. Until all elements of the permanent structure and lateral bracing system are complete, temporary bracing for the partially complete structure will be required.
- C. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including construction activities and operation of equipment is the responsibility of the Contractor.
 - 1. Plumb, align, and set structural steel members to specified tolerances.

2. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.
 3. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
 4. Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades.
 - a. If not obvious from experience or from the Drawings, confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.
 5. Remove and dispose of all temporary work and facilities off-site.
- D. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.
1. Report defects in work-in-place which may influence satisfactory completion of the work.
 2. Absence of such notification will be construed as acceptance of work-in-place.
- E. Field Measurement:
1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
 2. Contractor responsible for the accurate fit of the work.
- F. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.
1. Use surveyor's level.
 2. Notify Engineer of any errors or deviations found by such checking.
- G. Framing member location tolerances after erection shall not exceed the frame tolerances listed in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
- H. Erect plumb and level; introduce temporary bracing required to support erection loads.
- I. Use light drifting necessary to draw holes together.
1. Drifting to match unfair holes is not allowed.
- J. Welding:
1. Comply with AWS D1.1, AWS D1.2, and AWS D1.6 (as applicable for the material welded) and requirements of this Section's "Fabrications" Article in "Part 2 - Products".
 2. When joining two sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
 3. 100% of all completed stainless steel welds and material shall be passivated in accordance with ASTM A380/A380M.
- K. Shore existing members when unbolting of common connections is required.
1. Use new bolts for rebolting connections.
- L. Clean stored material of all foreign matter accumulated prior to the completion of erection.
- M. Bolt Field Connections: Where practicable, conceal fastenings.
- N. Field Welding:
1. Follow AWS procedures.
 2. Grind welds smooth where field welding is required.
 3. 100% of all completed stainless steel welds and material shall be passivated in accordance with ASTM A380/A380M.
- O. Field cutting grating or checkered plate to correct fabrication errors is not acceptable.
1. Replace entire section.
- P. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- Q. Unless noted or specified otherwise:
1. Connect aluminum to aluminum with 3/4 inches diameter stainless bolts.

2. Connect aluminum and steel members to concrete and masonry using stainless steel mechanical anchor bolts or adhesive anchor bolts unless shown otherwise.
 - a. Provide dissimilar materials protection.
3. Provide washers for all bolted connections.
4. Where exposed, bolts shall extend a maximum of 3/4 inches and a minimum of 1/2 inches above the top of installed nut.
 - a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- R. Install and tighten ASTM F3125, Grade A325 high-strength bolts in accordance with the AISC 325, Allowable Stress Design (ASD).
 1. Provide hardened washers for all Grade A325 bolts.
 - a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.
- S. After bolts are tightened, upset threads of ASTM A307 bolts or anchor bolts to prevent nuts from backing off.
- T. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing.
 1. Provide full penetration welded splices where continuity is required.
- U. Provide each fabricated item complete with attachment devices as indicated or required to install.
- V. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.
- W. Set beam and column base plates accurately on nonshrink grout as indicated on Drawings.
 1. See Division 03 Specification Sections for non-shrink grout and anchorage.
 2. Set and anchor each base plate to proper line and elevation.
 - a. Use metal wedges, shims, or setting nuts for leveling and plumbing columns and beams.
 - 1) Wedges, shims and setting nuts to be of same metal as base plate they support.
 - 2) Tighten nuts on anchor bolts.
 - b. Fill space between bearing surface and bottom of base plate with nonshrink grout.
 - 1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and grout.
 - c. Do not remove wedges or shims.
 - 1) Where they protrude, cut off flush with edge of base plate.
 - d. Fill sleeves around anchor bolts solid with non-shrink grout.
- X. Tie anchor bolts in position to embedded reinforcing steel using wire.
 1. Tack welding prohibited.
 - a. Coat projecting bolt threads and nuts with heavy coat of clean grease.
 2. Anchor bolt location tolerance:
 - a. Per Section 03 15 19.
- Y. Accurately locate and place frames for openings before casting into floor slab so top of plate is flush with surface of finished floor.
 1. Keep screw holes clean and ready to receive screws.
- Z. Attach grating to end and intermediate supports with grating saddle clips and bolts.
 1. Maximum spacing: 2 feet on-center with minimum of two per side.
 2. Attach individual units of aluminum grating together with clips at 2 feet on-center maximum with a minimum of two clips per side.
- AA. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 96 00.
- BB. Repair damaged galvanized surfaces in accordance with ASTM A780.
 1. Prepare damaged surfaces by abrasive blasting or power sanding.
 2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions.
- CC. Anchor ladder to concrete structure with minimum 3/4 inches stainless steel anchor bolts with minimum 6 inches embedment.

3.3 FIELD QUALITY CONTROL

- A. Tolerances (unless otherwise noted on the Drawings):
 - 1. Frame placement, after assembly and before welding or tightening.
 - a. Deviation from plumb, level and alignment: 1 in 500, maximum.
 - b. Displacement of centerlines of columns: 1/2 inches maximum, each side of centerline location shown on Drawings.

3.4 CLEANING

- A. After fabrication, erection, installation, or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. Provide surface acceptable to receive field applied paint coatings specified in Specification Section 09 96 00.

END OF SECTION



DIVISION 08

OPENINGS



SECTION 08 31 00

ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Floor access doors.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Specification Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO).
 - 2. ASTM International (ASTM):
 - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - c. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - d. A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
 - e. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - f. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - g. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - h. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.3 DEFINITIONS

- A. Clear Opening Size: Space within the opening having no obstructions. Furnish model that will provide the minimum clear opening indicated.
- B. Standard Duty: Will support live load of 150 psf.
- C. Heavy Duty: Will support live load of 300 psf.
- D. H-20 loading: As defined in AASHTO Guidelines.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Floor access doors:
 - a. The BILCO Company.
 - b. Babcock-Davis.
 - c. Dur-Red Products.
 - d. Halliday Products.
 - e. USF Fabrication by Eagle Manufacturing Company.

2.2 MATERIALS

- A. Aluminum:
 - 1. Sheet and Plate: ASTM B209.
 - 2. Extruded shapes: ASTM B221.
- B. Stainless Steel: ASTM A240/A240M or A666.

2.3 MANUFACTURED UNITS

- A. General:
 - 1. All access doors shall be provided by the same manufacturer when possible.
 - 2. Coat all aluminum components in contact with concrete or masonry with manufacturer's standard bituminous coating.
- B. Heavy Duty Floor Access Doors:
 - 1. Frame: 1/4 inches mill finish aluminum channel with anchor tabs.
 - a. 1-1/2 inches diameter drain coupling.
 - 2. Cover:
 - a. 1/4 inches mill finished diamond plate aluminum.
 - b. Reinforce cover with aluminum stiffeners.
 - 1) Live load: 300 psf.
 - 2) Deflection: Maximum 1/150 of span.
 - 3. Hardware:
 - a. All hardware to be stainless steel.
 - b. Positive hold open arm that engages automatically when door reaches full 90 degrees open position.
 - c. Slam lock and removable key handle.
 - 4. Bilco Company, Type "J-AL" or "JD-AL."
 - a. Size(s): Refer to the SCHEDULES Article in PART 3 of this Specification Section.

2.4 ACCESSORIES

- A. Secondary Fall Protection System:
 - 1. Design and install system such that when in the open position, no part of the system obstructs the clear opening size listed in the SCHEDULES Article in PART 3 of this Specification Section.
 - 2. Platform: Design grating to meet OSHA 29 CFR 1910 requirements for protection for floor openings.
 - 3. Finish:
 - a. Powder coated.
 - b. Color: Safety Orange or Safety Yellow.
 - 4. Hardware:
 - a. Stainless steel Type 316.
 - b. Tamper proof Type 316 stainless steel bolts.
 - 5. Provide positive latch to hold grating in upright position.
 - 6. Size: Allow 6 inches clear space on each unhinged side for visual observation.
 - 7. Provide padlock hasp for Owner provided padlock.
 - 8. Double leaf openings:
 - a. Provide two individual grating platforms independent from one another.
 - 1) Provide each platform with a padlock hasp and positive latch to hold grating in upright position.
 - 9. Install secondary fall protection system at the factory.
- B. Load Rating Plates:
 - 1. Minimum 18 GA Type 316 stainless steel, ASTM A666.
 - 2. Engraved with maximum design live load allowed for unit on which it will be mounted.
 - 3. Display load in English units as well as metric units.
 - 4. Size as required for text as needed.
 - 5. Text:
 - a. Font: Helvetica Narrow, all caps.
 - b. Size: 1/4 inches height.
 - c. Depth of engraving: 3 mils.

6. Finish:
 - a. Text:
 - 1) Black epoxy baked on paint.
 - 2) Plate to have finish conducive to paint application.
 - b. Coat entire plate with baked on clear coat on front and back side.
7. Attach to top of all vault access doors using stainless steel screws in location determined by manufacturer.
 - a. Provide a neoprene gasket under the plate to separate the stainless steel from the aluminum cover or frame.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide 1.5 inches schedule 80 PVC drain piping at vault access door(s) with drain outlet.
 1. Route piping as indicated in Schedule Article.
 2. Provide positive slope.

3.2 SCHEDULES

- A. Vault Access Door Schedule:

DOOR NO.	DRAWING NO.	LOCATION	CLEAR OPENING SIZE (a)	TYPE	REMARKS
20-VAD01	20U102	METER VAULT	3'-0" X 3'-0"	J-AL	b, c
20-VAD02	20U102	METER VAULT	4'-0" X 4'-0"	JD-AL	b, c
20-VAD03	20U102	METER VAULT	4'-0" X 4'-0"	JD-AL	b, c

1. Notes:
 - a. See definition of Clear Opening Size in the DEFINITIONS Article in PART 2 of this Specification Section.
 - b. Provide secondary fall protection system.
 - c. Route piping to sump.

END OF SECTION



DIVISION 09

FINISHES



SECTION 09 96 00
HIGH PERFORMANCE INDUSTRIAL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. High performance industrial coatings (HPIC).
 - 2. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Specification Section.
 - 3. Minimum surface preparation requirements.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Common Work Results for Equipment.
 - 2. Division 40 - Process Interconnections.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. B499, Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals.
 - b. D3359, Standard Test Methods for Rating Adhesion by Tape Test.
 - c. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - d. D4259, Standard Practice for Abrading Concrete.
 - e. D4261, Standard Practice for Surface Cleaning Concrete Masonry Units for Coating.
 - f. D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
 - g. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - h. D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages.
 - i. D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - j. D6132, Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gage.
 - k. D6677, Standard Test Method for Evaluating Adhesion by Knife.
 - l. D7091, Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
 - m. D7234, Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
 - n. E337, Standard Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures).
 - o. F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - p. F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
 - 2. Environmental Protection Agency (EPA).
 - 3. International Concrete Repair Institute (ICRI):
 - a. 310.2, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
 - 4. National Association of Pipe Fabricators (NAPF):
 - a. 500-03, Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings:
 - 1) 500-03-04, Abrasive Blast Cleaning for Ductile Iron Pipe.
 - 2) 500-03-05, Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
 - 5. The Society for Protective Coatings (SSPC):
 - a. PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
 - b. SP 1, Solvent Cleaning.
 - c. SP 2, Hand Tool Cleaning.

- d. SP 3, Power Tool Cleaning.
 - e. SP 16, Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
- B. Miscellaneous:
- 1. Furnish coating through one manufacturer unless noted otherwise.
- C. Deviation from specified MIL thickness or product type is not allowed without written authorization of Engineer.
- D. Material shall not be thinned unless approved, in writing, by coating manufacturer's technical representative.

1.3 DEFINITIONS

- A. Applicator:
- 1. Applicator is the person actually installing or applying the product in the field, at the Project site, or at an approved shop facility.
- B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Specification Section where the product is specified or in Specification Section 01 61 03.
- C. Appurtenant Surface: Accessory or auxiliary surface attached to or adjacent to a surface indicated to be coated.
- D. Corrosive Environment:
- 1. Immersion in or subject to:
 - a. Condensation, spillage or splash of a corrosive material such as water, wastewater or chemical solution.
- E. Outdoor Atmosphere or Surface: Outdoor atmosphere or surface exposed to weather and/or direct sunlight.
- F. Holiday:
- 1. A void, crack, thin spot, foreign inclusion, or contamination in the coating that significantly lowers the dielectric strength of the coating.
 - 2. May also be identified as a discontinuity or pinhole.
- G. HPIC: High performance industrial coatings.
- 1. Epoxies, urethanes, vinyl ester, waterborne vinyl acrylic emulsions, acrylates, silicones, alkyds, acrylic emulsions and any other coating listed as a HPIC.
- H. Indoor Atmosphere or Surface: Indoor atmosphere or surface not exposed to weather and/or direct sunlight.
- I. Immersion Service:
- 1. Any surface immersed in water or some other liquid.
 - 2. Surface of any pipe, valve, or any other component of the piping system subject to frequent wetting.
 - 3. Surfaces within two feet above high water level in water bearing structures.
- J. Piping System: Pipe, valves, fittings and accessories.
- K. Surface Hidden from View:
- 1. Within pipe chases.
 - 2. Between top side of ceilings and underside of floor or roof structures above.

1.4 SUBMITTALS

- A. Certifications:
- 1. Applicator experience qualifications.
 - a. No submittal information will be reviewed until Engineer has received and approved applicator qualifications.
- B. Shop Drawings:
- 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's surface preparation instructions.

- c. Manufacturer's application instructions.
 - 1) Manufacturer's standard details, including but not limited to penetrations, transitions, and terminations for:
 - a) Special conditions as applicable.
 - d. If products being used are manufactured by Company other than listed in the MATERIALS Article of this Specification Section, provide complete individual data sheet comparison of proposed products with specified products including:
 - 1) Application procedure.
 - 2) Coverage rates.
 - 3) Certification that product is designed for intended use and is equal or superior to specified product.
 - e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media.
 - f. Coating manufacturer's recommendation on abrasive blasting.
 - g. Coating manufacturer's technical representative's written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.
 - h. Manufacturer's recommendation for universal barrier coat.
 - i. Manufacturer's recommendation for providing temporary or supplemental heat or dehumidification or other environmental control measures.
- 2. Manufacturer's statement regarding applicator instruction on product use.
- C. Informational Submittals:
 - 1. Approval of application equipment.
 - 2. Applicator's daily records:
 - a. Submit daily records at end of each week in which coating work is performed unless requested otherwise by Engineer's on-site representative.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in original containers, labeled as follows:
 - 1. Name or type number of material.
 - 2. Manufacturer's name and item stock number.
 - 3. Contents, by volume, of major constituents.
 - 4. Warning labels.
 - 5. VOC content.
- B. Store materials in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F.

1.6 PROJECT CONDITIONS

- A. Verify that atmosphere in area where coating is to take place is within coating manufacturer's acceptable temperature, humidity and sun exposure limits.
 - 1. Provide temporary heating, shade and/or dehumidification as required to bring area within acceptable limits.
 - a. Provide temporary dehumidification equipment properly sized to maintain humidity levels required by coating manufacturer.
 - b. Provide clean heat with heat exchanger type equipment sufficient in size to maintain temperature on a 24 hour basis.
 - 1) Vent exhaust gases to outdoor environment.
 - 2) No exhaust gases shall be allowed to vent into the space being coated or any adjacent space.
 - 2. Do not apply coatings in snow, rain, fog or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. High Performance Industrial Coatings:
 - a. Carboline Protective Coatings.
 - b. PPG.
 - c. The Sherwin-Williams Company.

- d. Tnemec.
- e. AkzoNobel.

B. "Or-Equal" Submittals:

1. Materials by other manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the manufacturers listed.
2. Provide satisfactory documentation from the proposed "or-equal" manufacturer that proposed materials meets or exceeds the following:
 - a. Is of the same generic resin.
 - b. Requires comparable surface preparation.
 - c. Has comparable application requirements.
 - d. Meets the same VOC levels or better.
 - e. Provides the same finish and color options.
 - f. Is suitable for the intended service.
 - g. Resistance to abrasion and physical damage.
 - h. Resistance to chemical attack.
 - i. Resistance to UV exposure.
 - j. Ability to recoat in future.
 - k. Dry film thickness per coat.
 - 1) Where manufacturer's product data sheet indicates a minimum MIL thickness per coat that is greater than specified herein, MIL thickness for entire coating system shall be increased proportionately.
 - l. Minimum and Maximum time between coats.
 - m. Compatibility with other coatings.
 - n. Temperature limitations in service and during application.
 - o. Type and quality of recommended undercoats and topcoats.
 - p. Ease of application.
 - q. Ease of repairing damaged areas.
 - r. Stability of colors.
3. The cost of all testing and analyzing of the proposed substitute materials shall be borne by the CONTRACTOR.

2.2 MATERIALS

- A. Coatings used for indoor finishes shall meet the requirements of the building code.
- B. Coatings shall comply with the VOC limits of EPA.
- C. For unspecified materials such as thinner, provide manufacturer's recommended products.
- D. High Performance Industrial Coatings:

COATING CODE	GENERIC DESCRIPTION	MANUFACTURER	
		TNEMEC	SHERWIN WILLIAMS
AAE	Acrylic/Acrylate Emulsion	Series 180 WB Tneme-Crete	Cement Plex 875
AREC	Abrasion-Resistant Epoxy Coating	Series 435 Perma-Glaze	Duraplate 5900
AAP	Aliphatic Acrylic Polyurethane	Series 1095 Endurashield	Acrolon Ultra
AP	Acrylic Polymer	Series 1029 Enduratone	Pro Industrial Acrylic Coating
CRM	Cementitious Repair Mortar	Series 217 MortarCrete	Cemtec Silatec MSM
CRU	Corrosion Resistant Urethane	Series 290 CRU	Polylon HP
DFA	Dry-fall Acrylic	Series 115 Uni-Bond DF	DFA Dry Fall Acrylic

COATING CODE	GENERIC DESCRIPTION	MANUFACTURER	
		TNEMEC	SHERWIN WILLIAMS
EBF	Epoxy Block Filler	Series 1254 Epoxoblock WB	Kem Cati Coat HS
ESF	Epoxy Surfacers/Filler	Series 215 Surfacing Epoxy	Steel Seam FT 910
EMM	Epoxy Modified Cementitious Mortar	Series 218 MortarClad	Duraplate 2300
EF	Epoxy Flooring	Series 237 Power-Tread	GP3746
GFRE	Glass Flake Reinforced Epoxy	Series 142	Sher-Glass FF
HRE	H2S-Resistant Epoxy	Series 132 Protuff Mastic	Duraplate 235
HREM	H2S-Resistant Epoxy Mortar	Series 434 Perma-Shield H ₂ S	Duraplate 5900 Mortar
MIO	MIO Polyurethane	Series 1 Omnithane	Corothane 1 milesO
MPE	Multi-Purpose Epoxy	Series N69 Hi-Build Epoxoline II	Macropoxy 646
MTEP	Moisture-Tolerant Epoxy Primer	Series 201 Epoxoprime	Corobond 100
PVA	PVA Drywall Primer	Series 51 PVA Sealer	ProMar 200 Zero VOC Interior Latex Primer
SCN	Secondary Containment Novolac	Series 282	Cor Cote HCR
SCE	Secondary Containment Epoxy	Series 237SC Chembloc	Cor Cote HP
SCEP	Secondary Containment Epoxy Primer	Series 206SC Chembloc	GP3552
STEP	Surface-Tolerant Epoxy Primer	Series 135 Chembuild	Macropoxy 646
UHSE	Ultra-High Solids Epoxy (NSF 61)	Series 22 Epoxoline	Duraplate UHS
VEP	Vinyl Ester Primer	Series 251SC Chembloc	Corobond Vinyl Ester Primer
VESC	Vinyl Ester Secondary Containment	Series 252SC Chembloc	Cor Cote VEN FF
PVA	PVA Drywall Primer	Series 51 PVA Sealer	ProMar 200 Zero VOC Interior Latex Primer
SCN	Secondary Containment Novolac	Series 282	Cor Cote HCR
ZRU	Zinc-Rich Urethane	Series 94-H ₂ O Hydro-Zinc	Corothane 1 Galvapak

2.3 COATING SYSTEMS:

- A. The following tables indicate coating systems by material and environment unless a specific application is indicated.
- B. Ferrous Metals (Structural and Miscellaneous Metals):

Environment/ Application	Surface Preparation	Prime Coat	Intermediate Coats	Finish Coat
Indoor atmospheric (corrosive environment)	SSPC-SP 10/ NACE No. 2, min. 2 mil anchor profile	2.5 to 3.5 mil ZRU	3.0 to 4.0 mil MPE	3.0 to 4.0 mil MPE
Outdoor atmospheric	SSPC-SP 6/ NACE No. 3	2.5 to 3.5 mil ZRU	3.0 to 5.0 mil MPE	2.5 to 3.5 mil AAP

C. Non-Ferrous Metals, including piping:

Environment/ Application	Surface Preparation	Prime Coat	Intermediate Coats	Finish Coat
Dissimilar Materials Protection	SSPC-SP 2	4.5 to 5.5 mil MPE		
Indoor atmospheric (corrosive environment)	SSPC-SP 2	3.0 to 4.0 mil MPE		3.0 to 4.0 mil MPE
Outdoor atmospheric	SSPC-SP 2	4.0 to 6.0 mil MPE		2.5 to 3.5 mil AAP

D. Ferrous Piping:

Environment/ Application	Surface Preparation	Prime Coat	Intermediate Coats	Finish Coat
Indoor atmospheric (corrosive environment)	SSPC-SP 6/ NACE No. 3	2.5 to 3.5 mil ZRU	3.0 to 4.0 mil MPE	3.0 to 4.0 mil MPE
Outdoor atmospheric	SSPC-SP 10/ NACE No. 2	2.5 to 3.5 mil ZRU	3.0 to 4.0 mil MPE	2.5 to 3.5 mil AAP

E. Ductile Iron Piping:

Environment/ Application	Surface Preparation	Prime Coat	Intermediate Coats	Finish Coat
Indoor atmospheric (corrosive environment)	Pipe: NAPF 500-03-04 Fittings: NAPF 500-03-05	3.0 to 4.0 mil MPE	3.0 to 4.0 mil MPE	3.0 to 4.0 mil MPE
Outdoor atmospheric	Pipe: NAPF 500-03-04 Fittings: NAPF 500-03-05	3.0 to 4.0 mil MPE	3.0 to 4.0 mil MPE	2.5 to 3.5 mil AAP

PART 3 - EXECUTION

3.1 ITEMS TO BE COATED

- A. Outdoor Surfaces, including but not limited to:
 - 1. Piping, valves, fittings, supports:
 - a. As specified in Division 40.
 - 2. Appurtenant surfaces attached to or adjacent to a surface indicated to be coated:
 - a. Conduit, boxes, covers and supports.
- B. Indoor Areas:
 - 1. Piping, valves, fittings, and supports:
 - a. Do not coat piping scheduled to be insulated.
 - 2. Pumps and motors.

3.2 ITEMS NOT TO BE COATED

- A. General: Do not coat items listed in this Article, unless noted otherwise.
- B. Items with Approved Factory Finish: These items may require repair of damaged coated areas or coating of welded connections.
- C. Electrical Equipment.
- D. Moving parts of mechanical and electrical units where coating would interfere with the operation of the unit.
- E. Code labels, equipment identification or rating plates and similar labels, tagging and identification.
- F. Contact surfaces of friction-type structural connections.
- G. Stainless Steel Surfaces, except:
 - 1. Dissimilar metals in immersion service.
 - 2. Piping where specifically noted to be coated.
 - 3. Banding as required to identify piping.
- H. Aluminum Surfaces, except:
 - 1. Where specifically shown in the Contract Documents.
 - 2. Where in contact with concrete.
 - 3. Where in contact with dissimilar metals.
 - 4. Appurtenant surfaces as described in the ITEMS TO BE COATED article.
- I. Mechanical piping scheduled to be insulated.
- J. Interior of Pipe and Conduits.
 - 1. See Division 40 for pipe linings.
- K. Galvanized Steel Items, unless specifically noted to be coated.

3.3 PREPARATION

- A. General:
 - 1. Prepare surfaces to be coated in accordance with coating manufacturer's instructions and this Specification Section unless noted otherwise in this Specification Section.
 - a. Where discrepancy between coating manufacturer's instructions and this Specification Section exists, the more stringent surface preparation shall be provided unless approved otherwise, in writing, by the Engineer.
 - 2. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of coating to surface.
 - 3. Adhere to manufacturer's recoat time surface preparation requirements.
 - a. Surfaces that have exceeded coating manufacturer's published recoat time and/or have exhibited surface chalking shall be prepared prior to additional coating in accordance with manufacturer's published recommendations.
- B. Protection:
 - 1. Protect surrounding surfaces not to be coated.

2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
 3. Protect code labels, equipment identification or rating plates and similar labels, tagging and identification.
- C. Prepare and coat before assembly all surfaces which are inaccessible after assembly.
- D. Ferrous Metal:
1. Prepare ductile iron pipe in accordance with pipe manufacturer's recommendations and NAPF.
 - a. All piping, pumps, valves, fittings and any other component used in the water piping system that requires preparation for coating shall be prepared in accordance with requirements for immersion service.
 - b. Prepare all areas requiring patch coating in accordance with recommendations of manufacturer and NAPF.
 - c. Remove bituminous coating per piping manufacturer, coating manufacturer and NAPF recommendations.
 - 1) The most stringent recommendations shall apply.
 2. Complete fabrication, welding or burning before beginning surface preparation.
 - a. Chip or grind off flux, spatter, slag or other laminations left from welding.
 - b. Remove mill scale.
 - c. Grind smooth rough welds and other sharp projections.
 3. Solvent clean in accordance with SSPC-SP 1.
 4. Restore surface of field welds and adjacent areas to original surface preparation.
- E. Non-ferrous Metals:
1. Solvent clean in accordance with SSPC-SP 1 followed by brush-off blast clean in accordance with SSPC-SP 16 to remove zinc oxide and other foreign contaminants.
 - a. Provide uniform 1 mil profile surface.
- F. Preparation by Abrasive Blasting:
1. Schedule the abrasive blasting operation so blasted surfaces will not be wet after blasting and before coating.
 2. Provide compressed air for blasting that is free of water and oil.
 - a. Provide accessible separators and traps.
 3. Protect nameplates, valve stems, rotating equipment, motors and other items that may be damaged from blasting.
 4. All abrasive-blasted ferrous metal surfaces shall be inspected immediately prior to application of coatings.
 - a. Inspection shall be performed to determine cleanliness and profile depth of blasted surfaces and to certify that surface has been prepared in accordance with these Specifications.
 5. Perform additional blasting and cleaning as required to achieve surface preparation required.
 - a. Re-blast surfaces not meeting requirements of these Specifications.
 - b. Prior to coating, re-blast surfaces allowed to set overnight and surfaces that show rust bloom.
 - c. Surfaces allowed to set overnight or surfaces which show rust bloom prior to coating shall be re-inspected prior to coating application.
 6. Profile depth of blasted surface: Not less than 1 mil or greater than 2 mils unless required otherwise by coating manufacturer.
 7. Ensure abrasive blasting operation does not result in embedment of abrasive particles in coating.
 8. Confine blast abrasives to area being blasted.
 - a. Provide shields of polyethylene sheeting or other such barriers to confine blast material.
 - b. Plug pipes, holes, or openings before blasting and keep plugged until blast operation is complete and residue is removed.
 9. Abrasive blasting media may be recovered, cleaned and reused providing Contractor submits, for Engineer's review, a comprehensive recovery plan outlining all procedures and equipment proposed in reclamation process.
 10. Properly dispose of blasting material contaminated with debris from blasting operation.

3.4 APPLICATION

A. General:

1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.
 - a. Application equipment must be inspected and approved in writing by coating manufacturer.
 2. Temperature and weather conditions:
 - a. Do not coat surfaces when surface temperature is below 50 degrees F unless product has been formulated specifically for low temperature application and application is approved in writing by Engineer and coating manufacturer's technical representative.
 - b. Avoid coating surfaces exposed to hot sun.
 - c. Do not coat damp surfaces.
 - d. Apply coating to concrete or masonry surfaces in descending temperatures, in accordance with coating manufacturer's application instructions.
 3. Apply materials under adequate illumination.
 4. Provide complete coverage to MIL thickness specified.
 - a. Thickness specified is dry MIL thickness.
 5. Evenly spread to provide full, smooth coverage.
 - a. All coating systems are "to cover."
 - 1) In situations of discrepancy between manufacturer's square footage coverage rates and MIL thickness, MIL thickness requirements govern.
 - b. When color or undercoats show through, apply additional coats until coating is of uniform finish and color.
 - c. Finished coating system shall be uniform and without voids, bugholes, holidays, laps, brush marks, roller marks, runs, sags or other imperfections.
 6. If so directed by Engineer, do not apply consecutive coats until Engineer has had an opportunity to observe and approve previous coats.
 7. Work each application of material into corners, crevices, joints, and other difficult to work areas.
 8. Provide coating manufacturer's recommended details at all terminations, penetrations, embedments, cracks, joints and changes in substrate direction.
 9. Avoid degradation and contamination of blasted surfaces and avoid inter-coat contamination.
 - a. Clean contaminated surfaces before applying next coat.
 - b. Intercoat surface cleanliness shall be inspected and approved by the Engineer prior to application of each coat.
 10. Smooth out runs or sags immediately, or remove and recoat entire surface.
 11. Allow preceding coats to dry before recoating.
 - a. Recoat within time limits specified by coating manufacturer.
 - b. If recoat time limits have expired re-prepare surface in accordance with coating manufacturer's printed recommendations.
 12. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.
 13. Coat all aluminum in contact with dissimilar materials.
 14. When coating rough surfaces which cannot be backrolled sufficiently, hand brush coating to work into all recesses provided that the maximum DFT is not exceeded.
 15. Backroll surfaces if coatings are spray applied.
- B. Employ services of coating manufacturer's technical representative to ensure that field-applied coatings are compatible with factory-applied or existing coatings.
1. Certify through material data sheets.
 2. Perform test patch.
 - a. Prepare existing coating surface to receive specified coating system.
 - b. Apply coating to a minimum 1 square feet area and allow to cure in accordance with manufacturer's recommendations.
 - c. Evaluate adhesion to existing coating:
 - 1) Concrete or Masonry substrates: ASTM D4541.
 - 2) All other substrates: ASTM D6677 and ASTM D3359 (X-cut method).
 3. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.
 - a. Perform test patch as described above.
 4. At Contractor's option, coatings may be removed, surface re-prepared, and new coating applied using appropriate coating system listed in the MATERIALS Article, Coating Systems paragraph of this Specification Section.

- a. All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to Owner.
- C. Prime Coat Application:
 - 1. Prime all surfaces indicated to be coated.
 - a. Apply prime coat in accordance with coating manufacturer's written instructions and as written in this Specification Section.
 - 2. Prime ferrous metals embedded in concrete to minimum of 1 inch below exposed surfaces.
 - 3. Apply zinc-rich primers while under continuous agitation.
 - 4. Brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over entire surface.
 - 5. Touch up damaged primer coats prior to applying finish coats.
 - a. Restore primed surface equal to surface before damage.
 - 6. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely coated with both prime and finish coats prior to placing in wall.
- D. Finish Coat Application:
 - 1. Apply finish coats in accordance with coating manufacturer's written instructions and in accordance with this Specification Section; manufacturer instructions take precedent over these Specifications.
 - 2. Touch up damaged finish coats using same application method and same material specified for finish coat.
 - a. Prepare damaged area in accordance with the PREPARATION Article of this Specification Section.

3.5 FIELD QUALITY CONTROL

- A. Application Deficiencies:
 - 1. Surfaces showing runs, laps, brush marks, telegraphing of surface imperfections or other defects will not be accepted.
 - 2. Surfaces showing evidence of fading, chalking, blistering, delamination or other defects due to improper surface preparation, environmental controls or application will not be accepted.
 - a. Epoxy surfaces showing evidence of chalking or amine blush shall be prepared and recoated as follows:
 - 1) Recoat with intermediate and finish coats in accordance with coating system specified herein.
- B. Provide protection for coated surfaces.
 - 1. Surfaces showing soiling, staining, streaking, chipping, scratches, or other defects will not be accepted.
- C. Contractor Performed Testing:
 - 1. Provide ongoing testing and inspection, including but not limited to the following:
 - a. Measurement and recording of environmental conditions as specified herein.
 - b. Measurement and recording of substrate conditions as specified herein.
 - c. Thickness Testing:
 - 1) Wet film thickness during application in accordance with ASTM D4414.
 - 2) Dry Film Thickness (DFT) in accordance with SSPC-PA 2.
 - 3) Engineer may measure coating thickness at any time during project to assure conformance with these Specifications.
 - d. Bond Strength:
 - 1) Bond strength testing will be required by the Owner where there is reason to suspect the integrity of the coating system.
 - 2) Measure bond strength of the coating in accordance with:
 - a) Steel substrate: ASTM D4541.
 - b) Concrete substrate ASTM D7234.
 - 3) The number of test sites and locations to be tested shall be determined by the Owner after application of coating. The Contractor will apply the dollies, perform the tests and repair the coating in the presence of the Owner.
 - a) For each test that fails, two additional tests shall be performed in the adjacent area.
 - b) Further bond tests may be performed to determine the extent of potentially deficient bonded areas at no additional cost to the Owner.

- 4) Repairs shall be made by applicator in strict accordance with manufacturer's recommendations. Any coated areas that do not pass the bond strength tests shall be removed and replaced at the expense of the Contractor.

D. Maintain Daily Records:

1. Record the following information during application:
 - a. Date, starting time, end time, and all breaks taken by applicators.
 - b. Air temperature.
 - c. Relative humidity.
 - d. Dew point.
 - e. Moisture content and pH level of concrete or masonry substrates prior to coating.
 - f. Surface temperature of substrate.
 - g. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind-blown dust and debris from contaminating the wet coating.
 - h. For outdoor coating, also record:
 - 1) Sky condition.
 - 2) Wind speed and direction.
 - i. Record environmental conditions, substrate moisture content and surface temperature information not less than once every 4 hours during application.
 - 1) Record hourly when temperatures are below 50 degrees F or above 100 degrees F.
2. Record the following information daily for the coating manufacturer's recommended curing period:
 - a. Date and start time of cure period for each item or area.
 - b. For outdoor coating, also record:
 - 1) Sky conditions.
 - 2) Wind speed and direction.
 - 3) Air temperature.
 - a) Dry Bulb.
 - b) Wet Bulb.
 - 4) Relative humidity.
 - 5) Dew point.
 - 6) Surface temperatures.
 - c. Record environmental conditions not less than once every 4 hours.
 - 1) Record hourly when temperatures are below 50 degrees F or above 100 degrees F.
 - d. Provisions utilized to protect each item or area and to maintain areas within manufacturer's recommended curing parameters.
3. Format for daily record to be computer generated.

3.6 CLEANING

- A. Clean coating spattered surfaces.
 1. Use care not to damage finished surfaces.
- B. Upon completion of coating, replace hardware, accessories, plates, fixtures, and similar items.
- C. Remove surplus materials, scaffolding, and debris.

END OF SECTION



DIVISION 10

SPECIALTIES



SECTION 10 14 00

IDENTIFICATION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tag, tape and stenciling systems for equipment, piping, valves, pumps, ductwork and similar items.
 - 2. Hazard and safety signs.
- B. Related Specification Sections include but are not necessarily limited to:

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. A13.1, Scheme for the Identification of Piping Systems.
 - 2. The International Society of Automation (ISA).
 - 3. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. Z535.1, Safety Color Code.
 - b. Z535.2, Environmental and Facility Safety Signs.
 - c. Z535.3, Criteria for Safety Symbols.
 - d. Z535.4, Product Safety Signs and Labels.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 704, Standard System for the Identification of Hazards of Materials for Emergency Response.
 - 5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.145, Specification for Accident Prevention Signs and Tags.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Catalog information for all identification systems.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.
 - 2. Identification register, listing all items in PART 3 of this Specification Section to be identified, type of identification system to be used, lettering, location and color.
 - 3. Schedule of Hazard and Safety Signage indicating text and graphics.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. W.H. Brady Co.
 - 2. Panduit.
 - 3. Seton.
 - 4. National Band and Tag Co.
 - 5. Carlton Industries, Inc.

2.2 MANUFACTURED UNITS

- A. Type A1 - Round Metal Tags:
 - 1. Materials:
 - a. Aluminum or stainless steel.
 - b. Stainless steel shall be used in corrosive environments.
 - 2. Size:
 - a. Diameter: 1-1/2 inches minimum.
 - b. Thickness: 0.035 inches (20 GA) minimum.

3. Fabrication:
 - a. 3/16 inches minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
 4. Color: Natural.
- B. Type A2 - Rectangle Metal Tags:
1. Materials: Stainless steel.
 2. Size:
 - a. 3-1/2 inches x 1-1/2 inches minimum.
 - b. Thickness: 0.036 inches (20 GA) minimum.
 3. Fabrication:
 - a. 3/16 inches minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
 4. Color: Natural.
- C. Type A3 - Metal Tape Tags:
1. Materials: Aluminum or stainless steel.
 2. Size:
 - a. Width 1/2 inches minimum.
 - b. Length as required by text.
 3. Fabrication:
 - a. 3/16 inches minimum mounting hole.
 - b. Legend: Embossed.
 4. Color: Natural.
- D. Type B1- Square Nonmetallic Tags:
1. Materials: Fiberglass reinforced plastic.
 2. Size:
 - a. Surface: 2 x 2 inches minimum.
 - b. Thickness: 100 mils.
 3. Fabrication:
 - a. 3/16 inches mounting hole with metal eyelet.
 - b. Legend: Preprinted and permanently embedded and fade resistant.
 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
- E. Type B2 - Nonmetallic Signs:
1. Materials: Fiberglass reinforced or durable plastic.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 60 mils minimum.
 3. Fabrication:
 - a. Rounded corners.
 - b. Drilled holes in corners with grommets.
 - c. Legend: Preprinted, permanently embedded and fade resistant for a 10 year minimum outdoor durability.
 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- F. Type C - Laminated Name Plates:
1. Materials: Phenolic or DR (high impact) acrylic.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 1/16 inches.
 3. Fabrication:
 - a. Outdoor rated and UV resistant when installed outdoors.
 - b. Two layers laminated.

- c. Legend: Engraved through top lamination into bottom lamination.
 - d. Two drilled side holes, for screw mounting.
 - 4. Color: Black top surface, white core, unless otherwise indicated.
- G. Type D - Self-Adhesive Tape Tags and Signs:
- 1. Materials: Vinyl tape or vinyl cloth.
 - 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 5 mils minimum.
 - 3. Fabrication:
 - a. Indoor/Outdoor grade.
 - b. Weather and UV resistant inks.
 - c. Permanent adhesive.
 - d. Legend: Preprinted.
 - e. Wire markers to be self-laminating.
 - 4. Color: White with black lettering or as specified.
 - 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- H. Type E - Heat Shrinkable Tape Tags:
- 1. Materials: Polyolefin.
 - 2. Size: As required by text.
 - 3. Fabrication:
 - a. Legend: Preprinted.
 - 4. Color: White background, black printing.
- I. Type F - Underground Warning Tape:
- 1. Materials: Polyethylene.
 - 2. Size:
 - a. 6 inches wide (minimum).
 - b. Thickness: 3.5 mils.
 - 3. Fabrication:
 - a. Legend: Preprinted and permanently imbedded.
 - b. Message continuous printed.
 - c. Tensile strength: 1750 psi.
 - 4. Color: As specified.
- J. Type G - Stenciling System:
- 1. Materials:
 - a. Exterior type stenciling enamel.
 - b. Either brushing grade or pressurized spray can form and grade.
 - 2. Size: As required.
 - 3. Fabrication:
 - a. Legend: As required.
 - 4. Color: Black or white for best contrast.
- K. Underground Tracer Wire:
- 1. Materials:
 - a. Wire:
 - 1) 12 GA AWG.
 - 2) Solid.
 - b. Wire nuts: Waterproof type.
 - c. Split bolts: Brass.

2.3 ACCESSORIES

- A. Fasteners:
- 1. Bead chain: #6 brass, aluminum or stainless steel.
 - 2. Plastic strap: Nylon, urethane or polypropylene.
 - 3. Screws: Self-tapping, stainless steel.
 - 4. Adhesive, solvent activated.

2.4 MAINTENANCE MATERIALS

- A. Where stenciled markers are provided, clean and retain stencils after completion and include in extra stock, along with required stock of paints and applicators.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Install identification devices at specified locations.
- B. All identification devices to be printed by mechanical process, hand printing is not acceptable.
- C. Attach tags to equipment with sufficient surface or body area with solvent activated adhesive applied to back of each tag.
- D. Attach tags with 1/8 inches round or flat head screws to equipment without sufficient surface or body area, or porous surfaces.
 - 1. Where attachment with screws should not or cannot penetrate substrate, attach with plastic strap.
- E. Single items of equipment enclosed in a housing or compartment to be tagged on outside of housing.
 - 1. Several items of equipment mounted in housing to be individually tagged inside the compartment.
- F. Tracer Wire:
 - 1. Attach to pipe at a maximum of 10 feet intervals with tape or tie-wraps.
 - 2. Continuous pass from each valve box and above grade at each structure.
 - 3. Coil enough wire at each valve box to extend wire a foot above the ground surface.
 - 4. 1,000 feet maximum spacing between valve boxes.
 - 5. If split bolts are used for splicing, wrap with electrical tape.
 - 6. If wire nuts are used for splicing, knot wire at each splice point leaving 6 inches of wire for splicing.
 - 7. Use continuous strand of wire between valve box where possible.
 - a. Continuous length shall be no shorter than 100 feet.

3.2 SCHEDULES

- A. Hazard and Safety Signage:
 - 1. Permit Required Confined Space signage:
 - a. Tag Type: Type B2 - Nonmetallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 10 inches x 14 inches.
 - d. Location: As indicated on Drawings.
 - e. Location: Field located as directed by Engineer or Owner.
 - f. Legend:
 - 1) OSHA Danger sign.
 - 2) Description of hazard: "PERMIT REQUIRED CONFINED SPACE DO NOT ENTER".
- B. Process Systems:
 - 1. General:
 - a. Provide arrows and markers on piping.
 - 1) At 20 feet maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At valves, risers, "T" joints, machinery or equipment.
 - 4) Where pipes pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b. Position markers on both sides of pipe with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
 - c. Apply tapes and stenciling in uniform manner parallel to piping.
 - 2. Trenches with piping:
 - a. Tag type: Type F - Underground Warning Tape
 - b. Location: Halfway between top of piping and finished grade.
 - c. Letter height: 1-1/4 inches minimum.
 - d. Potable water:
 - 1) Color: Blue with black letters.

- 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED WATER LINE BELOW"
 - e. Storm and sanitary sewer lines:
 - 1) Color: Green with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED SEWER LINE BELOW"
 3. Yard valves, buried, with valve box and concrete pad:
 - a. Tag type: Type A2 - Rectangle Metal Tags.
 - b. Fastener: 3/16 inches x 7/8 inches plastic screw anchor with 1 inch #6 stainless steel pan head screw.
 - c. Legend:
 - 1) Letter height: 1/4 inches minimum.
 - 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
 4. Valves and slide gates:
 - a. Tag type:
 - 1) Outdoor locations: Type B1 - Square Nonmetallic Tags.
 - 2) Indoor noncorrosive:
 - a) Type A1 - Round Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A1 - Round Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - c. Color: Per ASME A13.1 corresponding to the piping system.
 - d. Legend:
 - 1) Letter height: 1/4 inches minimum.
 - 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
 5. Piping systems:
 - a. Tag type:
 - 1) Outdoor locations: Type G - Stenciling System.
 - 2) Indoor locations:
 - a) Type D - Self-Adhesive Tape Tags and Signs.
 - b) Type G - Stenciling System.
 - b. Fastener: Self.
 - c. Color: Per ASME A13.1.
 - d. Legend:
 - 1) Letter height: Manufacturers standard for the pipe diameter.
 - 2) Mark piping in accordance with ASME A13.1.
 - 3) Use piping designation as indicated on the Drawings.
 - 4) Arrow: Single arrow.
- C. Instrumentation Systems:
1. Instrumentation Equipment (e.g., flow control valves, primary elements, etc.):
 - a. Tag type:
 - 1) Outdoor locations: Type B1 - Square Nonmetallic Tags.
 - 2) Indoor noncorrosive:
 - a) Type A1 - Round Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A1 - Round Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - c. Legend:

- 1) Letter height: 1/4 inches minimum.
 - 2) Equipment ISA designation as indicated on the Drawings (e.g., "FIT-xxx").
 2. Enclosure for instrumentation and control equipment, (e.g., PLC control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 inches minimum.
 - 2) Equipment name (e.g., "PLC CONTROL PANEL PCP-xxx").
 3. Components inside equipment enclosure, (e.g., PLC's, control relays, contactors, and timers):
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 inches minimum.
 - 2) Description or function of component (e.g., "PLC-xxx" or "CR-xxx").
 4. Through enclosure door mounted components (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 inches minimum.
 - 2) Component ISA tag number as indicated on the Drawings (e.g., "HS-xxx").
- D. Electrical Systems:
1. Trenches with ductbanks, direct-buried conduit, or direct-buried wire and cable.
 - a. Tag type: Type F - Underground Warning Tape.
 - b. Letter height: 1-1/4 inches minimum.
 - c. Location:
 - 1) Where trench is 12 inches or more below finished grade: In trench 6 inches below finished grade.
 - 2) Where trench is less than 12 inches below finished grade: In trench 3 inches below finished grade.
 - d. Electrical power (e.g., low and medium voltage):
 - 1) Color: Red with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED ELECTRIC LINE BELOW".
 - e. Communications (e.g., telephone, instrumentation, LAN, SCADA):
 - 1) Color: Orange with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED COMMUNICATION LINE BELOW".
 2. Enclosure for instrumentation and control equipment, (e.g., lighting control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 inches minimum.
 - 2) Equipment name (e.g., "LIGHTING CONTROL PANEL LCPxxx").
 3. Components inside equipment enclosures (e.g., circuit breakers, fuses, control power transformers, control relays, contactors, timers, etc.):
 - a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 inches minimum.
 - 2) Description or function of component (e.g., "M-xxx", "CR-xxx" or "TR-xxx").
 4. Conductors in control panels and in pull or junction boxes where multiple circuits exist.
 - a. Tag type: Type D - Self-Adhesive Tape Tags or Type E - Heat Shrinkable Tape Tags.
 - b. Fastener: Self.
 - c. Tag conductor at both ends.
 - d. Legend:

- 1) Letter height: 1/8 inches minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings or as furnished with the equipment.
5. Conductors in handholes and manholes.
 - a. Tag type: Type A3 - Metal Tape Tags.
 - b. Fastener: Nylon strap.
 - c. Tag conductor at both ends.
 - d. Legend:
 - 1) Letter height: 1/8 inches minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings.

END OF SECTION



DIVISION 26

ELECTRICAL

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for electrical systems.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Common Work Results for Equipment.
 - 2. Section 03 15 19 - Anchorage to Concrete.
 - 3. Section 10 14 00 - Identification Devices.
 - 4. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 5. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

1.2 REFERENCES

- A. Definitions
 - 1. For the purposes of providing materials and installing electrical work the following definitions shall be used.
 - a. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
 - b. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
 - c. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
 - d. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
 - e. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
 - f. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.
- B. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM, Aluminum Design Manual.
 - 2. American Institute of Steel Construction (AISC):
 - a. Steel Construction Manual.
 - 3. American National Standards Institute (ANSI).
 - 4. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C2, National Electrical Safety Code (NESC).
 - 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 7. National Electrical Manufacturers Association (NEMA):
 - 8. Underwriters Laboratories, Inc. (UL).
- C. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.
 - 1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
 - 2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 61 03 and individual specification sections for submittal requirements for products defined as equipment.
 - 2. General requirements:
 - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
 - b. Include data sheets that include manufacturer's name and product model number.
 - 1) Clearly identify all optional accessories.
 - c. Acknowledgement that products are NRTL listed or are constructed utilizing NRTL recognized components.
 - d. Manufacturer's delivery, storage, handling and installation instructions.
 - e. Product installation details.
 - f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
 - g. See individual specification sections for any additional requirements.
 - 3. Fabrication and/or layout drawings:
 - a. Concrete and reinforcing steel, per Division 03 requirements.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content process of Operation and Maintenance Manuals.
- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01 33 00 and all Specification Sections shall be submitted simultaneously.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect nameplates on electrical equipment to prevent defacing.

1.5 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
 - 1. Outdoor areas:
 - a. Wet.
 - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
 - 2. Indoor areas:
 - a. Dry.
 - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

- A. Electrical Equipment Support Pedestals and/or Racks:
 - 1. Manufacturers:
 - a. Modular strut:
 - 1) Unistrut Building Systems.
 - 2) B-Line by Eaton.
 - 3) Globe Strut.

- 4) Superstrut by Thomas & Betts.
2. Material requirements:
 - a. Modular strut:
 - 1) Galvanized steel: ASTM A123/123M or ASTM A153/A153M.
 - 2) Stainless steel: AISI Type 316.
 - 3) PVC coated galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 mil PVC coating.
 - 4) Aluminum: AA Type 6063-T6.
 - b. Structural members (e.g., I beams, L and C channels):
 - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
 - 2) Aluminum: AA Type 6061-T6 or 6063-T6.
 - c. Mounting plates:
 - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
 - 2) Aluminum: AA Type 6063-T6.
 - d. Mounting hardware:
 - 1) Galvanized steel.
 - 2) Stainless steel.
 - e. Anchorage per Specification Section 03 15 19.
 - f. Concrete and reinforcing steel: See Division 03 specifications.
- B. Equipment pads (interior and exterior):
 1. Concrete and reinforcing steel: See Division 03 specifications.
- C. Field touch-up of galvanized surfaces.
 1. Zinc-rich primer.
 - a. One coat, 3.0 mils, ZRC by ZRC Products.

PART 3 - EXECUTION

3.1 PREPARATION

3.2 INSTALLATION

- A. Install and wire all equipment, including pre-purchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
 1. NFPA 70.
 2. IEEE C2.
 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
 4. See Section 26 05 19 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 inches from process, gas, air and water piping and equipment.

- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
 - 1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
 - a. Light switch (to center): 46 inches.
 - b. Receptacle in architecturally finished areas (to center): 18 inches.
 - c. Receptacle on exterior wall of building (to center): 18 inches.
 - d. Receptacle in non-architecturally finished areas (to center): 46 inches.
 - e. Telephone outlet in architecturally finished areas (to center): 18 inches.
 - f. Telephone outlet for wall-mounted phone (to center): 46 inches.
 - g. Safety switch (to center of operating handle): 54 inches.
 - h. Separately mounted motor starter (to center of operating handle): 54 inches.
 - i. Pushbutton or selector switch control station (to center): 46 inches.
 - j. Panelboard (to top): 72 inches.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
 - 1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 inches in equipment location with the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
 - 1. Dry areas:
 - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
 - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
 - 2. Wet areas:
 - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
 - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
 - 3. Corrosive areas:
 - a. Aluminum system consisting of aluminum channels and fittings with stainless steel nuts and hardware.
 - 4. Highly corrosive areas:
 - a. PVC coated steel system consisting of PVC coated steel channels and fittings with stainless steel nuts and hardware.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
 - 1. See Specification Section 03 15 19.
 - 2. Do not cut, or weld to, building structural members.
 - 3. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide non-metallic corrosion resistant spacers to maintain 1/4 inches separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- Q. Identify electrical equipment and components in accordance with Specification Section 10 14 00.
- R. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.
- S. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.

1. Determine the SCCR rating by one of the following methods:
 - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.
3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

3.3 FIELD QUALITY CONTROL

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
 1. See Specification Section 01 73 20 for openings and penetrations in structures.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. The protective coating integrity of support structures and equipment enclosures shall be maintained.
 1. Repair galvanized components utilizing a zinc rich paint.
 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
 4. Repair surfaces which will be inaccessible after installation prior to installation.
 5. See Specification Section 26 05 33 for requirements for conduits and associated accessories.
- D. Replace nameplates damaged during installation.

3.4 DEMONSTRATION

- A. Demonstrate equipment in accordance with Specification Section 01 75 00.

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Building wire.
 - b. Power cable.
 - c. Control cable.
 - d. Instrumentation cable.
 - e. Wire connectors.
 - f. Insulating tape.
 - g. Pulling lubricant.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 26 05 00 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Insulated Cable Engineers Association (ICEA):
 - a. S-58-679, Standard for Control Cable Conductor Identification.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
 - 3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
 - a. WC 57/S-73-532, Standard for Control Cables.
 - b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
 - 5. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
 - a. 568, Commercial Building Telecommunications Cabling Standard.
 - 6. Underwriters Laboratories, Inc. (UL):
 - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
 - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - c. 467, Standard for Safety Grounding and Bonding Equipment.
 - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
 - e. 486C, Standard for Safety Splicing Wire Connections.
 - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
 - g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - i. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Instrumentation Cable:
 - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
 - 2. The following are specific types of instrumentation cables:

- a. Analog signal cable:
 - 1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 VDC) signals, using No. 16 AWG and smaller conductors.
 - 2) Commonly used types are defined in the following:
 - a) TSP: Twisted shielded pair.
 - b) TST: Twisted shielded triad.
- b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.
- D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Wire connectors.
 - 2) Insulating tape.
 - 3) Cable lubricant.
 - b. See Section 26 05 00 for additional requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Building wire, power and control cable:
 - a. Aetna Insulated Wire.
 - b. Alphawire.
 - c. Cerrowire.
 - d. Encore Wire Corporation.
 - e. General Cable.
 - f. Okonite Company.
 - g. Southwire Company.
 - 2. Instrumentation cable:
 - a. Analog cable:
 - 1) Alphawire.
 - 2) Belden Inc.
 - 3) General Cable.
 - 3. Wire connectors:
 - a. Burndy Corporation.
 - b. Buchanan.
 - c. Ideal.
 - d. Ilsco.
 - e. 3M Co.
 - f. Teledyne Penn Union.
 - g. Thomas and Betts.
 - h. Phoenix Contact.
 - 4. Insulating and color coding tape:
 - a. 3M Co.
 - b. Plymouth Bishop Tapes.
 - c. Red Seal Electric Co.

2.2 MANUFACTURED UNITS

A. Building Wire:

1. Conductor shall be copper with 600 V rated insulation.
2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

B. Power Cable:

1. Conductor shall be copper with 600 V rated insulation.
2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
4. Number of conductors as required, including a bare ground conductor.
5. Individual conductor color coding:
 - a. ICEA S-58-679, Method 4.
 - b. See PART 3 of this Specification Section for additional requirements.
6. Conform to NFPA 70 Type TC and IEEE 1202 or CSA FT-4.

C. Control Cable:

1. Conductor shall be copper with 600 V rated insulation.
2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
 - a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
5. Individual conductor color coding:
 - a. ICEA S-58-679, Method 1, Table E-2.
 - b. See PART 3 of this Specification Section for additional requirements.
6. Conform to NFPA 70 Type TC and IEEE 1202, CSA FT-4 or NFPA 262.

D. Electrical Equipment Control Wire:

1. Conductor shall be copper with 600 V rated insulation.
2. Conductors shall be stranded.
3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
4. Conform to UL 44 for Type SIS insulation.
5. Conform to UL 83 for Type MTW insulation.

E. Instrumentation Cable:

1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
2. Analog cable:
 - a. Tinned copper conductors.
 - b. 300 V or 600 V PVC insulation with PVC jacket.
 - c. Twisted with 100% foil shield coverage with drain wire.
 - d. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
 - e. Conform to IEEE 1202 or CSA FT-4 or NFPA 262, UL 2250, UL 1581 and NFPA 70 Type ITC.
3. Digital cable:
 - a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
 - b. Horizontal voice and data cable:
 - 1) Category 6 per TIA/EIA/ANSI 568.
 - 2) Cable shall be label-verified.
 - 3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
 - 4) Conductors: No. 24 AWG solid untinned copper.
 - 5) Rated CMP per NFPA 70.
 - c. Conform to IEEE 1202 or CSA FT-4 or NFPA 262 and NFPA 70 Type ITC.

F. Wire Connectors:

1. Twist/screw on type:
 - a. Insulated pressure or spring type solderless connector.
 - b. 600 V rated.
 - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
 - d. Phase and neutral conductors: Conform to UL 486C.
 2. Compression and mechanical screw type:
 - a. 600 V rated.
 - b. Ground conductors: Conform to UL 467.
 - c. Phase and neutral conductors: Conform to UL 486A.
 3. Terminal block type:
 - a. High density, screw-post barrier-type with white center marker strip.
 - b. 600 V and ampere rating as required, for power circuits.
 - c. 600 V, 20 ampere rated for control circuits.
 - d. 300 V, 15 ampere rated for instrumentation circuits.
 - e. Conform to NEMA ICS 4 and UL 486A.
- G. Insulating and Color Coding Tape:
1. Pressure sensitive vinyl.
 2. Premium grade.
 3. Heat, cold, moisture, and sunlight resistant.
 4. Thickness, depending on use conditions: 7, 8.5, or 10 mil.
 5. For cold weather or outdoor location, tape must also be all-weather.
 6. Color:
 - a. Insulating tape: Black.
 - b. Color coding tape: Fade-resistant color as specified herein.
 7. Comply with UL 510.
- H. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Permitted Usage of Insulation Types:
1. Type XHHW-2:
 - a. Building wire and power and control cable in architectural and non-architectural finished areas.
 - b. Building wire and power and control cable in conduit in outdoor areas and below grade.
 - c. Building wire and power and control cable in cable tray in outdoor areas.
 2. Type SIS and MTW:
 - a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.
- B. Conductor Size Limitations:
1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow

Neutral	White	White or Gray
Ground	Green	Green

* Orange when it is a high leg of a 120/240 V Delta system.

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
 - b. Conductors larger than No. 6 AWG:
 - 1) Insulated phase and neutral conductors shall be identified by one of the following methods:
 - a) Continuous colored outer finish along its entire length.
 - b) 3 inches of colored tape applied at the termination.
 - 2) Insulated grounding conductor shall be identified by one of the following methods:
 - a) Continuous green outer finish along its entire length.
 - b) Stripping the insulation from the entire exposed length.
 - c) Using green tape to cover the entire exposed length.
 - 3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.
 2. Power cables ICEA S-58-679, Method 4 with:
 - a. Phase and neutral conductors identified with 3 inches of colored tape, per the Table herein, applied at the terminations.
 - b. Ground conductor: Bare.
 3. Control cables ICEA S-58-679, Method 1, Table E-2:
 - a. When a bare ground is not provided, one of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
 - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 inches of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
1. Where specifically indicated on the Drawings.
 2. Where field conditions dictate and written permission is obtained from the Engineer.
 3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) 12 VDC, 24 VDC and 48 VDC may be combined.
 - 2) 125 VDC shall be isolated from all other AC and DC circuits.
 - 3) AC control circuits shall be isolated from all DC circuits.
 4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) Analog signal circuits may be combined.
 - 2) Digital signal circuits may be combined but isolated from analog signal circuits.
 5. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.
 - a. Do not combine control device circuits with lighting or receptacle circuits.
 - b. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
 - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
 - 2) The neutral conductors may not be shared.
 - 3) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one end only.
1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).

- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
1. Feeder and branch power circuits:
 - a. Device outlet boxes:
 - 1) Twist/screw on type connectors.
 - b. Junction and pull boxes and wireways:
 - 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
 - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
 - c. Motor terminal boxes:
 - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
 - 2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.
 - d. Manholes or handholes:
 - 1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 AWG and smaller wire.
 - 2) Watertight compression or mechanical screw type connectors for use on No. 6 AWG and larger wire.
 2. Control circuits:
 - a. Junction and pull boxes: Terminal block type connector.
 - b. Manholes or handholes: Twist/screw on type connectors pre-filled with epoxy.
 - c. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
 3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Engineer.
 - a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.
 - b. Junction and pull boxes: Terminal block type connector.
 - c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.
 4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- H. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 mil vinyl tape.
 2. For insulating splices and taps of No. 6 AWG wire or larger: 10 mil vinyl tape.
 3. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.
- I. Color Coding Tape Usage: For color coding of conductors.

END OF SECTION

SECTION 26 05 33
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Conduits.
 - b. Conduit fittings.
 - c. Conduit supports.
 - d. Wireways.
 - e. Outlet boxes.
 - f. Pull and junction boxes.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 26 05 00 - Common Work Results for Electrical.
 - 2. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
 - 3. Section 26 05 43 - Underground Work for Electrical Systems.
 - 4. Section 26 27 26 - Wiring Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA).
 - 2. American Iron and Steel Institute (AISI).
 - 3. ASTM International (ASTM):
 - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - c. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
 - 4. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - e. TC 14.AG, Aboveground Reinforced Thermosetting Resin Conduit and Fittings.
 - f. TC 14.BG, Belowground Reinforced Thermosetting Resin Conduit and Fittings.
 - 5. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. C80.1, Electric Rigid Steel Conduit (ERSC).
 - b. C80.3, Steel Electrical Metallic Tubing (EMT).
 - c. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
 - d. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 7. Underwriters Laboratories, Inc. (UL):
 - a. 1, Standard for Flexible Metal Conduit.
 - b. 6, Electrical Rigid Metal Conduit - Steel.
 - c. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
 - d. 360, Standard for Liquid-Tight Flexible Metal Conduit.
 - e. 467, Grounding and Bonding Equipment.
 - f. 514A, Metallic Outlet Boxes.
 - g. 514B, Conduit, Tubing, and Cable Fittings.
 - h. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
 - i. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.

- j. 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.
- k. 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- l. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Conduit fittings.
 - 2) Support systems.
 - b. See Section 26 05 00 for additional requirements.
 - 2. Fabrication and/or layout drawings:
 - a. Identify dimensional size of pull and junction boxes to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Rigid metal conduits and electrical metallic tubing:
 - a. Allied Tube and Conduit.
 - b. Western Tube and Conduit Corporation.
 - c. Wheatland Tube.
 - d. Patriot Aluminum Products, LLC.
 - 2. PVC coated rigid metal conduits:
 - a. Robroy Industries.
 - b. Atkore - Calbond
 - 3. Rigid nonmetallic conduit:
 - a. Prime Conduit.
 - b. Cantex, Inc.
 - c. Osburn Associates, Inc.
 - d. Champion Fiberglass, Inc.
 - e. United Fiberglass of America, Inc.
 - 4. Flexible conduit:
 - a. AFC Cable Systems.
 - b. Anamet, Inc.
 - c. Electri-Flex Company.
 - d. International Metal Hose Company.
 - e. Southwire Company, LLC.
 - 5. Wireway:
 - a. Hoffman Engineering.
 - b. Wiegmann by Hubbell.
 - c. Square D by Schneider Electric.
 - 6. Conduit fittings and accessories:
 - a. Appleton by Emerson Electric Co.
 - b. Carlon by Thomas & Betts.
 - c. Cantex, Inc.
 - d. Crouse-Hinds by Eaton.
 - e. Killark by Hubbell.
 - f. Osburn Associates, Inc.
 - g. O-Z/Gedney by Emerson Electric Co.
 - h. Raco by Hubbell.
 - i. Steel City by Thomas & Betts.
 - j. Thomas & Betts.
 - 7. Support systems:

- a. Unistrut by Atkore International, Inc.
- b. B-Line by Eaton.
- c. Kindorf by Thomas & Betts.
- d. Minerallac Company.
- e. CADDY by Pentair.
- f. Superstrut by Thomas & Betts.
- 8. Outlet, pull and junction boxes:
 - a. Appleton by Emerson Electric Co.
 - b. Crouse-Hinds by Eaton
 - c. Killark by Hubbell.
 - d. O-Z/Gedney by Emerson Electric Co.
 - e. Steel City by Thomas & Betts.
 - f. Raco by Hubbell
 - g. Bell by Hubbell.
 - h. Hoffman Engineering.
 - i. Wiegmann by Hubbell.
 - j. B-Line by Eaton.
 - k. Adalet.
 - l. RITTAL North America LLC.
 - m. Stahlin by Robroy Enclosures.

2.2 RIGID METAL CONDUITS

- A. Rigid Galvanized Steel Conduit (RGS):
 - 1. Mild steel with continuous welded seam.
 - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
 - 3. Threads galvanized after cutting.
 - 4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
 - 5. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6.
- B. PVC-Coated Rigid Steel Conduit (PVC-RGS):
 - 1. Nominal 40 mil Polyvinyl Chloride Exterior Coating:
 - a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
 - b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
 - 2. Nominal 2 mil, minimum, urethane interior coating.
 - 3. Urethane coating on threads.
 - 4. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
 - 5. Female Ends:
 - a. Have a plastic sleeve extending a minimum of one pipe diameter or 2 inches, whichever is less beyond the opening.
 - b. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.
 - 6. Pass high temperature water PVC coating adhesion test and be ETL Verified PVC-001.
 - 7. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6, NEMA RN 1.
- C. Rigid Aluminum Conduit (RAC):
 - 1. AA Type 6063 aluminum alloy, T-1 temper.
 - 2. Maximum copper content of 0.10%.
 - 3. Extruded, seamless.
 - 4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

2.3 RIGID NONMETALLIC CONDUIT

- A. Schedules 40 (PVC-40) and 80 (PVC-80):
 - 1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
 - 2. Rated for direct sunlight exposure.
 - 3. Fire retardant and low smoke emission.
 - 4. Shall be suitable for use with 90 degrees C wire and shall be marked "maximum 90 degrees C".

5. Standards: NFPA 70 Type PVC, NEMA TC 2, UL 651.
- B. Fiberglass:
 1. Epoxy based resin system using an anhydride curing agent.
 2. Continuous E-glass roving.
 3. Winding angle approximately 54.75 degrees.
 4. Smooth internal walls with all fibers imbedded in the epoxy.
 5. Above grade rated: Halogen free additive for flame spread and smoke control.
 6. Ultraviolet inhibitor: Carbon black.
 7. Two-step curing process.
 8. Tensile strength: 11,000 psi per ASTM D2105.
 9. Dimensions: Iron Pipe Size (IPS).
 10. Wall thickness:
 - a. Standard: 3/4 inches to 4 inches nominal size.
 - b. Medium: 5 inches to 6 inches nominal size.
 - c. Extra Heavy for "bullet proof" and Class 1, Division 2 areas: 3/4 inches to 6 inches nominal size.
 11. Integral bell and spigot.
 12. Conduits and fittings to be joined with an interference joint and epoxy adhesive creating a concrete and water tight connection.
 13. Standard: NFPA 70 Type RTRC, NEMA TC14.AG, NEMA TC14.BG, NEMA TC.XW, UL 2420, UL 2515, UL 2515A.

2.4 FLEXIBLE CONDUIT

- A. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):
 1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
 2. Extruded PVC outer jacket positively locked to the steel core.
 3. Liquid and vaportight.
 4. Standard: NFPA 70 Type LFMC, UL 360.

2.5 WIREWAY

- A. General:
 1. Suitable for lay-in conductors.
 2. Designed for continuous grounding.
 3. Covers:
 - a. Hinged or removable in accessible areas.
 - b. Non-removable when passing through partitions.
 4. Finish: Rust inhibiting primer and manufacturer's standard paint inside and out except for stainless steel type.
 5. Standards: UL 870, NEMA 250.
- B. Watertight (NEMA 4X rated) Wireway:
 1. 14 GA Type 304 or 316 stainless steel bodies and covers without knockouts and 10 GA stainless steel flanges.
 2. Cover: Fully gasketed and held in place with captive clamp type latches.
 3. Flanges: Fully gasketed and bolted.
- C. Dusttight (NEMA 12 rated) Wireway:
 1. 14 GA steel bodies and covers without knockouts and 10 GA steel flanges.
 2. Cover: Fully gasketed and held in place with captive clamp type latches.
 3. Flanges: Fully gasketed and bolted.

2.6 CONDUIT FITTINGS AND ACCESSORIES

- A. Fittings for Use with RGS and RAC:
 1. General:
 - a. In hazardous locations listed for use in Class I, Groups C and D locations.
 2. Locknuts:
 - a. Threaded steel or malleable iron.
 - b. Gasketed or non-gasketed.

- c. Grounding or non-grounding type.
- 3. Bushings:
 - a. Threaded, insulated metallic.
 - b. Grounding or non-grounding type.
- 4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
- 5. Couplings:
 - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
 - b. Threadless type: Gland compression or self-threading type, concrete tight.
- 6. Unions: Threaded galvanized steel or zinc plated malleable iron.
- 7. Conduit bodies (ells and tees):
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Clip-on type with stainless steel screws.
 - 2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
- 8. Conduit bodies (round):
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
- 9. Sealing fittings:
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. With or without drain and breather.
 - d. Fiber and sealing compound: UL listed for use with the sealing fitting.
- 10. Hazardous location flexible coupling (HAZ-FLEX):
 - a. Liquid tight and arc resistant.
 - b. Electrically conductive so no bonding jumper is required.
 - c. Dry and wet areas:
 - 1) Bronze braided covering over flexible brass core.
 - 2) Bronze end fittings.
 - 3) Zinc-plated steel or malleable iron unions and nipples.
 - d. Corrosive areas:
 - 1) Stainless steel braided covering over flexible stainless steel core.
 - 2) Stainless steel end fittings.
 - 3) Aluminum unions and nipples.
- 11. Service entrance head:
 - a. Malleable iron, galvanized steel or copper free aluminum.
 - b. Insulated knockout cover for use with a variety of sizes and number of conductors.
- 12. Expansion couplings:
 - a. 2 inches nominal straight-line conduit movement in either direction.
 - b. Galvanized steel with insulated bushing.
 - c. Gasketed for wet locations.
 - d. Internally or externally grounded.
- 13. Expansion/deflection couplings:
 - a. 3/4 inches nominal straight-line conduit movement in either direction.
 - b. 30 degrees nominal deflection from the normal in all directions.
 - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
 - d. Internally or externally grounded.
 - e. Watertight, raintight and concrete tight.
- 14. Standards: UL 467, UL 514B, UL 1203.
- B. Fittings for Use with PVC-RGS:
 - 1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RGS and RAC" and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."
 - 2.
- C. Fittings for Use with FLEX-LT:

1. Connector:
 - a. Straight or angle type.
 - b. Metal construction, insulated and gasketed.
 - c. Composed of locknut, grounding ferrule and gland compression nut.
 - d. Liquid tight.
 2. Standards: UL 467, UL 514B.
- D. Fittings for Use with Rigid Nonmetallic PVC Conduit:
1. Coupling, adapters and conduit bodies:
 - a. Same material, thickness, and construction as the conduits with which they are used.
 - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
 - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
 2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
 3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.
- E. Fittings for Use with Rigid Nonmetallic Fiberglass Conduit:
1. Coupling and adapters shall be of the same material, thickness, and construction as the conduit.
 2. Epoxy adhesive for joining conduits and fittings shall be supplied by the same manufacturer as the conduit and fittings and shall provide a concrete and water tight connection.
 3. Standard: NFPA 70 Type RTRC, NEMA TC14.AG, NEMA TC14.BG, NEMA TC.XW, UL 2420, UL 2415, UL 2515A.
- F. Weather and Corrosion Protection Tape:
1. PVC based tape, 10 mils thick.
 2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
 3. Used with appropriate pipe primer.

2.7 ALL RACEWAY AND FITTINGS

- A. Mark Products:
1. Identify the nominal trade size on the product.
 2. Stamp with the name or trademark of the manufacturer.

2.8 OUTLET BOXES

- A. Metallic Outlet Boxes:
1. Hot-dip galvanized steel.
 2. Conduit knockouts and grounding pigtail.
 3. Styles:
 - a. 2 inches x 3 inches rectangle.
 - b. 4 inches square.
 - c. 4 inches octagon.
 - d. Masonry/tile.
 4. Accessories:
 - a. Flat blank cover plates.
 - b. Barriers.
 - c. Extension, plaster or tile rings.
 - d. Box supporting brackets in stud walls.
 - e. Adjustable bar hangers.
 5. Standards: NEMA/ANSI OS 1, UL 514A.
- B. Cast Outlet Boxes:
1. Zinc plated cast iron or die-cast copper free aluminum with manufacturer's standard finish.
 2. Threaded hubs and grounding screw.
 3. Styles:
 - a. "FS" or "FD".
 - b. "Bell".
 - c. Single or multiple gang and tandem.
 - d. "EDS" or "EFS" for hazardous locations.
 4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.

5. Standards: UL 514A, UL 1203.

C. See Specification Section 26 27 26 for wiring devices, wallplates and coverplates.

2.9 PULL AND JUNCTION BOXES

A. NEMA 4X Rated (metallic):

1. Body and cover: 14 GA Type 304 or 316 stainless steel.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Hinged door and stainless steel screws and clamps.
6. Door with oil-resistant gasket.

B. NEMA 12 Rated:

1. Body and cover:
 - a. 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. Type 5052 H-32 aluminum, unpainted.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Non-hinged cover held closed with captivated cover screws threaded into sealed wells or hinged cover held closed with stainless steel screws and clamps.
6. Flat door with oil resistant gasket.

C. Miscellaneous Accessories:

1. Rigid handles for covers larger than 9 square feet or heavier than 25 pounds.
2. Split covers when heavier than 25 pounds.
3. Weldnuts for mounting optional panels and terminal kits.
4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.

D. Standards: NEMA 250, UL 50.

2.10 SUPPORT SYSTEMS

A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:

1. Material requirements:
 - a. Galvanized steel: ASTM A123/A123M or ASTM A153/A153M.
 - b. Stainless steel: AISI Type 316.
 - c. PVC coat galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 mil PVC coating.

B. Single Conduit and Outlet Box Support Fasteners:

1. Material requirements:
 - a. Zinc plated steel.
 - b. Stainless steel.
 - c. Malleable iron.
 - d. PVC coat malleable iron or steel: 20 mil PVC coating.
 - e. Steel protected with zinc phosphate and oil finish.

2.11 OPENINGS AND PENETRATIONS IN WALLS AND FLOORS

A. Sleeves, smoke and fire stop fitting through walls and floors:

1. See Specification Section 01 73 20.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

A. Shall be in accordance with the requirements of:

1. NFPA 70.
2. Manufacturer instructions.

B. Size of Raceways:

1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a. Conduit: 3/4 inches.
 - b. Wireway: 2-1/2 inches x 2-1/2 inches.
- C. Field Bending and Cutting of Conduits:
 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
 2. Do not reduce the internal diameter of the conduit when making conduit bends.
 3. Prepare tools and equipment to prevent damage to the PVC coating.
 4. Degrease threads after threading and apply a zinc rich paint.
 5. Debur interior and exterior after cutting.
- D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
 1. Repair galvanized components utilizing a zinc rich paint.
 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
 - a. Total nominal thickness: 40 mil.
 4. Repair surfaces which will be inaccessible after installation prior to installation.
- F. Remove moisture and debris from conduit before wire is pulled into place.
 1. Pull mandrel with diameter nominally 1/4 inches smaller than the interior of the conduit, to remove obstructions.
 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.
- I. Fill openings in walls, floors, and ceilings and finish flush with surface.
 1. See Specification Section 01 73 20.

3.2 RACEWAY ROUTING

- A. Raceways shall be routed in the field unless otherwise indicated.
 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
 2. Run in straight lines parallel to or at right angles to building lines.
 3. Do not route conduits:
 - a. Through areas of high ambient temperature or radiant heat.
 - b. In suspended concrete slabs.
 - c. In concrete members including slabs, slabs on grade, beams, walls, and columns unless specifically located and detailed on structural Drawings.
 4. Locate sleeves or conduits penetrating floors, walls, and beams so as not to significantly impair the strength of the construction. Do not place conduit penetrations in columns.
 5. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
 6. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 degrees of bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All conduits within a structure shall be installed exposed.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 feet:
 1. Between instrumentation and telecommunication: 1 inch.

2. Between instrumentation and 125 V, 48 V and 24 VDC, 2 inches.
 3. Between instrumentation and 600 V and less AC power or control: 6 inches.
 4. Between instrumentation and greater than 600 VAC power: 12 inches.
 5. Between telecommunication and 125 V, 48 V and 24 VDC, 2 inches.
 6. Between telecommunication and 600 V and less AC power or control: 6 inches.
 7. Between telecommunication and greater than 600 VAC power: 12 inches.
 8. Between 125 V, 48 V and 24 VDC and 600 V and less AC power or control: 2 inches.
 9. Between 125 V, 48 V and 24 VDC and greater than 600 VAC power: 2 inches.
 10. Between 600 V and less AC and greater than 600 VAC: 2 inches.
 11. Between process, gas, air and water pipes: 6 inches.
- D. Conduits shall be installed to eliminate moisture pockets.
1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.
- G. Provide all required openings in walls, floors, and ceilings for conduit penetration.
1. See Specification Section 01 73 20.

3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
1. Power wire or cables: All raceway types.
 2. Control wire or cables: All raceway types.
 3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.
- B. Permitted Raceway Types Per Area Designations:
1. Dry areas:
 - a. RGS.
 - b. RAC.
 2. Wet areas:
 - a. RGS.
 - b. RAC.
 - c. Fiberglass (above grade rated).
 3. Corrosive areas:
 - a. PVC-RGS.
 - b. RAC.
 - c. Fiberglass (above grade rated).
 4. NFPA 70 hazardous areas:
 - a. RGS.
 - b. RAC when required by other area designations.
- C. Permitted Raceway Types Per Routing Locations:
1. Direct buried conduits and ductbanks:
 - a. PVC-80.
 - b. Fiberglass (above or below grade rated).
 - c. 90 degrees elbows for transitions to above grade:
 - 1) PVC-RGS.
 - 2) Fiberglass (above grade rated).
 - d. Long sweeping bends greater than 15 degrees:
 - 1) PVC-RGS.
 - 2) Fiberglass (above or below grade rated).
 2. Concrete encased ductbanks:
 - a. PVC-40.
 - b. PVC-EB.
 - c. Fiberglass (above or below grade rated).
 - d. 90 degree elbows for transitions to above grade:
 - 1) PVC-RGS.
 - 2) Fiberglass (above grade rated).

- e. Long sweeping bends greater than 15 degrees:
 - 1) RGS for sizes 2 inches and larger.
 - 2) Fiberglass (above or below grade rated).
- D. FLEX-LT conduits shall be installed as the final conduit connection to light fixtures, dry type transformers, motors, electrically operated valves, instrumentation primary elements, and other electrical equipment that is liable to vibrate.
 - 1. The maximum length shall not exceed:
 - a. 6 feet to light fixtures.
 - b. 3 feet to motors.
 - c. 2 feet to all other equipment.
- E. NEMA 4X Rated Wireway:
 - 1. Surface mounted in areas designated as wet and or corrosive.
- F. NEMA 12 Rated Wireway:
 - 1. Surface mounted in areas designated as dry in architecturally and non-architecturally finished areas.
- G. Underground Conduit: See Specification Section 26 05 43.

3.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Conduit Seals:
 - 1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.
 - 2. Fill plug and drain shall be accessible.
 - 3. Pour the conduit seals in a two-step process.
 - a. Pour the seal and leave cover off.
 - b. After seal is dry, inspect for proper sealing, install cover and mark (for example, paint or permanent marker) as complete.
- B. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
 - 1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- C. Install Expansion Fittings:
 - 1. Where conduits are exposed to the sun and conduit run is greater than 200 feet.
 - 2. Elsewhere as identified on the Drawings.
- D. Install Expansion/Deflection Fittings:
 - 1. Where conduits enter a structure.
 - a. Except electrical manholes and handholes.
 - b. Except where the ductbank is tied to the structure with rebar.
 - 2. Where conduits span structural expansions joints.
 - 3. Elsewhere as identified on the Drawings.
- E. Threaded connections shall be made wrench-tight.
- F. Conduit joints shall be watertight:
 - 1. Where subjected to possible submersion.
 - 2. In areas classified as wet.
 - 3. Underground.
- G. Terminate Conduits:
 - 1. In metallic outlet boxes:
 - a. RGS and RAC:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - 2. In NEMA 12 rated enclosures:
 - a. Watertight, insulated and gasketed hub and locknut.
 - b. Use grounding type locknut or bushing when required by NFPA 70.
 - 3. In NEMA 4X rated enclosures:
 - a. Watertight, insulated and gasketed hub and locknut.
 - 4. In NEMA 7 and NEMA 9 rated enclosures:

- a. Into an integral threaded hub.
- 5. When stubbed up through the floor into floor mount equipment:
 - a. With an insulated grounding bushing on metallic conduits.
 - b. With end bells on nonmetallic conduits.
- H. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
 - 1. Dry or wet and/or hazardous areas:
 - a. Galvanized system consisting of: Galvanized steel channels and fittings, nuts and hardware and conduit clamps.
 - b. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
 - 2. Conduit type shall be compatible with the support system material.
 - a. Galvanized steel system may be used with RGS.
 - b. Stainless steel system may be used with RGS, PVC-RGS and RAC.
 - c. PVC coated galvanized steel system may be used with PVC-RGS, RAC, PVC-40, PVC-80, and Fiberglass.
 - d. Aluminum system may be used with RAC and PVC-RGS.
 - e. Fiberglass system may be used with PVC-40 and PVC-80, PVC-RGS, and Fiberglass.
- B. Permitted single conduit support fasteners per area designations and conduit types:
 - 1. Architecturally finished areas:
 - a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.
 - b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - c. Provide anti-rattle conduit supports when conduits are routed through metal studs.
 - 2. Dry or wet and/or hazardous areas:
 - a. Material: Zinc plated steel, stainless steel and malleable iron.
 - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - 3. Conduit type shall be compatible with the support fastener material.
 - a. Zinc plated steel, steel protected with zinc phosphate and oil finish and malleable iron fasteners may be used with RGS.
 - b. Stainless steel system may be used with RGS, PVC-RGS and RAC.
 - c. PVC coated fasteners may be used with PVC-RGS, RAC, and PVC-40 and PVC-80.
 - d. Nonmetallic fasteners may be used with PVC-40, PVC-80 and fiberglass.
- C. Conduit Support General Requirements:
 - 1. Maximum spacing between conduit supports per NFPA 70.
 - 2. Support conduit from the building structure.
 - 3. Do not support conduit from process, gas, air or water piping; or from other conduits.
 - 4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 pounds.
 - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
 - b. Conduit hangers:
 - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
 - c. Do not use suspended ceiling support systems to support raceways.
 - d. Hangers in metal roof decks:
 - 1) Utilize fender washers.
 - 2) Not extend above top of ribs.
 - 3) Not interfere with vapor barrier, insulation, or roofing.
 - 5. Conduit support system fasteners:
 - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
 - b. Do not use concrete nails and powder-driven fasteners.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.
2. See Section 26 05 00 and the Drawings for area classifications.
3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

B. Outlet Boxes:

1. Permitted uses of cast outlet boxes:
 - a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet, corrosive, highly corrosive and hazardous areas.
 - b. Pull and junction box surface mounted in non-architecturally finished dry, wet, corrosive and highly corrosive areas.
2. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Section 26 05 00.
3. Set device outlet boxes plumb and vertical to the floor.
4. Place barriers between switches in boxes with 277 V switches on opposite phases.
5. Back-to-back are not permitted.
6. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.

C. Pull and Junction Boxes:

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
 - a. Make covers of boxes accessible.
2. Permitted uses of NEMA 4X metallic enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.
3. Permitted uses of NEMA 12 enclosure:
 - a. Pull or junction box surface mounted in areas designated as dry.

END OF SECTION

SECTION 26 05 43
UNDERGROUND WORK FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Underground conduits and ductbanks.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 03 - Concrete.
 - 2. Section 10 14 00 - Identification Devices.
 - 3. Section 26 05 33 - Raceways and Boxes for Electrical Systems.
 - 1. Division 31 - Earthwork.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. HB-17, Standard Specifications for Highway Bridges.
 - 2. ASTM International (ASTM):
 - a. A536, Standard Specification for Ductile Iron Castings.
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 4. Society of Cable Telecommunications Engineers (SCTE):
 - a. 77, Specifications for Underground Enclosure Integrity.

1.3 DEFINITIONS

- A. Direct-Buried Conduit(s):
 - 1. Individual (single) underground conduit.
 - 2. Multiple underground conduits, arranged in one or more planes, in a common trench.
- B. Concrete Encased Ductbank: An individual (single) or multiple conduit(s), arranged in one or more planes, encased in a common concrete envelope.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Prefabricated composite handholes:
 - a. Armorcast Products Company.
 - b. Quazite by Hubbell.
 - c. Synertech by Oldcastle Enclosure Solutions.

2.2 UNDERGROUND CONDUIT AND ACCESSORIES

- A. Concrete and reinforcing steel: See Division 03 Specifications.
- B. Conduit: See Specification Section 26 05 33.
- C. Duct Spacers/Supports:
 - 1. High density polyethylene or high impact polystyrene.
 - 2. Interlocking web or mesh design.

3. Provide 3 inches minimum spacing between conduits.
4. Accessories, as required:
 - a. Hold down bars.
 - b. Ductbank strapping.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERGROUND ELECTRICAL SYSTEMS - GENERAL

- A. Drawings indicate the intended location of ductbanks and direct buried conduit.
 1. Field conditions may affect actual routing.
- B. Install products in accordance with manufacturer's instructions.
- C. Comply with Division 31.

3.2 UNDERGROUND CONDUITS

- A. General Installation Requirements:
 1. Ductbank types per location:
 - 1) As indicated in the Ductbank Schedule.
 - b. Concrete encased ductbank:
 - 1) Under roads.
 - 2) Plant process equipment feeders and controls.
 - 3) As indicated in the Ductbank Schedule.
 - c. Direct-buried conduit(s):
 - 1) Area/Roadway lighting.
 - 2) As indicated in the Ductbank Schedule.
2. Do not place concrete or other required fill materials until conduits have been observed by Engineer.
3. Ductbanks shall be sloped a minimum of 4 inches per 100 feet or as detailed on the Drawings.
 - a. Low points shall be at manholes or handholes.
4. During construction and after conduit installation is complete, plug the ends of all conduits.
5. Provide conduit supports and spacers.
 - a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 inches and less: 3 feet.
 - 2) 1-1/4 to 3 inches: 5 feet.
 - 3) 3-1/2 to 6 inches: 7 feet.
 - b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 inches and less: 10 feet.
 - 2) 1-1/4 to 2-1/2 inches: 14 feet.
 - 3) 3 inches and larger: 20 feet.
 - c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or other required fill materials.
6. Stagger conduit joints at intervals of 6 inches vertically.
7. Make conduit joints watertight and in accordance with manufacturer's recommendations.
8. Accomplish underground changes in direction of runs exceeding a total of 15 degrees by long sweep bends having a minimum radius of 10 feet.
 - a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
9. Furnish manufactured elbows at end of runs as the conduit transitions to above grade.
 - a. Minimum radius of 18 inches for conduits less than 3 inches trade size and 36 inches for conduits 3 inches trade size and larger.
10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
11. After the conduit run has been completed:
 - a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
 - 1) Test mandrel:
 - a) Length: Not less than 12 inches.
 - b) Diameter: Approximately 1/4 inches less than the inside diameter of the conduit.

- b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
 - 12. Pneumatic rodding may be used to draw in lead wire.
 - a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
 - b. Extend cord 3 feet beyond ends of conduit.
 - 13. Transition from rigid nonmetallic conduit to rigid metallic conduit, per Specification Section 26 05 33, prior to entering a structure or going above ground.
 - a. Except rigid nonmetallic conduit may be extended directly to manholes, handholes, pad mounted transformer boxes and other exterior pad mounted electrical equipment where the conduit is concealed within the enclosure.
 - b. Terminate rigid PVC conduits with end bells.
 - c. Terminate steel conduits with insulated bushings.
 - 14. Place warning tape in trench directly over ductbanks, direct-buried conduit, and direct-buried wire and cable in accordance with Specification Section 10 14 00.
 - 15. Placement of conduits stubbing into handholes and manholes shall be located to allow for proper bending radiuses of the cables.
- B. Concrete Encased Ductbank:
- 1. Ductbank system consists of conduits completely encased in minimum 3 inches of concrete and with separations between different cabling types as required in Specification Section 26 05 33 or as detailed on the Drawings.
 - 2. Install so that top of concrete encased duct, at any point:
 - a. Is not less than 24 inches below grade.
 - b. Is below pavement sub-grading.
 - 3. Conduit supports shall provide a uniform minimum clearance of 3 inches between the bottom of the trench and the bottom row of conduit.
 - 4. Conduit separators shall provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.
- C. Direct-Buried Conduit(s):
- 1. Install so that the top of the uppermost conduit, at any point:
 - a. Is not less than 30 inches below grade.
 - b. Is below pavement sub-grading.
 - 2. Provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.
 - a. Maintain the separation of multiple planes of conduits by one of the following methods:
 - 1) Provide multilevel conduits with conduit supports and separators to maintain required separations, and backfill with flowable fill in accordance with Division 31 - Earthwork or concrete in accordance with the Specifications of Division 03 - Concrete.
 - 2) Install multilevel conduits one level at a time.
 - a) Each level shall be backfilled with required materials and compacted in accordance with Section 31 23 00 - Earthwork, while maintaining required separations.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Wall switches.
 - b. Receptacles.
 - c. Device wallplates and coverplates.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 26 05 00 - Common Work Results for Electrical.
 - 2. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. WD 1, General Color Requirements for Wiring Devices.
 - c. WD 6, Wiring Devices - Dimensional Requirements.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 20, General-Use Snap Switches.
 - b. 498, Standard for Attachment Plugs and Receptacles.
 - c. 514A, Metallic Outlet Boxes.
 - d. 894, Standard for Switches for Use in Hazardous (Classified) Locations.
 - e. 943, Ground-Fault Circuit-Interrupters.
 - f. 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
 - g. 1310, Standard for Class 2 Power Units.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. See Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Wall switches and receptacles:
 - a. Bryant Electric.
 - b. Cooper Wiring Devices by Eaton.
 - c. Hubbell Incorporated Wiring Device-Kellems.
 - d. Leviton Manufacturing Company.
 - e. Legrand/Pass & Seymour.
 - f. Eaton Crouse-Hinds.
 - g. Appleton Electric Co.
 - h. Hubbell Killark.

2.2 WALL SWITCHES

- A. Basic requirements unless modified in specific requirements paragraph of switches per designated areas or types:
 - 1. Industrial Specification Grade.
 - 2. Quiet action, snap switch.

3. Self-grounding with grounding terminal.
 4. Back and side wired.
 5. Solid silver cadmium oxide contacts.
 6. Rugged thermoplastic and/or nylon housing and one-piece switch arm.
 7. Ratings: 20 A, 120/277 VAC.
 8. Switch handle type: Toggle.
 9. Switch handle color: Gray.
 10. Types as indicated on the Drawings:
 - a. Single-pole.
 11. Standards: UL 20, UL 514A, NEMA WD 1, NEMA WD 6.
- B. Wet or Damp Non-Architecturally Finished or Exterior Area Specific Requirements:
1. Coverplate:
 - a. Cast aluminum, gasketed, stainless steel hardware, natural, lacquer, or factory painted finish.
 - b. Wet location rated.
 - c. Single or multiple gang as required.

2.3 RECEPTACLES

- A. Basic requirements unless modified in specific requirements paragraph of receptacles and per designated areas:
1. Industrial Specification Grade.
 2. Straight blade.
 3. Brass triple wipe line contacts.
 4. One-piece grounding system with double wipe brass grounding contacts and self-grounding strap with grounding terminal.
 5. Back and side wired.
 6. Rating: 20 A, 125 VAC.
 7. High impact nylon body.
 8. Receptacle body color:
 - a. Normal power: Gray.
 9. Duplex or simplex as indicated on the Drawings.
 10. Configuration: NEMA 5-20R.
 11. Standards: UL 498, UL 514A, NEMA WD 1, NEMA WD 6.
 12. Ground Fault Circuit Interrupter (GFCI):
 - a. Specification Grade.
 - b. Class A protection.
 - c. Feed through type.
 - d. Test and reset buttons.
 - e. Self-testing.
 - f. Visual indicator light.
 - g. Weather-resistant.
 - 1) Identification: Letters "WR" on face of receptacle.
- B. Wet Non-architecturally Finished Areas Specific Requirements:
1. Coverplate:
 - a. Extra-duty rated, weatherproof (NEMA 3R) while in use, gasketed, stainless steel hardware, flame retardant, UV stabilized polycarbonate, 3.2 inches minimum cover depth for #12 AWG cords.
 - b. Extra-duty rated, weatherproof (NEMA 3R) while in use, gasketed, stainless steel hardware, copper-free aluminum, 3.2 inches minimum cover depth for #12 AWG cords.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Mount devices where indicated on the Drawings and as scheduled in Section 26 05 00.
- C. See Specification Section 26 05 33 for device outlet box requirements.

END OF SECTION

SECTION 26 28 16.16

ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Safety switches.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 26 05 00 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. KS 1, Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 98, Enclosed and Dead-Front Switches.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. Provide a Summary Table or use Exhibit A that associates the safety switch features with connected equipment tag number. Exhibit A indicates minimum data required.
 - c. See Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following safety switch manufacturers are acceptable:
 - 1. Eaton.
 - 2. GE by ABB.
 - 3. Square D by Schneider Electric.
 - 4. Siemens Corporation.
 - 5. Appleton by Emerson Electric Co.
 - 6. Crouse-Hinds by Eaton.
 - 7. Killark by Hubbell.

2.2 SAFETY SWITCHES

- A. General:
 - 1. Non-fusible or fusible as indicated on the Drawings.
 - 2. Suitable for service entrance when required.
 - 3. NEMA Type HD heavy-duty construction.
 - 4. Switch blades will be fully visible in the OFF position with the enclosure door open.
 - 5. Quick-make/quick-break operating mechanism.
 - 6. Deionizing arc chutes.
 - 7. Manufacture double-break rotary action shaft and switchblade as one common component.
 - 8. Clear line shields to prevent accidental contact with line terminals.
 - 9. Operating handle (except NEMA 7 and NEMA 9 rated enclosures):
 - a. Red and easily recognizable.
 - b. Padlockable in the OFF position.
 - c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.

- B. Ratings:
 - 1. Horsepower rated of connected motor.
 - 2. Voltage and amperage: As indicated on the Drawings or as required for provided equipment.
 - 3. Short circuit withstand:
 - a. Non-fused: 10,000A.
 - b. Fused: 200,000A.
- C. Accessories, when indicated in PART 3 of this Specification Section or on the Drawings:
 - 1. Neutral kits.
 - 2. Ground lug kits.
- D. Enclosures:
 - 1. NEMA 4X rated (metallic):
 - a. Body and cover: Type 304 or 316 stainless steel.
 - b. No knockouts, external mounting flanges, hinged and gasketed door.
 - 2. NEMA 12 rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. No knockouts, external mounting flanges, hinged and gasketed door.
- E. Overcurrent and short circuit protective devices:
 - 1. Fuses.
- F. Standards: NEMA KS 1, UL 98.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's instructions and recommendations.
- B. Install switches adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.
- C. Permitted uses of NEMA 4X metallic enclosure:
 - 1. Surface mounted in areas designated as wet and/or corrosive.
- D. Permitted uses of NEMA 12 enclosure:
 - 1. Surface mounted in areas designated as dry in non-architecturally finished areas.

END OF SECTION

EXHIBIT A

[illegible]

SECTION 26 50 00
INTERIOR AND EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Interior building and exterior building mounted luminaires.
 - b. Exterior and site luminaires.
 - c. LEDs.
 - d. Drivers.
 - e. Light poles.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 03 - Concrete.
 - 2. Section 26 05 00 - Common Work Results for Electrical.
 - 3. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. C78.377, Specification for the Chromaticity of Solid State Lighting Products.
 - 2. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
 - 3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
 - 4. Illuminating Engineering Society of North America (IESNA):
 - a. LM-79, Electrical and Photometric Measurements of Solid-State Lighting Products.
 - b. LM-80, Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules.
 - 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. 410, Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts.
 - c. LE 4, Recessed Luminaires, Ceiling Compatibility.
 - 6. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. SSL 1, Electronic Drivers for LED Devices, Arrays or Systems.
 - 7. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 101, Life Safety Code.
 - 8. Underwriters Laboratories, Inc. (UL):
 - a. 248-4, Low-Voltage Fuses - Part 4: Class CC Fuses.
 - b. 844, Standard for Luminaires for Use in Hazardous (Classified) Locations.
 - c. 924, Standard for Emergency Lighting and Power Equipment.
 - d. 1012, Power Units Other Than Class 2.
 - e. 1310, Standard for Class 2 Power Units.
 - f. 1598, Luminaires.
 - g. 8750, Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.
 - 9. United States Department of Energy (USDOE):
 - a. EPLAct, the National Energy Policy Act.

1.3 DEFINITIONS

- A. Useful Life for LED luminaire light sources:
 - 1. The operating hours before reaching 70% of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions.

2. This is also known as 70% "Rated Lumen Maintenance Life" as defined in IESNA LM-80.

1.4 SUBMITTALS

A. Shop Drawings:

1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. Identify luminaire by Luminaire Schedule designation.
 - c. Luminaire data sheet:
 - 1) Name of manufacturer.
 - 2) Complete order information (catalog number).
 - 3) Description of construction and optics.
 - 4) Total input wattage.
 - 5) Luminous efficacy (lumens/Watt).
 - 6) Photometric performance data including candlepower distribution and coefficient of utilization (CU) table.
 - 7) Dimensional size.
 - 8) Weight.
 - 9) UL nameplate data for luminaires used in Class 1, Division 1 and 2 areas.
 - 10) Effective Projected Areas (EPA) for pole mounted luminaires.
 - d. Solid state Luminaire additional data:
 - 1) Voltage.
 - 2) Initial and IES L70 lumens.
 - 3) Luminous efficacy (lumens/Watt).
 - 4) Correlated Color Temperature (CCT).
 - 5) Color Rendering Index (CRI).
 - 6) Total Harmonic Distortion (THD).
 - 7) Lamp life.
 - 8) Driver manufacturer and model number.
 - 9) Driver life.
 - 10) Driver type (0-10V, constant voltage, constant current).
 - 11) Dimming range and control device compatibility.
 - 12) Remote driver: Maximum wire length to luminaire.
 - 13) Emergency battery driver:
 - a) Compatibility with lighting module.
 - b) Lumen output of lighting module in emergency operation.
 - c) Battery life.
 - d) Description of testing.
 - e) Ambient operating temperature.
 - 14) Toxicity Characteristic Leaching Procedure (TCLP) compliance.
 - 15) DesignLights Consortium (DLC) Listing.
 - 16) Warranty information.
 - e. See Section 26 05 00 for additional requirements.
2. Test Reports:
 - a. IESNA LM-79 Test Report for Solid-State Luminaire.
 - b. IESNA LM-80 Test Report Solid-State Light Source.
3. Certifications: Solid-state Luminaire Useful Life Certificate.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
 - b. Submittal data for each component covered by warranty.
 - c. Warranty.

1.5 WARRANTY

- A. Minimum of a five year Warranty from date of manufacture against failure for solid-state luminaire including LED arrays, LED drivers and integral control devices. The solid-state product is considered defective if more than 15% of the individual light emitting diodes fail to illuminate.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Luminaires: Per Drawing or equal.
 - 2. Solid State Light Sources:
 - a. Cree.
 - b. Xicato.
 - c. Luminaire manufacturer's proprietary system.
 - 3. LED Driver: Luminaire manufacturer's standard.
 - 4. Poles: Luminaire manufacturer's standard.

2.2 GENERAL REQUIREMENTS

- A. Luminaires complete with LED modules and drivers.
- B. Rated for area classification as indicated on the Drawings.
- C. No live parts normally exposed to contact.
- D. When intended for use in wet areas: Mark luminaire "Suitable for wet locations."
- E. When intended for use in damp areas: Mark luminaire "Suitable for damp locations" or "Suitable for wet locations."

2.3 LUMINAIRES

- A. Standards and Listings:
 - 1. DesignLights Consortium (DLC).
 - 2. UL 1598.
 - 3. UL 844 for hazardous locations.
- B. Castings:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Uniform quality, free from imperfections affecting strength and appearance.
 - b. Exterior surfaces, if not receiving a finish coat, shall be smooth and match adjacent surfaces. At least one coat of clear methacrylate lacquer shall be applied unless a painted finish is specified.
- C. Fasteners:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Aluminum or steel luminaires: Zinc-Nickel plated, stainless steel, or equivalent.
 - b. Stainless steel luminaires: Stainless steel.
 - c. Bronze luminaires: Bronze or stainless steel.
 - d. Non-metallic luminaires: Stainless steel.
- D. Finishes:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Painted surfaces:
 - 1) Manufacturer's standard metal pretreatment and baked or air-dried, light-stabilized enamel finish, acrylic, alkyd, epoxy, polyester, or polyurethane.
 - 2) White finishes shall have minimum 85% reflectance.
 - b. Unpainted surfaces:
 - 1) Interior: Clear anodic coating, satin finish.
 - 2) Exterior: Clear anodic coating.
- E. Lens/Louver Frames:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Extruded aluminum with mitered corners.
 - b. Hinging or other normal motion shall not cause lens or louver to drop out.
 - c. No light leak between frame and housing.
- F. Lenses:
 - 1. As Indicated in the Luminaire Schedule and the Following:
 - a. 100% virgin, UV stabilized acrylic.

- b. Held securely in place but must also be removable for cleaning and servicing.
 - c. Luminaires with directional lenses shall include a lens orientation device to ensure that lens installation provides light distribution as designed.
 - d. No light leaks between the lens and the luminaire.
- G. Gaskets:
 - 1. As Indicated in the Luminaire Schedule and the Following:
 - a. Moisture seal gaskets at exterior locations and in other designated wet areas.
 - b. Secure frames to luminaire bodies with screws or other means, to result in tight installation, without light leaks.
- H. Ventilation:
 - 1. Ventilation openings of adequate size and quantity to permit operation of driver without affecting rated output or life expectancy. Include wire mesh screens.
- I. Wiring:
 - 1. Factory-wired to be compatible with the project electrical and controls systems.
- J. Mounting Accessories:
 - 1. Provide appropriate mounting accessories for each luminaire, compatible with various structural conditions encountered.
 - 2. All luminaires with adjustable beam angles shall have a locking device to ensure that the beam distribution is not effected during servicing or cleaning.

2.4 SOLID-STATE LUMINAIRES - ADDITIONAL REQUIREMENTS

- A. Standards:
 - 1. IESNA LM-79, IESNA LM-80.
 - 2. NEMA SSL 1.
 - 3. UL 1012, 1310, and 8750.
 - 4. UL 844 for hazardous locations.
- B. Solid state modules and driver to be provided and warrantied by luminaire manufacturer.
- C. Solid-State Modules:
 - 1. Uniform color temperature of 4000K unless otherwise noted on the Luminaire schedule.
 - a. Color temperature measurement shall have a maximum 3 SDCM on the MacAdam Ellipse for frosted lensed luminaires, and 2 SDCM for other luminaire types (ANSI C78.377).
 - 2. Minimum color rendering index (CRI) of 80 for indoor and 70 for outdoor applications.
 - 3. LED module light output and efficacy: Measured in accordance with IESNA LM-79 standards.
 - 4. LED useful life and lumen maintenance: Measured in accordance with IESNA LM-80 standards.
 - 5. Driver and LED module: Minimum useful life of 50,000 hours (L70).
 - 6. Individual LEDs connected such that a failure of one LED will not result in a light output loss of the entire luminaire.
- D. Driver:
 - 1. Compatible with solid-state modules and control devices specified.
 - 2. Operate from 60 Hz input source of 120V through 277V with sustained variations of $\pm 10\%$ (voltage and frequency).
 - 3. Input current Total Harmonic Distortion (THD): Less than 20% when operated at nominal line voltage.
 - 4. Power Factor: Greater than 0.90.
 - 5. Avoid interference with infrared devices and eliminate visible flicker.
 - 6. Comply with ANSI C62.41 Category A for Transient protection.
 - 7. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).
 - 8. Control device must be compatible with type of driver and coordinated prior to submission of Shop Drawings. List of compatible dimming controllers must include the range of perceived brightness. No visible flicker throughout the dimming range.
 - 9. Operating temperature range must be suitable for site temperature conditions within exterior and gasketed luminaires.
- E. Emergency Battery Driver:

1. UL 924.
2. Confirm compatibility with LED modules utilized.
3. Consist of a high temperature, maintenance-free nickel cadmium battery, charger, and electronic circuitry.
4. A solid state charging indicator light to monitor the charger and battery.
5. Single-pole test switch.
6. The following product family shall be selected based on coordination with LED lamp type:
 - a. Philips Bodine "BSL23C": can operate up to 4.5W at 410mA.
 - b. Philips Bodine "BSL26C": can operate up to 5.1W at 265mA.
 - c. Philips Bodine "BSL722 inches: can operate up to 23W at 770mA.
 - d. Philips Bodine "BSL23C": can operate up to 23W at 770mA in operating conditions ranging from -20 degrees C (-4 degrees F) to 60 degrees C (140 degrees F).
 - e. Alternate manufacturer: Iota.
- F. Luminaire properly heat sunk to assure LED junction temperature ratings are not exceeded.
 1. Provide ambient operating temperature range for which product is warranted.

2.5 MAINTENANCE MATERIALS

- A. Furnish a minimum of 10% of total of each type and amperage of fuses for fixtures indicated to be fused.
- B. Spare parts are to be stored in a box clearly labeled as to its contents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide mounting brackets and/or structural mounting support for wall-mounted luminaires.
 1. Do not support luminaire from conduit system.
 2. When luminaire is supported from outlet boxes, install per NFPA 70.
 3. Supports for luminaire mounted on exterior walls shall not be attached to exterior face of the wall.
- B. Mount luminaire at heights indicated in Section 26 05 00 or as indicated on the Drawings.
- C. Install exterior luminaires so that water cannot enter or accumulate in the wiring compartment.
- D. Ground luminaire.

3.2 ADJUST AND CLEAN

- A. See Section 01 74 00.

END OF SECTION



DIVISION 31

EARTHWORK



SECTION 31 10 00 SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Site clearing Work, including:
 - a. General provisions for site clearing Work.
 - b. Preparation for site clearing Work.
 - c. Clearing and grubbing.
 - d. Tree protection, selective removals, and selective trimming.
 - e. Disposal and cleaning.
 - f. Stripping and stockpiling of topsoil.
- B. Related Requirements: Include but are not necessarily limited to:
 - 1. Section 31 23 00 - Earthwork.

1.2 REFERENCES

- A. Terminology:
 - 1. Terms indicated below are not defined terms indicated with initial capital letters but, when used in this Section, have the meanings indicated below:
 - a. “Arborist” means Subcontractor retained to perform Work requiring a specialist in trees, shrubs, brush, other vegetation of the types existing at the Site, and possessing not less than the required qualifications indicated in this Section.
 - b. “Clearing and grubbing” means removing and disposing of all: (1) trees, brush, and other vegetation, logs, and similar items (“clearing”); and (2) stumps, roots, logs, rubbish, and debris on or in the soil (“grubbing”) after Clearing. Clearing and grubbing includes grinding and removing of stumps. When clearing and grubbing, topsoil stripping and stockpiling, is complete, the Site will be ready for grading and other new construction.
 - c. “Demolition” means removal, whether in whole or in part, of existing human-made construction, such as removal of buildings, structures, and building systems; site work (such as pavement, curbs, sidewalks, gutters) and the like; Underground Facilities; and other existing construction.
 - d. “Selective removal” means removal of specific trees, shrubs, brush, and other vegetation, whether as shown or indicated in the Contract Documents or as directed at the Site by Engineer.
 - e. “Selective trimming” means removal of selected parts of trees, shrubs, brush, and other vegetation, performed by arborist, for the purpose of either: (1) allowing installation of new construction adjacent to or through the tree, shrub, brush, or vegetation, or (2) removing damaged or unhealthy growth, to allow balance of the subject tree, shrub, brush, or vegetation to continue normal, healthy growth.
 - f. “Site clearing” means all the Work required by this Section and related Drawings.
 - g. “Topsoil” means existing material at the Site, visible after clearing and grubbing, to be stripped, when such material is friable, clay loam, surface soil present in depth of not less than four inches. Topsoil shall be free of subsoil, clay lumps, stones, and other objects over two-inch diameter and other objectionable material. Topsoil required for planting and landscaping Work in the Specifications of Division 32 may differ from the meaning indicated in this Section.
- B. Reference Standards:
 - 1. ASTM International (ASTM):
 - a. C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - b. D448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 - 2. American National Standards Institute (ANSI):
 - a. A300, Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices.
 - 3. International Society of Arboriculture (ISA):
 - a. Container Rootball Shaving.

- b. Crown Correction.
- c. Balled and Burlapped Root Correction.
- d. Container Root Correction.
- e. High Branched Crown Observation.
- f. Low Branched Crown Observation.
- g. Multiple Low Branches Crown Observation.
- h. Balled and Burlapped Root Observation.
- i. Container Root Observation - Tree.
- j. Protection Maintenance.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Arborist:

- a. Where selective removal, selective trimming, or both are required or necessary, retain the services of, and employ in the Work, accredited arborist, possessing qualifications acceptable to Engineer.
- b. Arborist shall be skilled, trained, and possess documented experience in successfully protecting, trimming, and restorative care of trees and shrubs of the types necessary for the Work.
- c. Certification: Arborist shall be certified by either International Society of Arboriculture (ISA) or American Society of Consulting Arborists (ASCA).
- d. Arborist shall use in selective removal and selective trimming Work only workers with specific skill and successful experience in this type of Work required. Such workers shall work under the direct, personal supervision of arborist.
- e. Submit to Engineer names, employer(s), certifications, other relevant qualifications and record of relevant experience, as indicated below, for not less than three successful projects involving same species of trees, shrubs, and vegetation as involved in the site clearing Work:
 - 1) Names and telephone numbers of site owners, architects or engineers responsible for projects.
 - 2) Approximate contract price of the selective removal and selective trimming of trees, shrubs, and vegetation.
 - 3) Approximate time of year work was performed on each referenced project.
 - 4) Approximate quantity and types of selective removal and selective trimming of performed.
 - 5) General indication of species of trees, shrubs, and vegetation involved.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Limits of Site Clearing Work: When limits of site clearing Work are not expressly shown on the Drawings, or where Contractor proposes alternative limits of site clearing Work, submit drawings, developed from the Drawings, clearly indicating proposed limits of site clearing Work, with dimensions indicated where appropriate.
- b. Where proposed limits of clearing and grubbing, selective removals, and topsoil stripping are not identical with each other, clearly and expressly indicate limits of each on the Shop Drawings.

B. Informational Submittals: Submit the following:

1. Permits and Approvals:

- a. Submit copy of each permit required and obtained for site clearing Work, issued by authority having jurisdiction.
- b. Where Owner's permission or approval is required for selected site clearing activities, submit copy of Owner's written permission or approval for such activity.
- c. When approval of owner of property (other than Owner) is required for selected site clearing activity, submit to Engineer written copy of such approval.

2. Certificates:

- a. Arborist's certification that trees and shrubs shown or indicated to remain were protected during the site clearing Work in accordance with the Contract Documents.
- b. Where trees or shrubs (shown or indicated to remain) were damaged during site clearing Work, submit arborist's certification that such trees and shrubs were promptly and properly treated or, where successful treatment was not feasible, were replaced.

3. Qualifications Statements:

- a. Arborist qualifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Tree Wound Dressing:
 - 1. Provide tree wound dressing, waterproof, adhesive and elastic with an antiseptic, free from kerosene, coal tar, creosote, and other material injurious to life of tree or other plant.
- B. Drain Tile:
 - 1. Provide four-inch diameter, standard strength, perforated wall, bell-and- spigot clay pipe, in accordance with ASTM C700.
- C. Drainage Fill:
 - 1. Selected crushed stone, or crushed or uncrushed gravel, washed.
 - 2. Size 24 (in accordance with ASTM D448), with 90 to 100 percent passing 2.5-inch sieve and not more than 10 percent passing 3/4-inch sieve.
- D. Burlap:
 - 1. Jute, not less than 7.2 ounces per square yard.
- E. For other materials needed for site clearing Work, such as stone, topsoil, or other, comply with requirements of the Contract Documents.

PART 3 - EXECUTION

3.1 SITE CLEARING – GENERAL

- A. Limits of Site Clearing Work:
 - 1. Limits of site clearing Work are shown and indicated on the Drawings.
- B. General Provisions for Site Clearing:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required to perform site clearing Work in accordance with the Contract Documents.
 - 2. Perform site clearing Work to avoid creating nuisances, pollution, and preventable adverse effects on the environment.
 - 3. Comply with Section 01 71 33 - Protection of the Work and Property, and this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".
 - 4. Excavation required for site clearing shall comply with Section 31 23 00 - Earthwork. .
 - 5. Requirements of Authorities Having Jurisdiction:
 - a. Perform site clearing Work in accordance with Laws and Regulations.
 - b. Obtain, pay for, and comply with permits required for site clearing Work. Obtain from authorities having jurisdiction and furnish copy of each permit as a Submittal.
 - 6. Site clearing Work shall comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article, unless the Contract Documents indicate more-stringent requirements.

3.2 PREPARATION

- A. Permits and Approvals:
 - 1. Do not commence site clearing Work until necessary permits and approvals are obtained and copies furnished to Engineer as Submittals.
- B. Delineation of Limits of Site Clearing Work Areas:
 - 1. Locate and clearly flag at the Site:
 - a. Limits of site clearing Work.
 - b. Trees, shrubs, vegetation, and other materials to remain within limits of site clearing Work.
 - c. Trees, shrubs, and other vegetation to be selectively trimmed.
 - d. Trees, shrubs, and vegetation to be selectively removed.
 - e. Salvageable trees, shrubs, and vegetation (to be relocated) within limits of site clearing Work.
 - 2. Flagging:
 - a. Flagging shall be high-visibility type. Where necessary, provide lath or stakes driven into the ground, with flagging, to clearly delineate limits.

- b. Provide different-colored flagging for each type of delineation required by this Article.
 - c. Promptly replace lost, moved, or destroyed flagging until Engineer concurs that flagging is no longer needed.
- 3. Review with Engineer:
 - a. Before starting site clearing Work, other than flagging, review at the Site with Engineer.
 - b. Make corrections as necessary.
 - c. Review all trees, 12-inch diameter (measured one foot above ground) and larger, to be removed or selectively trimmed.
 - d. Review with Engineer at the Site trees and shrubs to be selectively trimmed, to reach mutual agreement on extent of selective trimming required.
- C. Protection: Establish protection of trees, shrubs, and vegetation to remain, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming", and other applicable provisions of the Contract Documents.
- D. Temporary Erosion and Sediment Controls:
 - 1. Provide applicable temporary erosion and sediment controls before commencing clearing and grubbing and topsoil stripping Work.
 - 2. Continue providing temporary erosion and sediment controls as clearing and grubbing and topsoil stripping and stockpiling Work progresses into previously uncleared, ungrubbed areas of the Site.

3.3 CLEARING AND GRUBBING

- A. Clearing and Grubbing – General:
 - 1. Remove and dispose of all materials constituting clearing and grubbing Work within limits shown and indicated in the Contract Documents.
 - 2. After grubbing Work is complete, properly fill holes resulting from grubbing before commencing site grading Work.
- B. Trees and Shrubs Improperly Destroyed or Damaged:
 - 1. Refer to this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".
- C. Trees and Shrubs to Remain:
 - 1. Trees and shrubs to remain shall be protected, and trimmed where necessary or required, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".

3.4 TREE PROTECTION, SELECTIVE REMOVALS, AND SELECTIVE TRIMMING

- A. General Provisions for Tree Protection, Selective Removals, and Selective Trimming:
 - 1. Provide temporary fencing, barricades, or guarding measures, as recommended by arborist, outside drip line of trees and shrubs to remain.
 - 2. Protect root systems from damage caused by noxious materials, storm water runoff, site clearing, planting and landscaping, other Work, and storage of materials and equipment. Protect root systems from flooding, erosion, and excessive wetting resulting from dewatering of excavations, drainage of tanks, and other construction activities.
 - 3. Fires are not allowed under or adjacent to trees, shrubs, and other vegetation to remain.
 - 4. Do not store matter resulting from site clearing or demolition, topsoil, or other excavated material within drip line of trees and shrubs to remain. Vehicles are not allowed within drip line. Restrict foot, vehicle and equipment traffic to prevent compaction of soil over root systems. Where such activities are unavoidable, and only as acceptable to Engineer, provide temporary, continuous, heavy-duty wood planking effectively fastened together and capable of distributing loads from such activities. Temporary planking shall be underlaid by layer of filter fabric covered with two-inch layer of gravel.
 - 5. Cut branches and roots, when necessary, with sharp pruning instruments; do not break or chop. Fully paint cuts 1/2-inch and larger in size with tree wound dressing.
- B. Excavation and Protection of Trees and Shrubs:
 - 1. Excavate within drip line of trees only where shown.
 - 2. Where trenching for utilities is required within drip line, tunnel under or around main lateral feeder roots by drilling, auger boring, pipe jacking, or digging by hand under supervision of arborist. Do not cut main lateral roots or tap roots; cut smaller roots, which interfere with installation of the Work.

3. Where excavation for the Work is required within drip line of trees or shrubs, hand excavate to minimize damage to root systems. Perform excavation under supervision of arborist. Provide temporary shoring or other protective support systems at excavations, to minimize sloping and benching of excavations. Use narrow tine spading forks and comb excavated material to expose roots.
 4. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of construction and relocation is not practical, cut roots approximately three inches back from construction.
 5. Do not allow exposed roots to dry out before permanent backfill is provided; provide temporary earth cover. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.
- C. Grade Adjustments and Tree Protection:
1. Maintain existing grade within drip line of trees, unless otherwise shown or indicated.
 2. Lowering of Preconstruction Grade:
 - a. Where required finish grade is below preconstruction grade around trees and shrubs, grade beyond drip line. Maintain preconstruction grade within drip line of trees and shrubs.
 - b. Prune tree and shrub roots exposed during grade lowering, or provide permanent protections as recommended by arborist. Do not cut main or lateral roots or tap-roots; cut only smaller roots.
 - c. Compensate for loss of roots and prune branches to stimulate root growth.
 - d. Provide extended service through completion of the Contract correction period as recommended by arborist.
 3. Minor Fills:
 - a. Where preconstruction grade is six inches or less below elevation of finish grade shown, fill with topsoil complying with quality requirements of Specifications for finish grading and landscaping.
 - b. Place in single layer and do not compact.
 - c. Hand-grade to required finish elevations.
 4. Moderate Fills:
 - a. Where preconstruction grade is more than six inches, but less than 16 inches, below finish grade elevation, provide layer of drainage fill and filter fabric on preconstruction grade prior to placing topsoil that complies with quality requirements of Specifications on finish grading and landscaping.
 - b. Carefully place drainage fill against trunk of tree or shrub approximately two inches above elevation of finish grade and extend not less than 1.5 feet from tree or shrub trunk on all sides.
 - c. Provide filter fabric with edges overlapping by 6 inches, minimum.
 - d. Place fill layer of topsoil to finish grade elevation.
 - e. Do not compact stone, gravel or topsoil layers. Hand-grade to required finish elevations.
 5. Deep Fills:
 - a. Provide an open dry circular well of durable, unmortared stone, located not less than two feet s from trunk of associated tree or shrub.
 - b. To facilitate proper drainage, provide eight to 10 continuous runs of four-inch drain tiles horizontally on the preconstruction ground surface under the complete spread of branches in radial pattern around the tree or shrub.
 - c. Slope drain tiles away from tree or shrub.
 - d. Provide drainage fill on preconstruction ground surface in depth of two inches under and six inches over drain tiles.
 - e. Provide filter fabric over entire top surface of drainage fill.
 - f. Provide eight to 10 drainage tiles, each four-inch diameter, vertically in radial pattern around tree or shrub, located five feet from trunk of tree or shrub. Extend vertical drainage tiles from the filter fabric layer above the horizontal drainage tiles to postconstruction finished grade
 - g. Hold drainage tiles in place with drainage fill.
 - h. Hand-grade to required finish grade elevation.
- D. Tree and Shrub Pruning (Selective Trimming):
1. Perform pruning and selective trimming under the supervision of arborist.

2. Remove branches from trees and shrubs to remain only after Engineer's concurrence, only to extent necessary to clear location of permanent construction, using branch removal methods in accordance with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 3. Extend pruning operation to restore natural shape of entire tree or shrub where pruning is approved by Engineer and as recommended by arborist.
 4. Prune branches to balance loss to root system caused by damage or cutting of root system.
 5. Chip branches removed from trees and shrubs. Stockpile and spread chips as directed by Engineer, with arborist's recommendation.
- E. Selective Trimming:
1. In addition to pruning (as required above), perform other selective trimming under direction of arborist.
 2. Comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 3. Where shown or indicated, and as directed by Engineer with arborist's recommendation, carefully remove larger branches, when necessary, using appropriate methods.
 4. Repair cut branches in accordance with this Section.
 5. During selective trimming, avoid damaging healthy (to remain) elements of trees and shrubs.
 6. Dispose of trimmings as indicated in this Section's "Disposal and Cleaning" Article.
- F. Selective Removals:
1. Perform selective removals under direction of arborist.
 2. Comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 3. Fully remove trees and shrubs shown or indicated for selective removal.
 4. Remove stumps to not less than one foot below preconstruction ground surface.
 5. During selective removals, avoid damaging adjacent trees and shrubs to remain, and other property.
 6. Remove larger branches before cutting the trunk of tree or shrub being selectively removed.
 7. Dispose of trees and shrubs selectively removed as indicated in this Section's "Disposal and Cleaning" Article.
- G. Repair and Replacement of Trees and Shrubs:
1. Perform tree and shrub repair under direction of arborist.
 2. Cavity Repair:
 - a. Remove decayed areas to depth that exposes healthy tissue.
 - b. Shape cavities to provide drainage.
 - c. Paint inside of cavity with antiseptic tree wound dressing material.
 - d. Do not fill cavities.
 - e. When cavity's cross-section exceeds 60 percent of cross-section of tree or shrub branch, selectively trim subject branch. When cavity's cross-section exceeds 60 percent of cross-section of trunk of tree or shrub, remove tree or shrub upon Engineer's authorization. Engineer will consider arborist's recommendation. Comply with this Section's requirements for selective trimming and selective removals.
 3. Repair trees and shrubs damaged by construction operations, or selectively trimmed, within 24 hours of occurrence of such damage or selective trimming. Treat damaged trunks, branches, and roots according to written instructions of arborist, in accordance with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 4. Remove and replace trees and shrubs that are (1) dead or destroyed due to construction operations, or (2) damaged beyond reasonable hope of recovery (as determined by arborist) following repairs, or (3) damaged and determined by arborist to be incapable of resuming normal growth pattern after repairs.,
 5. Obtain opinion from arborist regarding whether damaged trees, shrubs, and other vegetation is repairable with reasonable chance of success. Submit arborist's certification required in this Section's "Submittals" Article.
 6. For each tree or shrub to remain but is destroyed or damaged (beyond repair) by Contractor:
 - a. For trees 8 inches or more in diameter (measured one foot above preconstruction ground surface), provide two replacements of the same species. Each replacement shall be four inches diameter (measured one foot above top of root ball).

- b. For trees smaller than eight inches diameter, and for shrubs, provide one replacement for each, of same species. Replacements shall be equal in size to original, up to maximum of four inches (measured one foot above root ball).
- c. Provide replacement at locations at the Site as directed by Engineer.
- d. Provide replacements in accordance with the Contract Documents, including Specifications on planting and landscaping.

3.5 DISPOSAL AND CLEANING

A. Disposal – General:

- 1. Dispose of matter resulting from clearing and grubbing, selective removals, and selective trimming, at appropriate offsite location, unless otherwise expressly allowed by the Contract Documents or mutual agreement of Owner and Contractor.
- 2. Do not use cleared, grubbed, or trimmed material as fill, backfill, or in embankments.
- 3. Dispose of cleared, grubbed, and trimmed material, and other materials, rubbish, and debris, in accordance with Laws and Regulations.
- 4. Pay all costs associated with transporting and disposing of materials and debris resulting from site clearing Work.
- 5. Cleared lumber and trimmings from trees are Contractor's property and, at Contractor's option, may be sold or salvaged offsite.

3.6 TOPSOIL STRIPPING AND STOCKPILING

A. Stripping:

- 1. Before commencing topsoil stripping:
 - a. Perform clearing and grubbing and selective removals.
 - b. Remove grass and other vegetation that may remain following clearing and grubbing.
 - c. Provide necessary and required temporary erosion and sediment controls.
- 2. Strip topsoil to depths encountered, in manner that prevents intermingling of topsoil with underlying subsoil and other objectionable material. Remove heavy growths of grass and vegetation and material below topsoil.
- 3. Before stockpiling, separate objectionable material from topsoil.
- 4. Do not strip topsoil from within drip line of trees and shrubs to remain as part of the completed Project.

B. Reuse of Stripped Topsoil:

- 1. Reuse in the finish grading and landscaping Work topsoil that complies with the Contract Documents for such Work.
- 2. Where topsoil stripped from the Site does not comply with the Contract Documents relative to quality required for use in finish grading and landscaping Work, provide appropriate soil amendment material, properly and fully mixed into topsoil stripped from the Site, so that amended material complies with quality requirements for topsoil required for finish grading and landscaping Work.

C. Disposal of Excess Topsoil:

- 1. Topsoil in excess of quantity required for finished Project becomes Contractor's property when Engineer indicates finish grading and landscaping Work is complete. Properly dispose of excess topsoil offsite. Contractor may sell excess topsoil at offsite location.

END OF SECTION

SECTION 31 23 00

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Earthwork.
 - 2. Excavation, trenching, backfilling, and compacting for all underground utilities.
- B. Related Requirements include but are not necessarily limited to:
 - 1. Section 03 00 05 - Concrete.
 - 2. Division 26 - Electrical.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C33, Standard Specification for Concrete Aggregates.
 - b. D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - c. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - d. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - e. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - f. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - g. D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-MM Probe.
 - 2. American Association of State Highway and Transportation Officials Standard Method of Test (AASHTO):
 - a. T104, Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate Test.
 - 3. State of Kansas Department of Transportation (KDOT):
 - a. Standard Specification for Highway Construction.
 - 4. State of Missouri Department of Transportation (MoDOT):
 - a. Standard Specification for Highway Construction.
- B. Qualifications:
 - 1. Testing and inspection performed by an independent soils testing agency to assure that all work complies with this Section shall be supervised by a Professional Engineer licensed in the State where the Work is performed.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product Technical Data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Submit to Engineer for approval the name, location, and qualifications of the independent soils testing agency selected and hired by Contractor for compaction testing and soils inspection:
 - a. Include the name and qualifications of the supervising Professional Engineer to be designated the Soils Engineer.
 - 3. Submit sieve analysis reports on all granular materials:
 - a. Analysis shall include the source location and material description.
 - b. Analysis shall have been performed within 12 months of submittal.

4. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
- B. Informational Submittals:
 1. Submit soils inspection and testing results:
 - a. In-place moisture-density soil test reports. Fully document each with specific location or stationing information, lift or approximate elevation, and date, and other pertinent information.
 - b. Inspection records of subgrade and compaction. Fully document each with specific location or stationing information, lift, or approximate elevation, and date, and other pertinent information.

1.4 SITE CONDITIONS

- A. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent interruption of facility operations or travel.
- B. Protect and maintain bench marks, monuments or other established points and reference points:
 1. If disturbed or destroyed, replace items to full satisfaction of Owner and controlling agency
- C. Verify location of existing underground utilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Material properties for compaction:
 1. Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands exclusive of clayey and silty material; materials which are free-draining and for which impact compaction will not produce a well-defined moisture-density relationship curve and for which the maximum density by impact methods will generally be less than by vibratory methods.
 2. Cohesive materials include materials for which impact compaction will produce a well-defined moisture-density relationship curve and include silts and clays.
- B. Waste Materials:
 1. Includes excess suitable material and material unsuitable for use in the Work.
 2. Remove from Work area as excavated.
 3. Keep excess suitable material segregated from other waste material.
- C. Borrow Materials:
 1. Refers to all fill, backfill and embankment material obtained from approved locations on or off the Work Site.
 2. Borrow shall include all excavating, handling and final disposal of material as specified.
 3. Material removed from borrow area(s) shall be approved by the Engineer.
- D. Granular Fill Material:
 1. Material shall be crushed limestone or crushed natural gravel with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
1 IN	100
1/2 IN	60 to 90
No. 4	40 to 60
No. 10	15 to 35
No. 200	0 to 15

- a. MoDOT Type 5.
 - b. KDOT AB-3.
2. Material shall not have a loss of more than 15% after five cycles when tested for soundness with sodium sulfate as described in AASHTO T104.
3. Use:

- a. Sub-base under road pavements.
- b. Under slabs on grade.
- c. To correct over excavation in trenches.
- d. As shown on the Drawings.

E. Granular Drainage Fill:

1. Material shall be crushed limestone or crushed natural gravel with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
1 IN	100
3/4 IN	50 to 100
1/2 IN	0 to 15
No. 10	0 to 4

2. Material shall not have a loss of more than 15% after five cycles when tested for soundness with sodium sulfate as described in AASHTO T104.
3. Use:
 - a. Under slabs and mats where pressure relief valves or perforated drains are used for groundwater control.
 - b. At base of walls where perforated drains are shown.
 - c. Under electrical equipment pads, handholes, and manholes.
 - d. As shown on the Drawings.

F. Granular Bedding:

1. Material shall be crushed limestone or crushed natural gravel conforming to ASTM C33, gradation 67 (3/4 IN to No. 4 sieve) with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
1 IN	100
3/4 IN	90 to 100
3/8 IN	20 to 55
No. 4	0 to 10
No. 200	0

2. Material shall not have a loss of more than 15% after five cycles when tested for soundness with sodium sulfate as described in AASHTO T104.
3. Use:
 - a. As pipe bedding.
 - b. As shown on the Drawings.

G. Granular Pavement:

1. Material shall be crushed limestone with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
1 IN	100
1/2 IN	55 to 90
No. 4	25 to 65
No. 10	0 to 15
No. 200	0 to 4

- a. MoDOT Type 4, crushed stone.
- b. KDOT SS-3.
2. Material shall not have a loss of more than 15% after five cycles when tested for soundness with sodium sulfate as described in AASHTO T104.
3. Use:
 - a. Roadway granular pavements.
 - b. As shown on the Drawings.

H. Trench Stabilization Rock:

1. Crusher run limestone, 4 IN maximum size.
2. Use:
 - a. As shown on the Drawings.

- I. Fill, Backfill, Select Backfill, and Embankment Material:
 - 1. Fill Material includes suitable approved materials from excavations and borrow area(s):
 - a. Shall be friable sandy or silty clay containing fine material sufficient to provide a dense mass free of voids and capable of satisfactory compaction.
 - b. Shall be free of roots or other organic matter, refuse, cinders, ice, snow, frozen earth, or other unsuitable matter.
 - 2. Do not use material containing cobbles, stones, or shale particles greater in dimension than one-half the depth of the layer to be compacted:
 - a. Larger rocks may be incorporated in lower lifts of fill and embankments at locations specifically directed by Engineer.
 - 3. Select Backfill shall be Fill Material that is free of cobbles, stones, and shale.
- J. Lean Concrete, Mud Mat, or Flowable Fill:
 - 1. Comply with Section 03 00 05.
- K. Geotextile Filter Fabric:
 - 1. Nonwoven polypropylene fabric.
 - 2. Nonbiodegradable, and resistant to the chemical actions of water and the soil.
 - 3. Not less than 4 OZ/SQYD.
 - 4. Equivalent opening size: 50 to 100 (U.S. Standard Sieve).
 - 5. Water flow rate: 120 GPM/SQFT minimum in accordance with ASTM D4491 test method.
 - 6. Grab strength: 90 LBS minimum in either direction in accordance with ASTM D4632 test method.
 - 7. Puncture strength: 250 LBS minimum in accordance with ASTM D6241 test method
 - 8. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - a. Mirafi 140N by TenCate Geosynthetics America.
 - b. Contech C-45NW by Contech Engineered Solutions LLC.
 - c. ADS Geosynthetics 0451T by Advanced Drainage Systems, Inc.
 - 9. Submit request for substitution in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect existing surface and subsurface features on-Site and adjacent to Site as follows:
 - 1. Adequately protect from damage all existing utilities, structures and property and remove or relocate only as indicated, specified, or as directed by the Engineer.
 - 2. Protect and maintain bench marks, monuments or other established reference points and property corners:
 - a. If disturbed or destroyed, replace at own expense to full satisfaction of Owner and controlling agency.
 - 3. Verify location of utilities:
 - a. Omission or inclusion of utility items does not constitute non-existence or definite location.
 - b. Secure and examine local utility records for location data.
 - c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
 - d. Repair damages to utility items at own expense.
 - e. In case of damage, notify Engineer at once so required protective measures may be taken.
 - 4. Report inactive and abandoned utilities encountered in excavating and grading operations. Remove, plug, or cap as directed.
 - 5. Maintain free of damage existing facilities, sidewalks, structures, and pavement that are not indicated to be removed:
 - a. Any existing structure or facility that is inadvertently damaged, whether or not shown or fully located on the Plans, shall be repaired to original condition.

- b. All repairs shall be made and paid for by Contractor.
- 6. Confine operations to that area provided through easements, licenses, agreements, and rights-of-way:
 - a. The Contractor's entrance upon any lands outside of that area provided by easements, licenses, agreements, or public rights-of-way, shall be at the Contractor's sole liability.
- 7. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by Owner.
- 8. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.
- B. Salvageable Items: Carefully remove items to be salvaged to Owner, and store on Owner's designated premises unless otherwise directed.
- C. Unsuitable and waste materials:
 - 1. Dispose of excess, unsuitable, and waste material in a legal manner off site:
 - a. Place waste material on Site only as directed by the Engineer.
 - 2. Grade waste areas to drain and leave them with an orderly and neat appearance.

3.2 GENERAL REQUIREMENTS FOR EXCAVATION, FILLING, BACKFILLING, GRADING, AND TRENCHING

- A. Materials Classification:
 - 1. All materials encountered, regardless of type, character, composition, or condition thereof, shall be unclassified.
 - 2. Excavation shall include all materials found within designated or required limits of excavation:
 - a. Remove rock, if encountered, at no extra cost to Owner.
- B. Excavation and Grading:
 - 1. Perform as required by the Contract Drawings.
 - 2. Contract Drawings may indicate both existing grade and finished grade required for construction of Project:
 - a. Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
 - b. Perform other layout Work required.
 - c. Replace property corner markers to original location if disturbed or destroyed.
 - 3. Protection of finish grade:
 - a. During construction, shape and drain embankment and excavations.
 - b. Maintain ditches and drains to provide drainage at all times.
 - c. Protect graded areas against action of elements prior to acceptance of Work.
 - d. Re-establish grade where settlement or erosion occurs.
- C. Borrow:
 - 1. Provide necessary amount of borrow material to construct all fill, backfill, and embankment compacted to the density required in this Section.
 - 2. Include cost of all borrow material in Bid Price.
 - 3. Obtain fill and backfill material necessary to produce grades required:
 - a. Obtain off-site material if insufficient suitable material is available on Site.
 - b. Suitability of borrow materials and source shall be recommended by Soils Engineer for approval by Engineer.
 - c. Suitable excavated material approved by Engineer may also be used for fill and backfill.
 - 4. Grade borrow areas to drain and to maintain an orderly and neat appearance.
- D. Filling and Backfilling:
 - 1. Construct embankments and fills as shown by the Contract Drawings, at locations and to lines of grade indicated.
 - 2. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed Work.

3. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN:
 - a. Exclude rocks larger than 4 IN from the upper 2 FT of fill or embankment.
 - b. Place material in layers not exceeding 8 IN loose thickness.
 - c. Place layers horizontally and compact each layer prior to placing additional fill.
 - d. When rocks larger than 6 IN are present, they shall be scattered and thoroughly consolidated with sufficient compacted soil to completely fill all voids between the rocks.
 4. Compact fill material using sheepsfoot rollers, pneumatic rollers, vibrators, or other equipment as required to obtain specified density.
- E. Rock Excavation:
1. Remove rock, if encountered, to the following limits unless shown otherwise on the Contract Drawings:
 - a. For structures: 3 FT outside the exterior limits of foundations and vertically from rock surface to 6 IN below bottom of foundations.
 - b. For piping and utilities: A width 18 IN wider than the outside diameter of the pipe or conduit and from rock surface to 6 IN below bottom exterior surface of the pipe or conduit.
 - c. For paving: 2 FT outside the exterior limits of paving and from rock surface to 6 IN below bottom of pavement subbase.
- F. Use of Explosives:
1. Blasting with any type of explosives is prohibited.
- G. Dewatering:
1. Control grading around excavations to prevent surface water from flowing into excavation.
 2. Review available soils information before beginning excavation and determine where groundwater is likely to be encountered during excavation.
 3. Drain or pump surface and groundwater as required to continually maintain all excavations and trenches free of water or mud:
 - a. Commence when water first appears and continue until Work is complete to the extent that no damage will result from the presence of water.
 - b. Water control measures shall be sufficient to prevent softening and disturbance of subgrade, allow subgrade stabilization, allow base material and bedding to be placed in the dry, and to maintain stable excavation slopes or walls:
 - 1) Review Site conditions and subsurface data before beginning excavation and determine where groundwater could be encountered during excavation.
 - 2) Pumped ground water dewatering systems shall maintain groundwater at least 3 FT below the bottom of any excavation.
 - 3) Employ dewatering specialist for selecting and operating pumped dewatering system.
 - c. Keep dewatering system in operation until dead load of pipe, structure and backfill exceeds possible buoyant uplift force on pipe or structure.
 - d. For structures with pressure relief valves and for excavations connected to other locations by drains or gravel bedding, maintain dewatering measures until all internal and related Work is complete.
 4. Use pumps of adequate capacity to ensure rapid drainage.
 5. Construct and use drainage channels and subdrains as required.
 6. Discharge to approved drains or channels:
 - a. Contractor shall obtain State or local permits for discharge if such are required.
 - b. Water discharged to streams shall be free of silt and other objectionable materials.
 - c. Discharge water so that the Work in progress and other properties are not damaged.
 - d. Do not interfere unduly with the use of streets, alleys, private drives, or entrances.
 7. Remove unsuitable excessively wet material and replace with approved material.
 8. Cost of surface water control, groundwater control, and dewatering shall be included in Lump Sum Price for Work or in Unit Prices for excavation if shown in Bid Form:

- a. Perform dewatering, if required, at no extra cost to Owner.
- H. Stockpiling:
 1. Avoid overloading or surcharging by placing excavated material a sufficient distance from edge of excavation.
 2. Maintain and trim excavated materials to prevent inconvenience or damage to structures on-Site or on adjoining property.
 3. Do not obstruct drainage patterns.
- I. Excavation Support:
 1. Support excavations and slopes in accordance with 31 23 16.43 - Temporary Support of Excavations.
 2. Take precautions against movement or settlement of existing structures:
 - a. Establish and record elevations of existing facilities near excavations before excavating.
 - b. Remove sheeting and bracing in a manner that does not create voids or induce settlement of adjacent soil.
 3. If existing or adjacent structures show structural distress, or become endangered by any condition or event, cease operations immediately and notify Engineer:
 - a. Do not resume operations prior to correction or modification of procedures leading to the unstable condition.

3.3 FIELD QUALITY CONTROL

- A. Include in Bid Price the cost of soils testing and inspection services indicated herein as being performed by the Soils Engineer.
- B. An acceptable independent soils testing agency shall be selected and paid for by the Contractor to perform all laboratory and field soil testing necessary to demonstrate compliance with compaction requirements and to inspect subgrade and soil materials:
 1. Moisture density relationships shall be established by the Soils Engineer for all materials to be compacted.
 2. Soils Engineer shall record observations made of subgrade condition, compaction, and proofrolling.
- C. The soil density testing frequency shall be as follows:

TEST LOCATION	COMPACTION DENSITY TEST FREQUENCY
Compacted subgrade:	One test representative of each 500 SQYD of subgrade
Site Work embankments and fills:	One test representative of each 2,000 CUYD of fill
Structural fill and backfill:	One test representative of each 100 CUYD of fill
Trench bedding material:	One test at each 500 LF interval along the line.
Trench select backfill:	One test at each 500 LF interval along the line.
Common trench backfill within street right-of-way, or under drives or parking lots:	One test representative of each 3 FT of trench depth representative of each 500 LF interval along the line. Concentrate tests at cross streets and drives.
Common trench backfill under turfed, sodded, plant seeded, and non-traffic areas:	One test representative of each 3 FT of trench depth at each 1,000 LF interval along the line.

- D. Compaction of cohesionless soils with insufficient fines to perform ASTM D698 density testing:
 1. Three passes of approved vibratory compaction equipment over each 8 IN lift of cohesionless granular material may be substituted for test conforming to ASTM D4254 - Testing of Cohesionless Material if approved in writing by Engineer. All passes of compaction equipment shall be continuously observed by Soils Engineer.
- E. Give minimum of 24 hours advance notice to Soils Engineer when ready for compaction or subgrade testing and inspection.
- F. Should any compaction density test or subgrade inspection fail to meet Specification requirements, perform corrective Work as necessary.
- G. Pay for all costs associated with corrective Work and retesting resulting from failing compaction density tests.

3.4 COMPACTION DENSITY REQUIREMENTS

- A. Obtain recommendation from Soils Engineer with regard to suitability of soils and acceptable subgrade prior to subsequent operations.
- B. Control surface water and provide dewatering system necessary to successfully complete compaction and construction requirements.
- C. Remove frozen, loose, wet, or soft material and replace with approved material as directed by Engineer.
- D. Stabilize subgrade with granular materials as directed by Engineer.
- E. Compact granular and cohesionless material with vibratory equipment. Do not use water.
- F. Assure by results of testing that compaction densities comply with the following requirements:
 1. Site Work:

TEST LOCATION	COMPACTION DENSITY TEST FREQUENCY
Under Paved Areas, Sidewalks and Piping:	
Cohesive soils	95% in accordance with ASTM D698 with moisture content within $\pm 3\%$ of optimum.
Cohesionless soils	75% relative density in accordance with ASTM D4253 and ASTM D4254
Unpaved, Non-Traffic Areas:	
Cohesive soils	90% of ASTM D698 with moisture content within $\pm 3\%$ of optimum.
Cohesionless soils	75% relative density in accordance with ASTM D4253 and ASTM D4254

2. Structural fill and backfill:

LOCATION	COMPACTION DENSITY
Inside of structures, under foundations, under equipment support pads, under slabs-on-grade and scarified existing subgrade under structural fill	95% in accordance with ASTM D698 with moisture content within $\pm 3\%$ of optimum.
Outside structures next to walls, piers, columns, and any other structural exterior member	95% in accordance with ASTM D698 with moisture content within $\pm 3\%$ of optimum.
Outside structures under equipment support foundations, piping, or paving	95% in accordance with ASTM D698 with moisture content within $\pm 3\%$ of optimum.
Under void	90% in accordance with ASTM D698 with moisture content within $\pm 3\%$ of optimum.
Granular Fill Material used for any location described in this table	75% relative density in accordance with ASTM D4253 and ASTM D4254
Granular Drainage Material under base slabs with pressure relief valves, and under building floor slabs-on-grade	75% relative density in accordance with ASTM D4253 and ASTM D4254

3. Trenches:

a. Bedding material:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All locations	Granular material	75% of maximum relative density by ASTM D4253 and ASTM D4254

b. Select backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All applicable areas	Cohesive soils	95% of maximum dry density by ASTM D698 with moisture content within $\pm 3\%$ of optimum
	Cohesionless soils	75% of maximum relative density by ASTM D4253 and ASTM D4254

c. Common trench backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
Under pavements, roadways, and surfaces within highway right-of-ways	Cohesive soils	95% of maximum dry density by ASTM D698 with moisture content within $\pm 3\%$ of optimum.
	Cohesionless soils	75% of relative density by ASTM D4253 and ASTM D4254
Under turfed, sodded, plant seeded, non-traffic areas	Cohesive soils	85% of maximum dry density by ASTM D698 with moisture content within $\pm 3\%$ of optimum

	Cohesionless soils	40% of relative density by ASTM D4253 and ASTM D4254
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3.5 SITE EXCAVATION AND GRADING

- A. Excavation and Grading:
 - 1. Perform as required by the Contract Drawings.
 - a. Contract Drawings may indicate both existing grade and finished grade required for construction of Project:
 - 1) Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
 - 2) Perform other layout Work required.
 - 3) Replace property corner markers to original location if disturbed or destroyed.
 - 2. Protection of finish grade:
 - a. During construction, shape and drain embankment and excavations.
 - b. Maintain ditches and drains to provide drainage at all times.
 - c. Protect graded areas against action of elements prior to acceptance of Work.
 - d. Reestablish grade where settlement or erosion occurs.
- B. Subgrade Preparation:
 - 1. Prepare ground surface for embankments or fills:
 - a. Before fill is started, disc or scarify to a minimum depth of 6 IN in all embankment and fill areas. Recompact with first lift of embankment.
 - b. Plow sloped surface to bench and break up surface so that fill material will bind with existing surface:
 - 1) Where ground surface is steeper than one vertical to four horizontal, bench with horizontal planes.
 - c. Perform all wetting, drying, stabilization, shaping, and compacting required to prepare an acceptable subgrade.
 - d. Extend subgrade to full width of surfaced area or surface improvement plus 1 FT.
 - e. Compact top 6 IN of subgrades to meet specified compaction densities for Site Work.
 - 2. Frost Protection:
 - a. Do not place Site Work, fill, embankments, or foundations on frozen ground.
 - b. When freezing temperatures may be expected, do not excavate to full depth indicated unless fill or foundations can be placed and completed immediately after the excavation has been completed and approved.
 - c. Protect subgrade from freezing if placement of fill or foundation is delayed.
 - 3. Subgrade Stabilization:
 - a. Remove all unsuitable material, including but not limited to material in a frozen, loose, wet, soft, or disturbed condition, and replace with approved fill material as directed by Engineer.
 - b. Where a stone mat of base stabilization rock or granular drainage material is indicated, or is approved by Engineer for stabilization of loose, soft, or wet materials, Work, and compact stone material into subgrade so that voids in stone are filled.
 - c. Do not place further construction on repaired or stabilized subgrades until subgrade compaction has been tested and subgrades have been approved by Engineer.
 - 4. Proofrolling:
 - a. Proofroll subgrade for Site Work and embankments after moisture conditioning and compaction to identify soft or disturbed areas:
 - 1) Use a fully loaded tandem dump truck or equipment providing an equivalent loading for proofrolling.
 - 2) Perform in presence of Soils Engineer.
 - b. Undercut and replace soft areas identified by proofrolling with fill or granular fill material if so directed by Engineer.
- C. Construct embankments and fills as required by the Contract Drawings:
 - 1. Construct embankments and fills at locations and to lines of grade indicated:

- a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed Work.
- b. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN:
 - 1) Ensure that stones larger than 4 IN are not placed in upper 6 IN of fill or embankment.
 - 2) Do not place material in layers greater than 8 IN loose thickness.
 - 3) Place layers horizontally and compact each layer prior to placing additional fill.
- c. Compact by sheepsfoot, pneumatic rollers, vibrators, or by other equipment as required to obtain specified density:
 - 1) Control moisture for each layer necessary to meet requirements of compaction.

3.6 EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES

- A. General:
 - 1. In general, earthwork for structures includes, but is not necessarily limited to, excavation for foundations for structures and retaining walls, removal of underground obstructions and undesirable material, backfilling, filling, and compaction:
 - a. Foundations include footings, base slabs, slabs-on-grade, foundation walls, mat foundations, grade beams, piers and any other support placed directly on soil.
 - 2. Conform to requirements in this Section for Site excavation and grading, including subgrade preparation and control of materials.
- B. Excavation Requirements for Structures:
 - 1. General:
 - a. Do not commence excavation for foundations for structures until:
 - 1) Topsoil and other unsuitable and undesirable material have been removed from existing subgrade.
 - 2) Compacted density and moisture content of structural fill material under foundations meets requirements of Specifications.
 - 2. Dimensions:
 - a. Excavate to elevations and dimensions indicated or specified.
 - b. Make excavations large enough for working space, forms, coating and waterproofing application, and inspection.
 - 3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, and any other materials which may be concealed beneath present grade, as required to execute Work indicated on Contract Drawings:
 - a. If undesirable material and obstructions are encountered during excavation, remove material, and replace as directed by Engineer.
 - 4. Level off bottoms of excavations to receive foundations, floor slabs, equipment support pads, or compacted fill:
 - a. Remove loose materials and bring excavations into approved condition to receive concrete or fill material:
 - 1) Minimize construction traffic on native soils and saturated soils to avoid soil disturbance.
 - b. Where compacted fill material must be placed to bring subgrade elevation up to underside of construction, follow all requirements for subgrade preparation.
 - c. Do not carry excavations lower than shown for foundations except as directed by Engineer.
 - d. If any part of excavations is carried below required depth without authorization, maintain excavation and start foundation from excavated level with concrete of same strength as required for superimposed foundation without additional cost to Owner.
 - 5. Notify Soils Engineer and Engineer as soon as excavation is completed in order that subgrades may be inspected:

- a. Do not commence further construction until subgrade under compacted fill material, under foundations, under floor slabs-on-grade, under equipment support pads, and under retaining wall footings has been inspected by the Soils Engineer and approved by Engineer as being free of undesirable material, being of compaction density required by this specification, and being capable of supporting the allowable foundation design bearing pressures and superimposed foundation, fill, and building loads to be placed thereon.
 - b. Soils Engineer shall be given the opportunity to inspect subgrade below fill material both prior to and after subgrade compaction.
 - c. Protect approved subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.
 - d. Place fill material, foundations, retaining wall footings, floor slabs-on-grade, and equipment support pads as soon as weather conditions permit after excavation is completed, inspected, and approved and after forms and reinforcing are inspected and approved.
6. Subgrade stabilization:
 - a. If subgrade under foundations, fill material, floor slabs-on-grade, or equipment support pads is in a frozen, loose, wet, or soft condition before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as recommended by Soils Engineer and directed by Engineer.
 - b. Remove and replace frozen materials as recommended by Soils Engineer and directed by Engineer.
 - c. Loose, wet, or soft materials may be stabilized by a compacted working mat of Base Stabilization Rock where shown on the Drawings and approved by Engineer based on materials encountered:
 - 1) Compact stone mat thoroughly into subgrade to avoid future migration of fines into the stone voids.
 - d. Where concrete mud mat is shown on the Drawings for foundation, place concrete without damaging or disturbing subgrade.
 - e. Do not place further construction on repaired or stabilized subgrades until the subgrades have been approved by Engineer.
 7. Frost protection of subgrade for foundations:
 - a. Do not place foundations, slabs-on-grade, equipment support pads, or fill material on frozen ground.
 - b. When freezing temperatures may be expected, do not excavate to full depth indicated, unless foundations, floor slabs, equipment support pads, or fill material can be placed immediately after excavation has been completed and approved.
 - c. Protect excavation from frost if placing of concrete or fill is delayed.
 - d. Protect subgrade under concrete slab-on-grade and mats from becoming frozen until approved by Engineer.
 8. Granular material under base slabs with pressure relief valves:
 - a. Provide a minimum thickness of 6 IN of compacted Granular Fill Material as filter material over the subgrade:
 - 1) Geotextile Filter Fabric may be substituted for the filter material if approved by the Engineer.
 - 2) Filter material may be omitted where excavation below structure is entirely in sound rock, if approved by Engineer.
 - b. Provide compacted Granular Drainage Fill between the bottom of the base slab and the top of the filter material with a minimum thickness of 1 FT or as shown on the Drawings.
 9. Geotextile filter fabric:
 - a. Lap filter fabric 12 IN at splices.
 - b. Cover punctures and tears with an additional layer of fabric lapped 12 IN all around.
 - c. Do not puncture fabric with grade stakes or other items.
 - d. Spread fill material over the filter fabric in the direction of the lap splices.

- C. Fill and Backfill below Foundations:
 - 1. Where fill material is required below foundations, place structural fill material, conforming to the required density and moisture content, to a horizontal distance beyond the outer edge or perimeter of foundations that are no less than:
 - a. 5 FT
 - b. Distance equal to depth of compacted fill below bottom of foundations.
 - c. As required to provide fill material to indicated finished grade.
 - d. Or as directed by Engineer.
- D. Filling and Backfilling at Structures:
 - 1. Place backfill adjacent to structures and foundations only after a sufficient portion of the structure has been completed to resist the imposed soil load:
 - a. Obtain approval of Engineer for backfill against any partially completed structure.
 - 2. Fill and backfill placement:
 - a. Compact material with equipment of proper type and size to obtain density specified.
 - b. Do not place fill or backfill material when temperature is less than 40 DEGF and when subgrade to receive material is frozen, wet, loose, or soft.
 - c. Backfill within 1 FT of structure shall be free of gravel, rock or shale particles larger than 4 IN.
 - d. Where structural excavation has been through rock, backfill with compacted granular material to top of rock formation, unless indicated otherwise on the Drawings:
 - 1) Where entire excavation is in rock, terminate granular backfill 2 FT below finished grade.
 - 2) Place geotextile filter fabric over granular backfill and continue backfill to finish grade with suitable approved material.
 - 3. Backfilling against walls:
 - a. Do not backfill around any part of structures until each part has reached specified 28-day compressive strength.
 - b. Do not start backfilling until concrete forms have been removed, trash removed from excavations, pointing of masonry Work, concrete finishing, damp proofing, and waterproofing have been completed.
 - c. Do not place fills against walls until floor slabs at top, bottom, and at intermediate levels of walls are in place and have reached 28-day required compressive strength to prevent wall movement.
 - d. Use only equipment weighing less than 3,000 LBS for filling and backfilling within 10 FT of walls and retaining walls:
 - 1) Use hand or remote operated equipment to avoid damage to walls.
 - e. Bring backfill and fill up uniformly around the structures and individual walls, piers, or columns.
- E. Backfilling Outside of Structures under Piping or Paving:
 - 1. When backfilling outside of structures requires placing backfill material under piping or paving, the material shall be placed from bottom of excavation to trench or paving subgrade at the density required for structural fill.
 - 2. Compacted structural fill shall be placed to horizontal extents from the centerline of piping or paving to a distance each side of the exterior edges of piping or paving equal to the depth of backfill measured from bottom of excavation to underside of piping or paving.
 - 3. Provide compacted bedding or compacted subgrade material under piping or paving as indicated.

3.7 TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

- A. General:
 - 1. Unclassified Excavation:
 - a. Excavate all materials encountered to lines and grades required for utilities.
 - 2. Perform trenching and utility installation in accordance with general requirements for excavation, filling, backfilling, grading, and trenching.

B. Excavation for Appurtenances:

1. 12 IN (minimum) clear distance between outer surface and embankment.

C. Trench Excavation:

1. Excavate trenches by open cut method to depth shown on the Drawings and necessary to accommodate Work:
 - a. Support existing utility lines and piping where proposed work crosses at a lower elevation:
 - 1) Stabilize excavation to prevent undermining of existing utility and piping.
2. Open trench outside buildings, units, and structures:
 - a. No more than the distance between two manholes, structures, units, or 300 LF, whichever is less.
 - b. Reduce distance as weather conditions dictate.
 - c. Conform to local codes and regulations.
3. Trenching within buildings, units, or structures:
 - a. No more than 100 LF at any one time.
4. Any trench or portion of trench, which is opened and remains idle for seven calendar days, or longer, as determined by the Owner, may be directed to be immediately refilled, without completion of Work, at no additional cost to Owner:
 - a. Said trench may not be reopened until Owner is satisfied that Work associated with trench will be prosecuted with dispatch.
5. Observe following trenching criteria:
 - a. Trench size:
 - 1) Excavate width to accommodate free working space.
 - 2) Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:

OVERALL DIAMETER OF UTILITY SERVICE	EXCESS DIMENSION
33 IN and less	18 IN
More than 33 IN	24 IN

- 3) Cut trench walls vertically from bottom of trench to 1 FT above top of pipe, conduit, or utility service.
 - 4) Keep trenches free of surface water runoff:
 - a) Include cost in Bid.
 - b) No separate payment for surface water runoff pumping will be made.
 - b. Cut trenches for electrical runs with minimum 30 IN cover, unless otherwise specified or shown on the Drawings.
6. Erect barriers or other appropriate protection to prohibit accidental or unauthorized entry of persons into trenches.

D. Preparation of Trench Bottom:

1. Over-Excavation:
 - a. Backfill and compact to 90% of maximum dry density in accordance with ASTM D698.
 - b. Backfill with granular bedding material as option.
2. Rock Excavation:
 - a. Excavate minimum of 6 IN below bottom exterior surface of the pipe or conduit.
 - b. Backfill to grade with suitable earth or granular material.
 - c. Form bell holes in trench bottom.
3. Subgrade Stabilization:
 - a. Stabilize the subgrade when directed by the Engineer.
 - b. Observe the following requirements when unstable trench bottom materials are encountered:
 - 1) Notify Engineer and soils engineer when unstable materials are encountered:
 - a) Report extent of unstable condition using station numbers.

- 2) Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations:
 - a) Replace with subgrade stabilization with no additional compensation.
- E. Backfilling Methods:
1. Do not backfill until tests to be performed on piping system show system is in full compliance to specified requirements.
 2. Carefully Compacted Backfill:
 - a. Furnish where indicated on the Drawings, for all pipe bedding, and for compacted backfill up to 12 IN above top of pipe or conduit.
 - b. Comply with the following:
 - 1) Place backfill in lifts not exceeding 8 IN (loose thickness).
 - 2) Hand place, shovel slice, and vibrate all carefully compacted backfill.
 - 3) Observe specific pipe or conduit manufacturer's recommendations regarding backfilling and compaction.
 - 4) Compact each lift to specified requirements.
 3. Common Trench Backfill:
 - a. Perform in accordance with the following:
 - 1) Conform to compaction density requirements for location.
 - 2) Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.
 4. Water flushing for consolidation is not permitted.
 5. Trench checks:
 - a. At intervals not to exceed 400 FT, or closer if so indicated, provide trench bedding cut-off wall 5 FT in length constructed of select impermeable material hand-placed and compacted around pipe.
 - b. Construct concrete or flowable fill concrete trench checks where shown on plan:
 - 1) Place concrete against undisturbed trench walls and subgrade.
 6. Backfilling for Electrical Installations:
 - a. Place backfill in immediate vicinity of direct burial cable as shown on the Drawings.

3.8 MAINTENANCE AND REPAIR

- A. Maintenance:
1. Protect newly graded areas from actions of the elements.
 2. Settling or erosion shall be filled, repaired and grades reestablished to elevations and slopes indicated.
- B. Correction of Settlement:
1. Settlement of embankments, backfill, or trenches occurring within one year after Final Acceptance shall indicate defective Work and shall be promptly corrected if the settlement results in the following:
 - a. Visible depressions, ruts, or ground slumping.
 - b. Pooling of water where positive slope existed or was required.
 - c. Voids beneath or beside slabs or structures.
 - d. Movement of soil exposing unfinished or waterproofed structure surfaces.
 - e. Movement of structures or facilities, including but not limited to foundation settlement, differential settlement, cracking, misalignment of adjacent objects, or movement of vertical elements out of plumb.
 2. Contractor shall correct settlement and damages arising from or attributable to the settlement.
 3. Make repairs within 10 days from and after due notification by Owner of embankment or backfill settlement and resulting damage.
 4. Make own arrangements for access to the Site for purposes of correction and maintenance of corrected areas.

END OF SECTION

SECTION 31 23 16.43
TEMPORARY SUPPORT OF EXCAVATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for temporary (during construction) support of excavations including:
 - a. Qualifications of Contractor's professional engineer (if any) retained for designing temporary support of excavations.
 - b. Contractor's additional investigations and evaluations necessary for designing temporary support of excavations.
 - c. Performance criteria and general provisions for temporary support of excavations.
 - d. General provisions for temporary support of excavations, including supports Contractor proposes remain in place following construction.
 - e. Trench boxes.
 - f. Maintenance and removal of temporary support of excavations.
2. Temporary support of existing piping.
 - a. Support existing lines so that they remain in service during construction.
3. 31 23 00 - Earthwork.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment:

1. Temporary support of excavations is part of the Work associated with excavating and filling. Include costs for temporary support of excavations under bid/pay items for excavating and related Work. No separate payment will be made for temporary support of excavations.
2. In the event Engineer directs that temporary sheeting, shoring, or other excavation supports originally intended as temporary are to remain in place, and the Contract includes an appropriate item of Unit Price Work for permanent sheeting (or other appropriate material) to remain in place, then payment for such temporary sheeting ordered to remain by Engineer will be at the unit price indicated in the Contract. Where Engineer directs temporary sheeting, shoring, or other temporary support of excavations is to remain and the Contract does not include an appropriate item of Unit Price Work, then an appropriate price for such support of excavations will be mutually agreed upon by the parties and either an appropriate Contract modification or allowance authorization, if any, will be issued in accordance with the Contract Documents.

1.3 REFERENCES

A. Terminology:

1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this section have the meaning indicated below:
 - a. "Sheeting" means: Long, structural sections of steel with a vertical interlocking system that create a continuous wall, often used for retaining soil or water. The terms "sheet piling", "sheeting", and "piling" (and derivative terms, such as "piles") have the same meaning. Certain types of soldier piles may qualify as sheeting.
 - b. "Shoring" means: Temporary means of supporting the walls of an excavation or existing structure, that does not qualify as sheeting. Two basic types of shoring for excavations are timber shoring and aluminum hydraulic shoring; the latter is a lightweight system and equipment used for supporting trench excavations.
 - c. "Subgrade" means: The uppermost surface of native soil material unremoved from cuts; the bottom of excavation.
 - d. "Tie-backs" means: A method of laterally supporting sheeting or shoring when congestion within the limits of the excavation need to be minimized. Tiebacks generally consist of a central steel bar (or strand tendon), embedded in the soil, surrounded by an annulus of grout.
 - e. "Trench box" means: A one- or two-sided shield, placed temporarily in an excavation, typically a trench, which protects workers inside the trench box in the event of collapse of the excavation wall. Trench boxes may be relocated within the excavation as the Work progresses. Trench

boxes also shield workers from falling or dislodged materials. Trench boxes are not intended to shore up excavation walls or prevent collapse. The terms “trench box”, “trench shield”, and “shore shield” have the same meaning.

- f. “Wales” means: Beams that span across the face of sheeting or shoring distributing the earth and water pressures to either a raker or cross-strut. Struts, as used in this Section, are structural elements that transfer the load from a temporary excavation support wall to an adjacent, parallel structure. Rakers are struts that are positioned at an angle extending from a temporary excavation support wall to a foundation block or supporting substructure. In this Section, the words “wales” and “walers” have the same meaning.
- B. Reference Standards: Standards referenced in this section include, but are not necessarily limited to, the following:
- 1. American Institute of Steel Construction (AISC):
 - a. ANSI/AISC 360 - Specification for Structural Steel Buildings.
 - 2. American Welding Society (AWS):
 - a. D1.1/D1.1M - Structural Welding Code – Steel.
 - 3. United States Army Corps of Engineers (USACOE)
 - a. Engineer Manual 1110-2-2504 - Design of Sheet Pile Walls.
 - 4. United States Department of Transportation, Federal Highway Administration (FHWA)
 - a. FHWA-IF-99-015 Geotechnical Engineering Circular No. 4 - Ground Anchors and Anchored Systems.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Contractor’s Professional Engineer:
 - a. Retain the services of a professional engineer, licensed and registered in the same jurisdiction as the Site, to evaluate subsurface conditions and design systems for temporary support of excavations.
 - b. Professional engineer shall be appropriately licensed and registered for the professional services required by this Section and shall be appropriately experienced in evaluating subsurface conditions and excavation conditions affecting health and safety of personnel and protection of property similar to those at the Site, and in designing and evaluating systems for temporary support of excavations.
 - c. Responsibilities shall include:
 - 1) Evaluating existing subsurface data and information for the Site and adjacent areas, available to Contractor.
 - 2) Advising Contractor regarding additional subsurface investigations necessary to provide temporary support of excavations as required by this Section.
 - 3) Evaluating the potential effect on existing facilities, at and adjacent to the Site, of installing and removing temporary systems for supporting excavations.
 - 4) Personally designing or supervising the design of temporary supports for excavations, including preparing drawings, performance requirements, and specifications for temporary support of excavations, such as temporary sheeting, shoring, bracing, wales, tie-backs, and similar systems.
 - 5) Sealing and signing instruments of service developed for the Work, including calculations, evaluation reports, recommendations of a technical nature, drawings, specifications, and similar documents.
 - 6) Assisting Contractor with obtaining permits and approvals necessary for temporary support of excavations.
 - 7) Consulting with Contractor, including visiting the Site during construction as required by Contractor, during installation, use, and removal of temporary supports of excavations.

1.5 SUBMITTALS

A. Informational Submittals: Submit the following:

- 1. Temporary Support of Excavations and Temporary Pipe Supports:
 - a. Furnish document regarding Contractor’s proposed approach for temporary support of excavations and pipes, indicating the following:
 - 1) General indication of Contractor’s overall, intended approach for temporary support of excavations; for example, indicate whether excavations will be supported by a trench box,

- temporary sheeting, shoring, wales, tie-backs, or other method. Indicate where different approach will be used for different excavations or portions of excavations.
- 2) General indication of Contractor's overall intended approach for temporary support of pipes including support members and pipe stabilization.
 - 3) Furnish evidence that such professional engineer possesses professional liability insurance in accordance with the Contract Documents, including indication of whether required coverage limits have been eroded during the current policy by prior claims.
 - 4) Contractor-proposed modifications to the permanent Work requested to accommodate temporary support of excavations. In the event such changes are proposed, approval, if any, of such changes will be only via an appropriate Contract modification. If no such request is submitted prior to start of the Work of this Section, Engineer will proceed on the premise that Contractor-proposed modifications are not intended.
 - 5) Where temporary steel sheeting will be used for temporary support of excavations, indicate anticipated dates for installing such items and anticipated dates for removing such items.
 - 6) Description of how temporary support of excavations and operations will, or may, affect Owner, facility manager (if other than Owner), and other property owners and occupants.
 - 7) Indication of locations, if any, where temporary support of excavations are proposed to remain in place following construction and backfilling, and extent of Contractor's proposed modifications or partial removals of such systems.
 - 8) Indicate Project-specific sequence of installation and removal of temporary supports of excavations, including: installation and removal of wales, struts, and other supports; and locations and approximate elevations of interim (partial) backfilling against foundations, when interim (partial) backfilling is proposed.
 - 9) Where applicable, indicate intended monitoring including monitoring of deflection of permanent construction and settlement outside of excavations.
- b. Engineer's (or Owner's) review, comments upon, acceptance, or other appropriate action on such Submittal does not, in any way, reduce or mitigate Contractor's sole responsibility for construction means, methods, techniques, procedures, sequences, and associated safety and protection measures.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Description:
1. Provide temporary support of excavations comprised of materials and systems suitable for the intended purpose, excavation depth, subsurface conditions, other environmental factors, installation and removal methods, and duration of use.
 2. Contractor shall determine necessary elements for temporary support of excavations for compliance with Laws and Regulations and the Contract Documents, while considering subsurface conditions, construction means, methods, techniques, procedures, and sequences, and associated safety and protection measures.
 3. Previously-used materials, where used for temporary support of excavations, shall be in good condition and be neither damaged nor excessively pitted.
 4. Steel materials and fabrications for temporary support of excavations shall be in accordance with ANSI/AISC 360 and welding shall be in accordance with AWS D1.1/D1.1M.
 5. Steel sheeting that Contractor proposes remain in place following construction shall consist of rolled sections of continuous interlocking type. Type and design of the sheeting and bracing shall comply with this Article's requirements, above, for steel work for all temporary support of excavations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification, Evaluation, and Assessment of Existing Conditions:
1. Evaluate information and data available to Contractor regarding subsurface and physical conditions at the Site and adjacent areas relative to temporary support of excavations. Perform additional investigations as necessary to enable Contractor to provide appropriate temporary support of excavations required to comply with Laws and Regulations and the Contract Documents.

2. Such investigations and evaluations by Contractor may include excavating (and subsequently backfilling), test pits to visually observe subsurface conditions and groundwater, test borings, sampling, and laboratory analyses. Obtain and record data and perform evaluations necessary for Contractor to provide temporary support of excavations as required.
 3. As the Work progresses, evaluate performance of temporary support of excavations as necessary and modify temporary support of excavations as appropriate to comply with Laws and Regulations and the Contract Documents.
- B. Installing the Work constitutes Contractor's approval of field conditions prevailing at the time of the Work and materials and design of temporary support of excavations used by Contractor.

3.2 GENERAL PROVISIONS FOR TEMPORARY SUPPORT OF EXCAVATIONS

- A. Excavations in stable rock may be made with vertical sides without temporary support of the excavation. Under all other conditions, excavations shall be sloped and benched as appropriate for the subsurface conditions, or provided with temporary support of excavations.
- B. Temporary Support of Excavations - General:
1. Provide temporary sheeting, shoring, wales, tie-backs, trench boxes, cofferdams, and other excavation supports as necessary and required for the Work, in accordance with Laws and Regulations and the Contract Documents.
 2. Clearances and types of temporary sheeting, shoring, wales, tie-backs, and other excavation supports, insofar as they may affect the finished character of the Work and the design of sheeting to be left in place, will be subject to Engineer's approval; but Contractor is solely responsible for adequacy of all temporary sheeting, shoring, wales, tie-backs, cofferdams, and other excavation supports, Contractor proposes remain in place following construction.
 3. Performance and Design: Design and provide temporary supports of excavations and excavation supports Contractor proposes to remain in place in conformance with USACOE Engineer Manual 1110-2-2504 and FHWA-IF-99-015 Geotechnical Engineering Circular No. 4, unless more-stringent requirements are expressly indicated in the Contract Documents or by Laws or Regulations.
 4. Installation:
 - a. Steel work for temporary support of excavations shall be in accordance with ANSI/AISC 360 and AWS D1.1/D1.1M.
 5. As excavation progresses, carry down temporary supports of excavation to required elevation at or below subgrade.
- C. Temporary Support of Existing Pipes – General:
1. Provide temporary supports as necessary to support pipe over or adjacent to open cuts.
 2. Provide pipe stabilization to securely hold pipe in place on supports.
 3. Design supports to avoid lateral moment or settlement of pipe.

3.3 TRENCH BOXES

- A. Installing and Using Trench Boxes:
1. Excavation of unclassified and other materials below bottom of trench box shall not exceed limits established in Laws and Regulations.
 2. When using trench box for installing piping:
 - a. Portions of trench box extending below the mid-diameter of an installed, rigid pipe, such as prestressed concrete pipe and other types of rigid pipe, shall be raised above the pipe's mid-diameter elevation prior to relocating the trench box within the excavation for further construction.
 - b. Bottom of trench box shall not at any time extend below mid-diameter of installed pipe that is flexible or has flexing capability, such as steel, ductile iron, PVC, CPVC, polyethylene, and other pipe that has flexing capability.
 3. When using trench box for installing structures, bottom of trench box shall not extend below elevation of top of granular base material of structure.
- B. Removal or Relocation of Trench Boxes:
1. When removing trench box or relocating trench box within the excavation, exercise extreme care to prevent moving piping, structures, and other Underground Facilities, and prevent disturbance of bedding material for piping, structures, and other Underground Facilities.

2. When piping, structures, or other Underground Facilities are disturbed, remove and reinstall the disturbed items in accordance with the Contract Documents.

3.4 MAINTENANCE AND REMOVAL OF TEMPORARY SUPPORT OF EXCAVATIONS

A. Maintenance of Temporary Support for Excavations:

1. During construction, maintain temporary support of excavations as long as necessary until removal or Engineer's concurrence that such temporary support of excavations may remain in place following construction.
2. As necessary, promptly remedy deficiencies in temporary support of excavations.

B. Removal of Temporary Support of Excavations:

1. When temporary support of excavations are no longer necessary, remove from the Site all elements of temporary systems supporting excavations unless Owner (through Engineer) approves temporary support of excavations, or part thereof, continuing existence at the Site after final payment.
2. Perform such removal in manner not injurious to buildings, structures, Underground Facilities, and other facilities, their appearance, and adjacent construction.
3. Removal of Temporary Sheeting and Bracing:
 - a. Remove from excavations sheeting, shoring, wales, and other elements of temporary supports, unless otherwise directed by Engineer in writing. Perform removal to avoid damaging the Work and adjacent construction. Removal shall be equal on both sides of excavation to ensure no unequal loads on buildings, structures, Underground Facilities, and other facilities.
 - b. Defer removal of sheeting, shoring, wales, and other elements, where removal may cause soil to come into contact with concrete, until the following conditions are satisfied:
 - 1) Concrete has cured for not less than seven days and reached full design strength as indicated in the Contract Documents.
 - 2) Wall and floor framing, up to and including grade level floors, is in place.
4. Requirements for removing and relocating trench boxes are indicated in the "Trench Boxes" Article of this Section.
5. Restore disturbed areas in accordance with the Contract Documents.

END OF SECTION



DIVISION 40

PROCESS INTERCONNECTIONS



SECTION 40 05 01
COMMON WORK RESULTS FOR PROCESS PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Process piping systems.
 - 2. Utility piping systems.
 - 3. Plumbing piping systems.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 09 96 00 - High Performance Industrial Coatings.
 - 2. Section 10 14 00 - Identification Devices.
 - 3. Section 40 05 07 - Pipe Support Systems.
 - 4. Section 40 05 51 - Common Requirements for Process and Utility Valves.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M36, Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent ASTM A760).
 - b. M190, Standard Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - c. M252, Standard Specification for Corrugated Polyethylene Drainage Tubing.
 - d. M294, Interim Specification for Corrugated Polyethylene Pipe 12 to 24 Inch Diameter.
 - 2. American Iron and Steel Institute (AISI).
 - 3. American Society of Mechanical Engineers (ASME):
 - a. B16.3, Malleable Iron Threaded Fittings.
 - b. B16.5, Pipe Flanges and Flanged Fittings.
 - c. B16.9, Factory-Made Wrought Steel Butt-Welding Fittings.
 - d. B16.22, Wrought Copper and Bronze Solder - Joint Pressure Fittings.
 - e. B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
 - f. B36.19, Stainless Steel Pipe.
 - 4. ASTM International (ASTM):
 - a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - b. A74, Standard Specification for Cast Iron Soil Pipe and Fittings.
 - c. A106, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
 - d. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - e. A182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
 - f. A197, Standard Specification for Cupola Malleable Iron.
 - g. A234, Standard Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 - h. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - i. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - j. A518, Standard Specification for Corrosion-Resistant High-Silicon Iron Castings.
 - k. A536, Standard Specification for Ductile Iron Castings.
 - l. A587, Standard Specification for Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry.
 - m. A760, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
 - n. A774, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
 - o. A778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.

- p. B88, Standard Specification for Seamless Copper Water Tube.
- q. C14, Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
- r. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- s. C425, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
- t. C443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- u. C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- v. C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- w. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- x. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- y. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- z. D4101, Standard Specification for Polypropylene Plastic Injection and Extrusion Materials.
- aa. F439, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- bb. F441, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
- 5. American Water Works Association (AWWA):
 - a. B300, Standard for Hypochlorites.
 - b. C200, Standard for Steel Water Pipe - 6 inches and Larger.
 - c. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches.
 - d. C208, Standard for Dimensions for Fabricated Steel Water Pipe Fittings.
 - e. C606, Standard for Grooved and Shouldered Joints.
 - f. C651, Standard for Disinfecting Water Mains.
 - g. C800, Standard for Underground Service Line Valves and Fittings.
- 6. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C110/A21.10, Standard for Ductile-Iron and Gray-Iron Fittings.
 - b. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - c. C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - d. C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - e. C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
- 7. Chlorine Institute, Inc. (CI):
 - a. Pamphlet 6, Piping Systems for Dry Chlorine.
- 8. Cast Iron Soil Pipe Institute (CISPI):
 - a. 301, Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- 9. International Plumbing Code (IPC).
- 10. National Fire Protection Association (NFPA):
 - a. 54, National Fuel Gas Code.
 - b. 69, Standard on Explosion Prevention Systems.
- 11. Underwriters Laboratories, Inc. (UL).

B. Coordinate flange dimensions and drillings between piping, valves, and equipment.

1.3 DEFINITIONS

- A. Hazardous Gas Systems: Digester gas, chlorine gas, sulfur dioxide gas, carbon dioxide gas, lab gases.
- B. HPIC: High performance industrial coating.
- C. PVDF: Polyvinylidene fluoride.

1.4 SYSTEM DESCRIPTION

- A. Piping Systems Organization and Definition:
 - 1. Piping services are grouped into designated systems according to the chemical and physical properties of the fluid conveyed, system pressure, piping size and system materials of construction.
 - 2. See PIPING SYSTEMS SCHEDULE in PART 3.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
 - c. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components.
 - 1) Attach technical product data on gaskets, pipe, fittings, and other components.
 - 2. Fabrication and/or Layout Drawings:
 - a. Exterior yard piping drawings (minimum scale 1 inch equals 10 feet) with information including:
 - 1) Dimensions of piping lengths.
 - 2) Invert or centerline elevations of piping crossings.
 - 3) Acknowledgement of bury depth requirements.
 - 4) Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint segments, hydrants, and related appurtenances.
 - 5) Acknowledge designated valve or gate tag numbers, manhole numbers, instrument tag numbers, pipe and line numbers.
 - 6) Line slopes and vents.
 - b. Interior piping drawings (minimum scale 1/8 inches equals 1 foot) with information including:
 - 1) Dimensions of piping from column lines or wall surfaces.
 - 2) Centerline dimensions of piping.
 - 3) Centerline elevation and size of intersecting ductwork, conduit/conduit racks, or other potential interferences requiring coordination.
 - 4) Location and type of pipe supports and anchors.
 - 5) Locations of valves and valve actuator type.
 - 6) Details of fittings, tapping locations, equipment connections, flexible expansion joints, connections to equipment, and related appurtenances.
 - 7) Acknowledgement of valve, equipment and instrument tag numbers.
 - 8) Provisions for expansion and contraction.
 - 9) Line slopes and air release vents.
 - 10) Rough-in data for plumbing fixtures.
 - c. Schedule of interconnections to existing piping and method of connection.
- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- C. Informational Submittals:
 - 1. Qualifications of lab performing disinfection analysis on water systems.
 - 2. Test reports:
 - a. Copies of pressure test results on all piping systems.
 - b. Reports defining results of dielectric testing and corrective action taken.
 - c. Disinfection test report.
 - d. Notification of time and date of piping pressure tests.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe coating during handling using methods recommended by manufacturer.
 - 1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
- B. Prevent damage to pipe during transit.
 - 1. Repair abrasions, scars, and blemishes.
 - 2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Insulating unions:
 - a. "Dielectric" by Epco.
 - 2. Dirt strainers (Y type):
 - a. Mueller (#351).
 - b. Sarco.
 - c. Armstrong.
 - 3. Chemical strainers (Y type):
 - a. Chemtrol.
 - b. Asahi.
 - 4. Dry disconnect couplings:
 - a. Kamlock.
 - 5. Dielectric flange kit:
 - a. PSI.
 - b. Maloney.
 - c. Central Plastics.
 - 6. Pipe saddles (for gage installation):
 - a. Dresser Style 91 (steel and ductile iron systems).
 - b. Dresser Style 194 (nonmetallic systems).
 - 7. Expansion joint at FRP and poly tanks:
 - a. PROCO.
 - b. Garlock, Style 215.
 - 8. Elastomeric bellows type expansion joints:
 - a. Garlock, Guardian 200/204.
 - b. PROCO, equivalent model.
 - c. Red Valve, equivalent model.
 - d. Or equal.
 - 9. Dismantling Joint
 - a. Romac DJ400.
 - b. Smith Blair 972.

2.2 PIPING SYSTEMS SCHEDULE

- A. Piping system materials, fittings and appurtenances are subject to requirements of specific piping systems schedule located at the end of PART 3 of this Specification Section.

2.3 COMPONENTS AND ACCESSORIES

- A. Insulating Components:
 - 1. Dielectric flange kits:
 - a. Flat faced.
 - b. 1/8 inches thick dielectric gasket, phenolic, non-asbestos.
 - c. Suitable for 175 psi, 210 degrees F.
 - d. 1/32 inches wall thickness bolt sleeves.
 - e. 1/8 inches thick phenolic insulating washers.
 - 2. Dielectric unions:
 - a. Screwed end connections.
 - b. Rated at 175 psi, 210 degrees F.
 - c. Provide dielectric gaskets suitable for continuous operation at union rated temperature and pressure.
- B. Reducers:
 - 1. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections.
 - 2. Connection size requirements may change from those shown on Drawings depending on equipment furnished.
- C. Protective Coating and Lining:

1. Include pipe, fittings, and appurtenances where coatings, linings, coating, tests and other items are specified.
 2. Piping systems scheduled in the PIPING SYSTEM SCHEDULES Article of this Section that are indicated to receive HPIC per Specification Section 09 96 00 shall receive surface preparation and primer applied in the fabrication facility, at the coating applicator's shop, or other off-site location acceptable to the Engineer. Intermediate and topcoats are to be field applied unless noted otherwise.
- D. Underground Warning Tape:
1. See Specification Section 10 14 00.
- E. Dry Disconnect Couplings:
1. Adapters:
 - a. Male adapters: Size shown on Drawings.
 - b. Adapters:
 - 1) Female NPT end connection for sludge and flush applications.
 - 2) Male NPT end connection for chemical applications.
 - c. Construct adapters for sludge applications from cast iron or steel.
 - d. Construct adapters for chemical and PVC system applications 3 inches and below from polypropylene.
 - 1) Above 3 inches size, provide stainless steel units.
 2. Couplers:
 - a. Built-in valve and spring loaded poppet which close automatically when disconnected.
 - b. Designed to remain with only one arm locked in closed position.
 - c. Construct couplers for sludge applications fabricated from material utilized for adapters.
 - d. Construct couplers for chemical and PVC system applications 3 inches and less from polypropylene with stainless steel arms and pins.
 - 1) Above 3 inches, provide stainless steel units.
 - e. Gasket: Compatible with conveyed liquid.
 3. Dust caps: For all adapters.
- F. Valves:
1. See schematics and details for definition of manual valves used in each system under 4 inches in size.
 - a. See Specification Section 40 05 51 schedule for valve types 4 inches and above and for automatic valves used in each system.
 2. See Specification Section 40 05 51.

PART 3 - EXECUTION

3.1 EXTERIOR BURIED PIPING INSTALLATION

- A. Unless otherwise shown on the Drawings, provide a minimum of 4 feet earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.
- B. Enter and exit through structure walls, floors, and ceilings by using penetrations and seals specified in Specification Section 01 73 20 and as shown on Drawings.
- C. When entering or leaving structures with buried mechanical joint piping, install joint within 2 feet of point where pipe enters or leaves structure.
 1. Install second joint not more than 6 feet nor less than 4 feet from first joint.
- D. Install expansion devices as necessary to allow expansion and contraction movement.
- E. Laying Pipe In Trench:
 1. Excavate and backfill trench in accordance with Section 31 23 00 - Earthwork and Appendix A - City Technical Specifications.
 2. Clean each pipe length thoroughly and inspect for compliance to specifications.
 3. Grade trench bottom and excavate for pipe bell and lay pipe on trench bottom.
 4. Install gasket or joint material according to manufacturer's directions after joints have been thoroughly cleaned and examined.
 5. Except for first two joints, before making final connections of joints, install two full sections of pipe with earth tamped alongside of pipe or final with bedding material placed.
 6. Lay pipe in only suitable weather with good trench conditions.

- a. Never lay pipe in water except where approved by Engineer.
- 7. Seal open end of line with watertight plug if pipe laying stopped.
- 8. Remove water in trench before removal of plug.
- F. Lining Up Push-On Joint Piping:
 - 1. Lay piping on route lines shown on Drawings.
 - 2. Deflect from straight alignments or grades by vertical or horizontal curves or offsets.
 - 3. Observe maximum deflection values stated in manufacturer's written literature.
 - 4. Provide special bends when specified or where required alignment exceeds allowable deflections stipulated.
 - 5. Install shorter lengths of pipe in such length and number that angular deflection of any joint, as represented by specified maximum deflection, is not exceeded.
- G. Anchorage and Blocking:
 - 1. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces in or on buried piping tees, wye branches, plugs, or bends.
 - 2. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall.
 - a. Concrete blocks shall not cover pipe joints.
 - 3. Provide bearing area of concrete in accordance with drawing detail.
- H. Install underground hazard warning tape per Specification Section 10 14 00.
- I. Install insulating components where dissimilar metals are joined together.

3.2 INTERIOR AND EXPOSED EXTERIOR PIPING INSTALLATION

- A. Install piping in vertical and horizontal alignment as shown on Drawings.
- B. Alignment of piping smaller than 4 inches may not be shown; however, install according to Drawing intent and with clearance and allowance for:
 - 1. Expansion and contraction.
 - 2. Operation and access to equipment, doors, windows, hoists, moving equipment.
 - 3. Headroom and walking space for working areas and aisles.
 - 4. System drainage and air removal.
- C. Enter and exit through structure walls, floor and ceilings using penetrations and seals specified in Specification Section 01 73 20 and as shown on the Drawings.
- D. Install vertical piping runs plumb and horizontal piping runs parallel with structure walls.
- E. Pipe Support:
 - 1. Use methods of piping support as shown on Drawings and as required in Specification Section 40 05 07.
 - 2. Where pipes run parallel and at same elevation or grade, they may be grouped and supported from common trapeze-type hanger, provided hanger rods are increased in size as specified for total supported weight.
 - a. The pipe in the group requiring the least maximum distance between supports shall set the distance between trapeze hangers.
 - 3. Size pipe supports with consideration to specific gravity of liquid being piped.
- F. Locate and size sleeves and castings required for piping system.
 - 1. Arrange for chases, recesses, inserts or anchors at proper elevation and location.
- G. Use reducing fittings throughout piping systems.
 - 1. Bushings will not be allowed unless specifically approved.
- H. Equipment Drainage and Miscellaneous Piping:
 - 1. Provide drip pans and piping at equipment where condensation may occur.
 - 2. Hard pipe stuffing box leakage to nearest floor drain.
 - 3. Avoid piping over electrical components such as motor control centers, panelboards, etc.
 - a. If piping must be so routed, utilize 16 GA, 316 stainless steel drip pan under piping and over full length of electrical equipment.
 - b. Hard pipe drainage to nearest floor drain.
 - 4. Collect system condensate at drip pockets, traps and blowoff valves.

5. Provide drainage for process piping at locations shown on Drawings in accordance with Drawing details.
 6. For applications defined above and for other miscellaneous piping which is not addressed by a specific piping service category in PART 1, provide 304 stainless steel piping and fittings.
 - a. Size to handle application with 3/4 inches being minimum size provided.
- I. Unions:
1. Install in position which will permit valve or equipment to be removed without dismantling adjacent piping.
 2. Mechanical type couplings may serve as unions.
 3. Additional flange unions are not required at flanged connections.
- J. Install expansion devices as necessary to allow expansion/contraction movement.
- K. Provide full face gaskets on all systems.
- L. Anchorage and Blocking:
1. Block, anchor, or harness exposed piping subjected to forces in which joints are installed to prevent separation of joints and transmission of stress into equipment or structural components not designed to resist those stresses.
- M. Equipment Pipe Connections:
1. Equipment - General:
 - a. Exercise care in bolting flanged joints so that there is no restraint on the opposite end of pipe or fitting which would prevent uniform gasket pressure at connection or would cause unnecessary stresses to be transmitted to equipment flanges.
 - b. Where push-on joints are used in conjunction with flanged joints, final positioning of push-on joints shall not be made until flange joints have been tightened without strain.
 - c. Tighten flange bolts at uniform rate which will result in uniform gasket compression over entire area of joint.
 - 1) Provide tightening torque in accordance with manufacturer's recommendations.
 - d. Support and match flange faces to uniform contact over their entire face area prior to installation of any bolt between the piping flange and equipment connecting flange.
 - e. Permit piping connected to equipment to freely move in directions parallel to longitudinal centerline when and while bolts in connection flange are tightened.
 - f. Align, level, and wedge equipment into place during fitting and alignment of connecting piping.
 - g. Grout equipment into place prior to final bolting of piping but not before initial fitting and alignment.
 - h. To provide maximum flexibility and ease of alignment, assemble connecting piping with gaskets in place and minimum of four bolts per joint installed and tightened.
 - 1) Test alignment by loosening flange bolts to see if there is any change in relationship of piping flange with equipment connecting flange.
 - 2) Realign as necessary, install flange bolts and make equipment connection.
 - i. Provide utility connections to equipment shown on Drawings, scheduled or specified.
 2. Plumbing and HVAC equipment:
 - a. Make piping connections to plumbing and HVAC equipment, including but not limited to installation of fittings, strainers, pressure reducing valves, flow control valves and relief valves provided with or as integral part of equipment.
 - b. Furnish and install sinks, fittings, strainers, pressure reducing valves, flow control valves, pressure relief valves, and shock absorbers which are not specified to be provided with or as integral part of equipment.
 - c. For each water supply piping connection to equipment, furnish and install union and gate or angle valve.
 - 1) Provide wheel handle stop valve at each laboratory sink water supply.
 - 2) Minimum size: 1/2 inches.
 - d. Furnish and install "P" trap for each waste piping connection to equipment if waste is connected directly to building sewer system.
 - 1) Size trap as required by IPC.
 - e. Stub piping for equipment, sinks, lavatories, supply and drain fittings, key stops, "P" traps, miscellaneous traps and miscellaneous brass through wall or floor and cap and protect until such time when later installation is performed.

- N. Provide insulating components where dissimilar metals are joined together.
- O. Instrument Connections:
 - 1. See drawing details.

3.3 CONNECTIONS WITH EXISTING PIPING

- A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
- B. Perform connections with existing piping at time and under conditions which will least interfere with service to customers affected by such operation.
- C. Undertake connections in fashion which will disturb system as little as possible.
- D. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.
- F. Where connection involves potable water systems, provide disinfection methods as prescribed in this Specification Section.
- G. Once tie-in to each existing system is initiated, continue work continuously until tie-in is made and tested.

3.4 ACCESS PROVISIONS

- A. Provide access doors or panels in walls, floors, and ceilings to permit access to valves, piping and piping appurtenances requiring service.
- B. Size of access panels to allow inspection and removal of items served, minimum 10 x 14 inches size.
- C. See Specification Section 08 31 00 - Access Doors.

3.5 CATHODIC PROTECTION

- A. Isolate, dielectrically, all piping from all other metals including reinforcing bars in concrete slabs, other pipe lines, and miscellaneous metal.
- B. Make all connections from wire or cable by Thermit Cadwelding accomplished by operators experienced in this process.
- C. Install all cables with a loop and overhead knot around each pipe and slack equal to at least 50% of the straight line length.
- D. After cadwelding, coat all exposed metallic surfaces with hot applied tape.

3.6 PRESSURE GAGES

- A. Provide at locations shown on the Drawings and specified.
- B. See Specification Section 01 61 03.

3.7 FIELD QUALITY CONTROL

- A. Pipe Testing - General:
 - 1. Test piping systems as follows:
 - a. Test exposed, non-insulated piping systems upon completion of system.
 - b. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
 - c. Test concealed interior piping systems prior to concealment and, if system is insulated, prior to application of insulation.
 - d. Test buried piping (insulated and non-insulated) prior to backfilling and, if insulated, prior to application of insulation.
 - 2. Isolate equipment which may be damaged by the specified pressure test conditions.
 - 3. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
 - a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.

- b. Notify the Engineer 24 hours prior to each test.
4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
5. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.
6. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

B. Pressure Testing:

1. Testing medium: Unless otherwise specified in the PIPING SYSTEMS SCHEDULE, utilize the following test media.
 - a. Process systems:

PIPE LINE SIZE	SPECIFIED TEST PRESSURE	TESTING MEDIUM
2 inches and smaller	75 psi or less	Water
2 inches and smaller	Greater than 75 psi	Water
Greater than 2 inches	3 psi or less	Water
Greater than 2 inches	Greater than 3 psi	Water

- b. Laboratory gases and natural gas systems: Cylinder nitrogen.
- c. Liquid systems:

PIPE LINE SIZE (DIA)	GRAVITY OR PUMPED	SPECIFIED TEST PRESSURE	TESTING MEDIUM
Up to and including 48 inches	Gravity	25 psiG or less	Water
Above 48 inches	Gravity	25 psiG or less	Water
All sizes	Pumped	250 psiG or less	Water

2. Allowable leakage rates:
 - a. Hazardous gas systems, all exposed piping systems, all pressure piping systems and all buried, insulated piping systems which are hydrostatically pressure tested shall have zero leakage goal at the specified test pressure throughout the duration of the test.
 - b. Hydrostatic exfiltration and infiltration for sanitary and stormwater sewers (groundwater level is below the top of pipe):
 - 1) Leakage rate: 200 GAL per inch diameter per mile of pipe per day at average head on test section of 3 feet.
 - 2) Average head is defined from groundwater elevation to average pipe crown.
 - 3) Acceptable test head leakage rate for heads greater than 3 feet: Acceptable leakage rate (gallons per inch diameter per mile per day) equals 115 by (actual test head to the 1/2 power).
 - c. Hydrostatic infiltration test for sanitary and stormwater sewers (groundwater level is above the top of pipe):
 - 1) Allowable leakage rate: 200 GAL per inch diameter per mile of pipe per day when depth of groundwater over top of pipe is 2 to 6 feet.
 - 2) Leakage rate at heads greater than 6 feet: Allowable leakage rate (gallons per inch diameter per mile of pipe per day) equals 82 by (actual head to the 1/2 power).
 - d. Large diameter (above 48 inches) gravity plant piping systems shall have a maximum exfiltration of 25 GPD per inch-mile.
 - e. Non-hazardous gas and air systems which are tested with air shall have a maximum pressure drop of 5% of the specified test pressure throughout the duration of the test.
 - f. For low pressure (less than 25 psiG) air testing, the acceptable time for loss of 1 psiG of air pressure shall be:

PIPE SIZE (IN DIA)	TIME, MINUTES/100 feet
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0
42	7.3
48	7.6

3. Hydrostatic pressure testing methodology:
 - a. General:
 - 1) All joints, including welds, are to be left exposed for examination during the test.
 - 2) Provide additional temporary supports for piping systems designed for vapor or gas to support the weight of the test water.
 - 3) Provide temporary restraints for expansion joints for additional pressure load under test.
 - 4) Isolate equipment in piping system with rated pressure lower than pipe test pressure.
 - 5) Do not coat or insulate exposed piping until successful performance of pressure test.
 - b. Soil, waste, drain and vent systems:
 - 1) Test at completion of installation of each stack or section of piping by filling system with water and checking joints and fittings for leaks.
 - 2) Eliminate leaks before proceeding with work or concealing piping.
 - 3) Minimum test heights shall be 10 feet above highest stack inlet.
 - c. Larger diameter (above 36 inches) gravity plant piping:
 - 1) Plug downstream end of segment to be tested.
 - a) Provide bracing as required.
 - 2) Fill segment and upstream structure to normal operating level as per hydraulic profile.
 - 3) Allow 24 hours for absorption losses.
 - a) Refill to original level.
 - 4) Provide reservoir to maintain constant head over duration of test.
 - 5) Record reservoir water volume at beginning and end of test.
4. Natural gas systems - testing methodology:
 - a. Maintain specified test pressure until each joint has been thoroughly examined for leaks by means of soap suds and glycerin.
 - b. Wipe joints clean after test.
5. Air testing methodology:
 - a. General:
 - 1) Assure air is ambient temperature.
 - b. Low pressure air testing:
 - 1) Place plugs in line and inflate to manufacturer's designated seal pressure.
 - 2) Check plugs for proper sealing.
 - 3) Introduce low pressure air into sealed line segment until air pressure reaches 4 psiG greater than ground water or allowable limits of ASTM F1417.

- a) Use test gage conforming to ASME B40.100 with 0 to 15 psi scale and accuracy of 1% of full range.
 - 4) Allow 2 minutes for air pressure to stabilize.
 - 5) After stabilization period (3.5 psiG minimum pressure in pipe) discontinue air supply to line segment.
 - 6) Record pressure at beginning and end of test.
- C. Dielectric Testing Methods and Criteria:
 - 1. Provide electrical check between metallic non-ferrous pipe or appurtenances and ferrous elements of construction to assure discontinuity has been maintained.
 - 2. Wherever electrical contact is demonstrated by such test, locate the point or points of continuity and correct the condition.

3.8 CLEANING, DISINFECTION AND PURGING

- A. Cleaning:
 - 1. Clean interior of piping systems thoroughly before installing.
 - 2. Maintain pipe in clean condition during installation.
 - 3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
 - a. Pig high pressure air piping before connecting to valves or instruments.
 - 4. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
 - a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
 - b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.
- B. , liquefied petroleum gasDisinfection of Potable Water Systems:
 - 1. After favorable performance of pressure test and prior to Final Acceptance, thoroughly flush entire potable water piping system including supply, source and any appurtenant devices and perform disinfection as prescribed.
 - 2. Perform work, including preventative measures during construction, in full compliance with AWWA C651.
 - 3. Perform disinfection using sodium hypochlorite complying with AWWA B300.
 - 4. Flush each segment of system to provide flushing velocity of not less than 2.5 feet per second.
 - 5. Drain flushing water to sanitary sewer.
 - a. Do not drain flushing water to receiving stream.
 - 6. Use continuous feed method of application.
 - a. Tag system during disinfection procedure to prevent use.
 - 7. After required contact period, flush system to remove traces of heavily chlorinated water.
 - 8. After final flushing and before placing water in service, obtain an independent laboratory approved by the Owner to collect samples and test for bacteriological quality.
 - a. Repeat entire disinfection procedures until satisfactory results are obtained.
 - 9. Secure and deliver to Owner, satisfactory bacteriological reports on samples taken from system.
 - a. Ensure sampling and testing procedures are in full compliance to AWWA C651, local water purveyor and applicable requirements of State of Missouri.

3.9 LOCATION OF BURIED OBSTACLES

- A. Furnish exact location and description of buried utilities encountered and thrust block placement.
- B. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants and related fixed structures.
- C. Include such information as location, elevation, coverage, supports and additional pertinent information.
- D. Incorporate information on "As-Recorded" Drawings.

3.10 PIPING SYSTEM SCHEDULES

- A. Piping System 10 – Buried and Exposed Potable Water Piping.
 - 1. General:
 - a. Piping symbol and service:

- 1) PW - Potable Water.
- b. Test requirements:
 - 1) Test medium: Water.
 - 2) Pressure: 1.25 x working pressure.
 - 3) Duration: 6 hours.
- c. Gaskets and O-rings:
 - 1) O-rings: Neoprene or rubber.
 - 2) Flanged, push-on and mechanical joints (ductile iron): Rubber, AWWA/ANSI C111/A21.11.
 - 3) Flanged joints (steel): Rubber, AWWA C207.
 - 4) Grooved coupling joints (ductile and steel): Rubber, AWWA C606.
2. System components:
 - a. Pipe size 3 inches through 24 inches:
 - 1) Exposed service:
 - a) Materials:
 - (1) Flanged: Ductile iron, Pressure Class 250.
 - (2) Grooved type joint system: Use pipe thickness per AWWA C606.
 - (3) With both systems, provide screwed on flanges at equipment, valves and structural penetrations.
 - b) Reference: AWWA/ANSI C115/A21.15.
 - c) Lining: Cement.
 - d) Coating: HPIC; See Specification Section 09 96 00.
 - e) Fittings: Either AWWA/ANSI C110/A21.10 ductile or gray iron.
 - f) Joints:
 - (1) Flanged or grooved type mechanical coupling (AWWA C606) joints.
 - (2) With both systems, provide screwed-on flanges at valves, equipment, and structure penetration.
 - 2) Buried service:
 - a) Materials: Ductile iron, Class 52.
 - b) Reference: AWWA/ANSI C151/A21.51.
 - c) Lining: Cement.
 - d) Coating: Bituminous.
 - e) Fittings:
 - (1) Either AWWA/ANSI C110/A21.10 ductile or gray iron.
 - (2) Optional: AWWA/ANSI C153/A21.53 ductile iron compact fittings for sizes 3 to 16 inches.
 - f) Joints: Push-on with mechanical (stuffing box type) joints at fittings and valves.
 - g) Provide polyethylene encasement.
3. Install drain tees with capped nipples of IPS brass 3 inches long at low points.
 - a. If low point occurs in concealed piping, provide approved flush access panel.
 - b. These drains are not shown on Drawings.
4. Slope water lines down to drain points not less than 1 inch in 60 feet.
5. Install all threaded piping with clean-cut tapered threads and with ends thoroughly reamed after cutting to remove burrs.
 - a. Pipe joint cement permitted only on external threads.
6. For screwed nipples for connections to flush valves, lavatory supplies, and other equipment with threaded connections use iron, copper, or brass pipe.
7. Install ball, butterfly and plug valves where indicated or required to adequately service all parts of system and equipment.
 - a. Install valves on each branch serving restroom.
 - b. Install valves on inlet and outlet connections of heat exchangers and on other equipment connected to water lines.
8. Install unions between valves and connections to each piece of equipment and install sufficient number of unions throughout piping system to facilitate installation and servicing.
 - a. On copper pipelines, install wrought, solder-joint, copper to copper unions for lines 2 IN and smaller and, for lines 2-1/2 inches and over install brass flange unions.
9. Construct and equip plumbing fixtures and equipment with anti-siphon devices as to entirely eliminate any danger of siphoning waste material into potable water supply system.

10. Where exposed pipes 6 inches in size and smaller pass through floors, finished walls, or finished ceilings, fit with nickel or chrome-plated plates large enough to completely close hole around pipes.
 - a. Secure plates to pipe by set screw in approved manner.
11. Size supply branches to individual fixtures as scheduled or indicated on Drawings.
12. Install piping so as to be free to expand with proper loops, anchors and joints without injury to system or structure.
13. Provide branches to wall hydrants or hose bibbs in exterior locations with interior shutoff and drain valves.
14. Provide approved type vacuum breaker and backflow preventer installations indicated or as required by Code.
15. Install concealed in finished structures such as administration and office facilities and at locations shown on Drawings.

END OF SECTION

SECTION 40 05 07
PIPE SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe support and anchor systems.
 - 2. Design of Pipe Support Systems as specified.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 03 15 19 - Anchorage to Concrete.
 - 2. Section 05 50 00 - Metal Fabrications.
 - 3. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B31.3, Process Piping.
 - 2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A123/123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. A153/153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - e. A575, Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - f. A576, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
 - g. A917, Standard Specification for Steel Sheet, Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface (General Requirements).
 - h. A918, Standard Specification for Steel Sheet, Zinc-Nickel Alloy Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.
 - i. B633, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 3. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.
 - b. D1.6, Structural Welding Code - Stainless Steel.
 - 4. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
 - a. SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.
- B. Responsibility:
 - 1. Support systems for piping greater than 12 inches diameter, or with internal pressure over 100 psi, or piping with product temperatures over 200 degrees F, are shown on the Drawings and are not to be designed by Contractor unless indicated in Contract Documents.
 - 2. Design complete support systems for piping 12 inches and smaller where supports are not shown on the Drawings.
 - 3. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to design, furnish and install the system of hangers, supports, guidance, anchorage and appurtenances.
 - 4. General piping support details may be indicated on the Drawings in certain locations for pipe 12 inches diameter and smaller.
 - 5. Incorporate those details with requirements of this Specification Section to provide the piping support system.
- C. Each type of pipe hanger or support shall be the product of one manufacturer.
- D. Qualifications:
 - 1. Pipe support designer:
 - a. Licensed Professional Engineer registered in the state the project is located in.

- b. Minimum of five years experience designing pipe supports for projects of similar size and complexity.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Scaled drawings showing location, installation, material, loads and forces, and deflection of all hangers and supports.
 - b. Analyze each pipe system for all loads and forces on hangers and supports and their reaction forces to the structure to which they are fastened.
 - c. Where Contract Documents indicate contractor is to design pipe support systems, submit detail design calculations and scaled drawings signed by Pipe support designer.
 - 2. Product data:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Itemized list of wall sleeves, anchors, support devices and all other items related to pipe support system.
- B. Informational Submittals:
 - 1. Certifications.
 - a. Pipe support designer qualifications

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Empire Industries, Inc.
 - 2. ASC Engineered Solutions (ANVIL).
 - 3. National Pipe Hanger Corp.
 - 4. PHD Manufacturing, Inc.
 - 5. Piping Technology & Products, Inc.
 - 6. Atkore International (Unistrut, Powerstrut and Aickinstrut).
 - 7. Or Equal.

2.2 MANUFACTURED UNITS

- A. General:
 - 1. Galvanized components:
 - a. Hot-dip galvanized components:
 - 1) General: ASTM 123/123M.
 - 2) Fasteners and hardware: ASTM 153/153M.
 - 2. Dissimilar metals protection:
 - a. Galvanized-to-galvanized and galvanized-to-aluminum: No protection required.
 - b. All other galvanized-to-dissimilar metal connections: Neoprene or nylon pads, shims, grommets, etc.
- B. Hanger Rods:
 - 1. Material:
 - a. ASTM A36.
 - b. ASTM A575, Grade M1020.
 - c. ASTM A576, Grade 1020.
 - d. Minimum allowable tensile stress of 12,000 psi at 650 degrees F per MSS SP-58.
 - 2. Continuously threaded.
 - 3. Hot-dip galvanized after threads are cut.
 - 4. Load limit:

NOMINAL ROD DIAMETER	MAXIMUM SAFE LOAD, (LBS)
3/8 inches diameter (min)	610

NOMINAL ROD DIAMETER	MAXIMUM SAFE LOAD, (LBS)
1/2 inches diameter	1,130
5/8 inches diameter	1,810
3/4 inches diameter	2,710
7/8 inches diameter	3,770
1 inches diameter	4,960

C. Hangers:

- Hangers for use directly on copper pipe: Copper plated or PVC coated.
- Hangers for use other than directly on copper pipe: 316 stainless steel.
- Hanger type schedule:

APPLICATION	PIPE SIZE	HANGER TYPE
All except noted	4 inches and less	MSS Type 1 or 12 Similar to Empire Figure 41.
All except noted	Over 4 inches	MSS Type 1 Similar to Empire Figure 11.
Steam, condensate, and hot water	All	MSS Type 43 Similar to Empire Figure 272 w/ spring hanger.
Service in chemical storage areas and as indicated on drawings for corrosion resistance	All	FRP trapeze hangers or clevis hangers as specified below.

D. Concrete Inserts for Hanger Rods:

- Continuous slots: Unistrut #P1000.
- Individual inserts: Similar to ANVIL Figure 281.
- See Specification Section 03 15 19, mechanical anchors.

E. Vertical Pipe Supports:

- At base of riser.
 - Material: 316 stainless steel.
- Lateral movement:
 - Clamps or brackets:
 - MSS SP-58, Type 8 or 42.
 - Similar to Empire Industries Figure 50.

F. Pipe Support Saddle:

- General:
 - Minimum contact area:
 - 120 Degrees minimum.
 - 180 Degrees for PVC/PE greater than 12 inches
- For pipe located 3 feet or less from floor elevation, except as otherwise indicated on Drawings.
 - MSS SP-58 Type 38.
 - Material: 316 stainless steel.
 - Similar to Empire Industries Figure 426.

G. Pipe Support Risers/Stanchions:

- Schedule 40 pipe.
- Material: match pipe support saddle.
- Size: As recommended by saddle manufacturer.

H. Pipe Support Base Plate:

- 4 inches larger than support.

2. Collar 3/16 inches thickness, circular in shape, and sleeve type connection to pipe.
 3. Collar fitted over outside of support pipe and extended 2 inches from floor plate.
 4. Collar welded to floor plate.
 5. Edges ground smooth.
 6. Material: match pipe support saddle.
 7. Assembly hot-dip galvanized after fabrication.
 8. Provide low carbon stainless steel for welded fabrications.
- I. Wall Brackets:
1. For pipe located near walls and 8 feet or more above floor elevation or as otherwise indicated on the Drawings.
 2. MSS SP-58, Type 33.
 3. Material: 316 stainless steel.
 4. Similar to Empire Industries Figure 802.
- J. Pipe Anchors:
1. For locations shown on the Drawings.
 2. 1/4 inches steel plate construction.
 3. Hot-dip galvanized after fabrication.
 4. Designed to prevent movement of pipe at point of attachment.

2.3 DESIGN REQUIREMENTS

- A. Supports capable of supporting the pipe for all service and testing conditions.
1. Provide 5 to 1 safety factor.
- B. Allow free expansion and contraction of the piping to prevent excessive stress resulting from service and testing conditions or from weight transferred from the piping or attached equipment.
- C. Design supports and hangers to allow for proper pitch of pipes.
- D. Check all physical clearances between piping, support system and structure.
1. Provide for vertical adjustment after erection.
- E. Support vertical pipe runs in pipe chases at base of riser.
1. Support pipes for lateral movement with clamps or brackets.
- F. Provide 20 GA pipe saddle for fiberglass and plastic pipe support points to ensure minimum contact width of 4 inches.
1. Material: match support.
- G. Pipe Support Spacing:
1. General:
 - a. Factor loads by specific weight of liquid conveyed if specific weight is greater than water.
 - b. Locate pipe supports at maximum spacing scheduled unless indicated otherwise on the Drawings.
 - c. Provide at least one support for each length of pipe at each change of direction and at each valve.
 2. Steel, stainless steel, cast-iron pipe support schedule:

PIPE SIZES - IN	MAXIMUM SPAN - FT
1-1/2 and less	5
2 thru 4	10
5 thru 8	15
10 and greater	20

3. Copper pipe support schedule:

PIPE SIZES - IN	MAXIMUM SPAN - FT
2-1/2 and less	5

PIPE SIZES - IN	MAXIMUM SPAN - FT
3 thru 6	10
8 and greater	15

4. PVC pipe support schedule:

PIPE SIZES - IN	MAXIMUM SPAN - FT
1-1/4 and less	3
1-1/2 thru 3	4
4 and greater	5

* Maximum fluid temperature of 120 degrees F.

5. Support each length and every fitting:
- Bell and spigot piping:
 - At least one hanger.
 - Applied at bell.
 - Mechanical coupling joints:
 - Place hanger within 2 feet of each side of fittings to keep pipes in alignment.
6. Space supports for soil and waste pipe and other piping systems not included above every 5 feet.
7. Provide continuous support for nylon tubing.

PART 3 - EXECUTION

3.1 INSTALLATION

- Provide piping systems exhibiting pulsation, vibration, swaying, or impact with suitable constraints to correct the condition.
 - Included in this requirement are movements from:
 - Trap discharge.
 - Water hammer.
 - Similar internal forces.
- Weld Supports:
 - AWS D1.1.
 - Weld anchors to pipe in accordance with ASME B31.3.
 - AWS D1.6 for stainless steel supports.
- Locate piping and pipe supports as to not interfere with open accesses, walkways, platforms, and with maintenance or disassembly of equipment.
- Inspect hangers for:
 - Design offset.
 - Adequacy of clearance for piping and supports in the hot and cold positions.
 - Guides to permit movement without binding.
 - Adequacy of anchors.
- Inspect hangers after erection of piping systems and prior to pipe testing and flushing.
- Anchorage to Concrete - reference Specification Section 03 15 19.
- Install individual or continuous slot concrete inserts for use with hangers for piping and equipment.
 - Install concrete inserts as concrete forms are installed.
- Welding:
 - Welding rods: ASTM and AWS standards.
 - Integral attachments:
 - Include welded-on ears, shoes, plates and angle clips.
 - Ensure material for integral attachments is of good weldable quality.
 - Preheating, welding and postheat treating: ASME B31.3, Chapter V.

- I. Field Painting:
 - 1. Comply with Specification Section 09 96 00.

END OF SECTION

SECTION 40 05 19
DUCTILE IRON PROCESS PIPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ductile iron piping, fittings, and appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Appendix A - City Technical Specifications.
 - 2. Section 40 05 01 - Common Work Results for Process Piping.

1.2 REFERENCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
 - b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - 2. ASTM International (ASTM):
 - a. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - b. A536, Standard Specification for Ductile Iron Castings
 - c. B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - 3. American Water Works Association (AWWA):
 - a. C203, Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.
 - b. C217, Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe.
 - c. C606, Standard for Grooved and Shouldered Joints.
 - 4. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C104/A21.4, Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - b. C105/A21.5, Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - c. C110/A21.10, Standard for Ductile-Iron and Gray-Iron Fittings.
 - d. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - f. C150/A21.50, Standard for Thickness Design of Ductile-Iron Pipe.
 - g. C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - h. C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
 - i. C217, Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Comply with Section 40 05 01 - Common Work Results for Process Piping.
 - 2. Certification of factory hydrostatic testing.
 - 3. If mechanical coupling system is used, submit piping, fittings, and appurtenant items which will be utilized to meet system requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Restrained Flanged Adaptors (flanged coupling adaptors):
 - a. Romac, Style RFCA.
 - b. Or equal.
 2. Restrained Sleeve:
 - a. Romac, Style 400 RG.
 - b. Or equal.
 3. Polyethylene Encasement Tape:
 - a. Chase, Chasekote 750.
 - b. Kendall, Polyken 900.
 - c. 3 M, Scotchrap 50.
 - d. V-Bio Polywrap.
 4. Restrained joints:
 - a. American (Flex-Ring) - 4 IN to 54 IN.
 - b. U.S. Pipe (TR-Flex) - 4 IN to 36 IN.
 - c. Or equal.
 5. Dismantling joints:
 - a. Smith-Blair (Style 975).
 - b. Dresser (Style 131).
 - c. Romac (Style DJ 400).
 - d. Or equal.

2.2 MATERIALS

- A. Ductile Iron Pipe:
1. AWWA/ANSI C115/A21.15.
 2. AWWA/ANSI C150/A21.50.
 3. AWWA/ANSI C151/A21.51.
- B. Fittings and Flanges:
1. AWWA/ANSI C110/A21.10.
 2. AWWA/ANSI C153/A21.53
 - a. Do not use for pump suction piping.
 3. AWWA/ANSI C115/A21.15.
 4. Flanges drilled and faced per ASME B16.1 for both 125 and 250 PSI applications.
- C. Nuts and Bolts:
1. Buried:
 - a. T-Bolts for mechanical joints: Per AWWA/ANSI C111/A21.1
 - b. Other bolts and nuts: ASTM A307.
 - c. Fluoropolymer coated.
 2. Exposed: Mechanical galvanized ASTM B695, Class 40.
 3. Heads and dimensions per ASME B1.1.
 4. Threaded per ASME B1.1.
 5. Project ends 1/4 to 1/2 IN beyond nuts.
- D. Gaskets: See individual piping system requirements in Section 40 05 01.
- E. If mechanical coupling system is used, utilize pipe thickness and grade in accordance with AWWA C606.
1. Manufactured from ductile iron conforming to ASTM A536.
 2. Gaskets: Flushseal® type, grade to suit the intended service.
- F. Polyethylene Encasement: Per AWWA/ANSI C105/A21.5.

G. See Piping Schedules in Section 40 05 01.

2.3 MANUFACTURED UNITS

A. Couplings:

1. Restrained flanged adaptors:
 - a. Provide units specified in the MANUFACTURERS Article.
 - b. Supply flanges meeting standards of adjoining flanges.
 - c. Rate entire assembly for test pressure specified on piping schedule for each respective application.

2.4 FABRICATION

- A. Furnish and install without outside coatings of bituminous material any exposed pipe scheduled to be painted.
- B. Furnish cast parts with lacquer finish compatible with finish coat.

2.5 LININGS AND COATINGS

- A. See Appendix A - City Technical Specifications.

2.6 SOURCE QUALITY CONTROL

- A. Factory Test:
 1. Subject pipe to hydrostatic test of not less than 500 PSI with the pipe under the full test pressure for at least 10 seconds.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Joining Method - Push-On Mechanical (Gland-Type) Joints:
 1. Install in accordance with AWWA/ANSI C111/A21.11.
 2. Assemble mechanical joints carefully according to manufacturer's recommendations.
 3. If effective sealing is not obtained, disassemble, thoroughly clean, and reassemble the joint.
 4. Do not overstress bolts.
 5. Where piping utilizes mechanical joints with tie rods, align joint holes to permit installation of harness bolts.
- B. Joining Method - Push-On Joints:
 1. Install in accordance with AWWA/ANSI C151/A21.51.
 2. Assemble push-on joints in accordance with manufacturer's directions.
 3. Bevel and lubricate spigot end of pipe to facilitate assembly without damage to gasket.
 - a. Use lubricant that is non-toxic, does not support the growth of bacteria, has no deteriorating effects on the gasket material, and imparts no taste or odor to water in pipe.
 4. Assure the gasket groove is thoroughly clean.
 5. For cold weather installation, warm gasket prior to placement in bell.
 6. Taper of bevel shall be approximately 30 DEG with centerline of pipe and approximately 1/4 IN back.
- C. Joining Method - Flanged Joints:
 1. Install in accordance with AWWA/ANSI C115/A21.15.
 2. Extend pipe completely through screwed-on flanged and machine flange face and pipe in single operation.
 3. Make flange faces flat and perpendicular to pipe centerline.
 4. When bolting flange joints, exercise extreme care to ensure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or would

cause unnecessary stress, bending or torsional strains to be applied to cast flanges or flanged fittings.

5. Allow one flange free movement in any direction while bolts are being tightened.
6. Do not assemble adjoining flexible joints until flanged joints in piping system have been tightened.
7. Gradually tighten flange bolts uniformly to permit even gasket compression.

D. Flange Adaptors 12 IN and Less:

1. Locate and drill holes for anchor studs after pipe is in place and bolted tight.
2. Drill holes not more than 1/8 IN larger than diameter of stud projection.

E. Cutting:

1. Do not damage interior lining material during cutting.
2. Use abrasive wheel cutters or saws.
3. Make square cuts.
4. Bevel and free cut ends of sharp edges after cutting.

F. Support exposed pipe in accordance with Section 40 05 01.

G. Where specified in Section 40 05 01 under individual piping system, install polyethylene encasement in full compliance to AWWA/ANSI C105/A21.5.

1. Encase underground appurtenances required as part of installation.
2. Where tapping polyethylene encased pipe, first wrap location of tap with three (3) layers of polyethylene adhesive tape.
 - a. Make tap through tape.
3. Make sections 2 FT longer than pipe section to be covered.
4. Slip tube over pipe while pipe is suspended immediately before placing in trench.
5. After installing in trench, pull tube ends over joint and overlap.
6. Fasten securely in-place on each side of each joint with joint tape or strapping.
7. Pull loose tube along pipe barrel up snugly around pipe and fasten in-place with joint tape at 3 FT intervals.
8. Completely cover fittings and connections with film held snugly in-place with joint tape or strapping.

H. Install buried piping in accordance with Section 40 05 01.

I. Install restrained joint systems where specified in Section 40 05 01 under specific piping system.

3.2 FIELD QUALITY CONTROL

A. Test piping systems in accordance with Section 40 05 01.

END OF SECTION

SECTION 40 05 51
COMMON REQUIREMENTS FOR PROCESS AND UTILITY VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valving and valving appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Common Work Results for Equipment.
 - 2. Section 09 96 00 - High Performance Industrial Coatings.
 - 3. Section 40 05 01 - Common Work Results for Process Piping.

1.2 REFERENCES

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B1.20.1, Pipe Threads, General Purpose.
 - b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches.
 - b. C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
 - c. C504, Standard for Rubber-Seated Butterfly Valves.
 - d. C507, Standard for Ball Valves, 6 inches through 48 inches (150 mm through 1200 mm).
 - e. C509, Standard for Resilient-Seated Gate Valves for Water Supply Service.
 - f. C550, Standard for Protective Coatings for Valves and Hydrants.
 - g. C606, Standard for Grooved and Shouldered Joints.
 - 4. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. MG 1, Motors and Generators.
 - 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Valve pressure and temperature rating.
 - d. Valve material of construction.
 - e. Special linings.
 - f. Valve dimensions and weight.
 - g. Valve flow coefficient.
- B. Informational Submittals:

1. Test reports if required in the individual valve specification.
- C. Closeout Submittals:
 1. Operation and Maintenance Data:
 - a. Submit in accordance with Section 01 78 23 - Operation and Maintenance Data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to individual valve Specification Sections for acceptable manufacturers.

2.2 MATERIALS

- A. Refer to individual valve Specification Sections.

2.3 FABRICATION

- A. End Connections:
 1. Provide the type of end connections for valves as required in the Piping Schedules presented in Section 40 05 01 or as shown on the Drawings.
 2. Comply with the following standards:
 - a. Threaded: ASME B1.20.1.
 - b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.
 - c. Bell and spigot or mechanical (gland) type: AWWA/ANSI C111/A21.11.
 - d. Soldered: ASME B16.18.
 - e. Grooved: Rigid joints per Table 5 of AWWA C606.
- B. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.
- C. On Insulated Piping: Provide valves with extended stems to permit proper insulation application without interference from handle.
- D. Epoxy Interior Coating: Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Painting Requirements: Comply with Section 09 96 00 for High Performance Industrial Coatings.
- C. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- D. Install valves accessible for operation, inspection, and maintenance.

3.2 VALVE SCHEDULE

- A. Unless shown otherwise on Drawings and drawing schedules, provide valves as follows:

Valve Tag	Service ¹	Type	Size (dia), Inches	Actuator ²	Voltage / Phase ³	Supply Pressure, PSI ⁴	Open / Close or Modulating ⁵	Comment ⁶
PW-VLV-01	PW	Check	24	-	-	-	-	Owner-furnished
PW-VLV-02	PW	Plug	6	M	-	-	O/C	

1. Service defined in section 40 05 01
2. M = Manual
3. Not used
4. Not used
5. O/C = Open/Close, MOD = modulating
6. See Section 01 64 00. See this section for INSTALLATION and Section 40 05 66 for INSTALLATION and QUALITY CONTROL.

END OF SECTION

SECTION 40 05 66

CHECK VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valve installation and quality control.
- B. Related Requirements: Include but are not necessarily limited to:
 - 1. Section 01 64 00 - Owner-Furnished Products.
 - 2. Section 40 05 51 - Common Requirements for Process and Utility Valves.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation – General:
 - 1. Provide check valves at locations shown and indicated in the Contract Documents.
 - 2. Install in accordance with the Contract Documents and manufacturer's written instructions. In event of conflict between the Contract Documents and manufacturer's written instructions, obtain written interpretation or clarification from Engineer.
 - 3. Comply with:
 - a. Section 01 61 03 - Common Work Results for Equipment.
 - b. Section 40 05 01 - Common Work Results for Process Piping.
 - c. Section 40 05 51 - Common Requirements for Process and Utility Valves.
 - 4. Before installing, ensure each check valve is clean and free of dirt and debris.

3.2 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 - 1. Promptly after installing, before installing connecting pipe, verify proper and free operation of check valve.
 - 2. Hydrostatically test check valves together with associated piping.
 - 3. Where check valves are installed in piping conveying potable water or water that will be treated to become potable, disinfect check valves with connected piping.
 - 4. To extent practical, prior to Substantial Completion, verify proper operation of each installed check valve.

END OF SECTION

SECTION 40 71 00

FLOW INSTRUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flow Transmitters:
 - a. Magnetic Flow Meters (Inline).
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 61 13 - Process Control System General Requirements.
- C. Referenced Standards:
 - 1. American Gas Association (AGA):
 - a. Gas Measurement Committee Report #3.
 - 2. American Society of Mechanical Engineers (ASME):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - c. B16.5, Pipe Flanges and Flanged Fittings.
 - d. B626, Standard Specification for Welded Nickel and Nickel-Cobalt Alloy Tube.
 - e. PTC 19.5, Application of Fluid Meters, Part 2.
 - 3. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 4. American Water Works Association (AWWA).
 - 5. National Sanitation Foundation (NSF).
 - 6. US Department of Interior Bureau of Reclamation (USDIBR):
 - a. Water Measurement Manual.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Section 01 64 00 - Owner-Furnished Products.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

3.2 TRAINING

- A. Provide on-site training in accordance with Specification Section 01 75 00.

END OF SECTION

Exhibit A

ANTI-DISCRIMINATION AGAINST ISRAEL ACT CERTIFICATION

Note: Contractor is not required to provide this certification if: (1) the contract has a total potential value of less than one hundred thousand dollars (\$100,000.00) or (2) Contractor employees fewer than ten (10) employees.

Pursuant to RSMo. §34.600, a public entity is prohibited from contracting “to acquire or dispose of services, supplies, information technology, or construction unless the contract includes a written certification that the person or company is not currently engaged in, and shall not, for the duration of the contract, engage in a boycott of:

Goods or services from the State of Israel;

Companies doing business in, or with, Israel

Companies authorized by, licensed by, or organized under the laws of the State of Israel; or

Persons or entities doing business in the State of Israel.”

For a definition of the term “boycott”, please refer to RSMo. §34.600.3. A copy of the statute is attached. This is a requirement of state law and not the City of Fenton.

By signing the below, the Contractor agrees and certifies that it does not currently, and will not for the duration of this contract, engage in any of the types of boycotts listed above and further understands that this is a contractual requirement imposed by the State of Missouri and, therefore, agrees to hold the City harmless and seek no damages of any kind against the City for requiring such a certification, and further agrees that, if Contractor believes such certification violates Contractor’s rights, Contractor will pursue any legal claim against the state of Missouri or any other related entity and expressly covenants not to sue the City as a result of this statutory certification requirement.

CONTRACTOR

By: _____
[signature]

Print Name

Its: _____
[list title]

34.600. Citation of law — public entity contracts, no boycott of goods or services from Israel — definitions — violation, voiding of contract — rulemaking authority. — 1. This section shall be known as the "Anti-Discrimination Against Israel Act".

2. A public entity shall not enter into a contract with a company to acquire or dispose of services, supplies, information technology, or construction unless the contract includes a written certification that the company is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel. This section shall not apply to contracts with a total potential value of less than one hundred thousand dollars or to contractors with fewer than ten employees.

3. As used in this section, the following terms and phrases shall mean:

(1) **"Boycott Israel"** and **"boycott of the State of Israel"**, engaging in refusals to deal, terminating business activities, or other actions to discriminate against, inflict economic harm, or otherwise limit commercial relations specifically with the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel, that are all intended to support a boycott of the State of Israel. A company's statement that it is participating in boycotts of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel, or that it has taken the boycott action at the request, in compliance with, or in furtherance of calls for a boycott of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel shall be considered to be conclusive evidence that a company is participating in a boycott of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel; provided, however that a company that has made no such statement may still be considered to be participating in a boycott of the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel if other factors warrant such a conclusion;

(2) **"Company"**, any for-profit or not-for-profit organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, limited liability company, or other entity or business association, including all wholly owned subsidiaries, majority-owned subsidiaries, parent companies, or affiliates of those entities or business associations;

(3) **"Public entity"**, the state of Missouri or any political subdivision thereof, including all boards, commissions, agencies, institutions, authorities, and bodies politic and corporate of the state created by or in accordance with state law or regulations.

4. Any contract that fails to comply with the provisions of this section shall be void against public policy.

5. The commissioner of administration or his or her designee may promulgate regulations to implement the provisions of this section* so long as they are consistent with this section and do not create any exceptions. Any rule or portion of a rule, as that term is defined in section [536.010](#), that is created under the authority of this section shall become effective only if it complies with and is subject to all of the provisions of [chapter 536](#) and, if applicable, section [536.028](#). This section and [chapter 536](#) are nonseverable and if any of the powers vested with the general assembly pursuant to [chapter 536](#) to review, to delay the effective date, or to disapprove and annul a rule are subsequently held unconstitutional, then the grant of rulemaking authority and any rule proposed or adopted after August 28, 2020, shall be invalid and void.

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (Name and Address):

Kissick Construction Co., Inc.
8131 Indiana, Kansas City, MO 64132

SURETY (Name, and Address of Principal Place of Business):

Liberty Mutual Insurance Company
175 Berkeley Street, Boston, MA 02116 (617) 357-9500

OWNER (Name and Address):

City of Liberty, Missouri
101 East Kansas Street, Liberty, MO 64068

BID

Bid Due Date: April 14, 2026
Description (Project Name— Include Location):
24-Inch Resilient Water Transmission Main and Vault; Project No: 26-UT-001

BOND

Bond Number: N/A
Date: April 14, 2026
Penal sum Five Percent of Amount Bid (Words) \$ 5% of Amount Bid (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

Kissick Construction Co., Inc. (Seal)

Bidder's Name and Corporate Seal

By:

Signature

David Kissick
Print Name

Vice President
Title

Christine McKeown
Signature

Corporate Secretary
Title

SURETY

Liberty Mutual Insurance Company (Seal)

Surety's Name and Corporate Seal

By:

Signature (Attach Power of Attorney)

Rebecca S. Leal
Print Name

Attorney-in-Fact
Title

Attest:

Signature

Witness
Title

Note: Addresses are to be used for giving any required notice.
Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.



POWER OF ATTORNEY

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8213385-674009**

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, C. Stephens Griggs; Charles R Teter, III; Christy M Braille; Danielle R Capps; Debra J Scarborough; Erin C Lavin; Evan D Sizemore; Hillary D Shepard; Jeffrey C Carey; Kellie A Meyer; Kristin D Thurber; Lauren Scott; Mariana Walker; Mary T Flanigan; Patrick T Pribyl; Rebecca S Leal; Tahitia M Fry; Veronica Lawver; Anne M Gliedt; Roxanne Avila; Tamara Bowser; Meredith McMillen; Nancy Singleton; Robert Elliott

all of the city of Kansas City state of MO each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 18th day of March, 2025.



Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: Nathan J. Zangerle
Nathan J. Zangerle, Assistant Secretary

State of PENNSYLVANIA ss
County of MONTGOMERY

On this 18th day of March, 2025 before me personally appeared Nathan J. Zangerle, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2029
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS: Section 12. Power of Attorney.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII - Execution of Contracts: Section 5. Surety Bonds and Undertakings.

Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Nathan J. Zangerle, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 14th day of April, 2026.



By: Renee C. Llewellyn
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

BID FORM

**CITY OF LIBERTY
LIBERTY, MISSOURI
24-Inch Resilient Water Transmission Main and Vault
PROJECT # _____**

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Liberty, 101 E. Kansas Street, Liberty, MO 64068

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
<u>01</u>	<u>03/17/2026</u>
<u>02</u>	<u>04/10/2026</u>
_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

A. LUMP SUM AND UNIT PRICE SCHEDULES:

Base Bid					
Line Item #	Description	Unit	Estimated Quantity	Unit Price	Bid Price
1	Watermain Extension	LF	475	\$ 1,225.00	\$ 581,875.00
2	Road Boring (E Ruth Ewing Rd)	LF	80	\$ 1,704.00	\$ 136,320.00
3	Highway Boring (Mo Hwy 291)	LF	295	\$ 1,580.00	\$ 466,100.00
4	Stream Crossing	LS	1	\$ 71,798.00	\$ 71,798.00
5	Meter and Valve Vault	LS	1	\$ 457,874.00	\$ 457,874.00
BASE BID SUBTOTAL:					\$ 1,713,967.00

*Add Alternate 1					
Line Item #	Description	Unit	Estimated Quantity	Unit Price	Bid Price
AA-1.1	Bypass Pumping	Mo.	1	\$33,875.00	\$33,875.00
ADD ALT 1 BID SUBTOTAL:					\$33,875.00

*Refer to Special Conditions of the Contract *SPC-1.02 Add Alternates* for details on how Add Alternates are to be considered.

TOTAL BID (BASE BID + ADD ALT 1 BID)	\$ 1,747,842.00
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Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
 - C. Contractor's License No.: F00405424 [or] Evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

Kissick Construction Co., INC.

By:

[Signature]



[Printed name]

Lloyd Kissick

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature]



[Printed name]

Peter B. Brown

Title:

PRESIDENT

Submittal Date: _____

Address for giving notices:

8131 Indiana Ave. Kansas City, MO 64132

Telephone Number: 816-363-5530

Fax Number: 816-523-1557

Contact Name and e-mail address: Avery Purtee | apurtee@kissickco.com

Bidder's License No.: LIC-02-26-0016
(where applicable)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.

Kissick Construction Principal Members



Pete Browne

President

pbrowne@kissickco.com

As President and co-founder, Pete leads the senior leadership team for Kissick Construction. With over 35 years of experience and leadership in the construction industry, he has developed a strong reputation for providing innovative solutions to complex projects. From humble beginnings as a small start-up, Kissick Construction has grown to more than 350 employees and over \$100 million in annual revenue.

His project experience includes proposal development and leadership for a wide spectrum of heavy-civil, industrial and structural concrete projects. The scope of these projects includes new construction, renovations, and expansion programs for civil, water and wastewater, power generation, and major manufacturing facilities across the Midwest. Pete continues to maintain direct involvement with the firm's structural concrete and industrial facility improvement projects. He brings significant experience with multi-phase project expansion programs, incorporating the sitework, concrete foundation and underground utilities with the architectural, mechanical and electrical trades. Pete's expertise in planning and managing the construction phasing of critical sequencing in challenging environments has created long-lasting client relationships for the company. His thoughtfulness and "team" attitude result in successful projects that often turn into retention-based clients for the company.

Pete is genuinely proud to champion Kissick Construction's commitment to the community by providing civic leadership, non-profit support, and in-kind services to education, social service, community development, and arts organizations throughout the Kansas City area.

CREDENTIALS

Years of Experience: 40

Industry / Civic Involvement: Heavy Constructors Association of KC (AGC) – President, Board of Directors; Kansas City Area Development Council – Board Member, Kansas City Industrial Council – Board of Directors; Kansas City Public Library – President, Board of Trustees; Nelson-Atkins Museum of Art – Board of Trustees

PROJECT EXPERIENCE HIGHLIGHT

Project: KCPL Iatan Unit 2

Owner: Evergy (formerly KCPL)

Contract Amount: \$124,500,000.00

Completion: 2014

Role on Project: Project Executive



Lloyd J. Kissick, IV

Vice President

lkissick@kissickco.com

A 29-year veteran of Kissick Construction, Lloyd brings a unique perspective to the firm's leadership. As a fifth generation Kissick, he began his construction career as a young field laborer and has progressively grown from laborer, carpenter, and field superintendent into estimating and project management. In early 2019, he joined the senior leadership team of Kissick Construction.

Lloyd has provided facility management services to a variety of clients. His extensive field expertise combined with the ability to coordinate fleet and equipment contracts have supported the ongoing operations for Kissick's clients. His understanding of constructability and focus on schedule and cost is a valuable resource.

Lloyd has always enjoyed being hands-on in the field. His ability to resolve issues and value engineer projects as they are being constructed supports his estimating and project management responsibilities. Lloyd's field expertise, work ethic, integrity, and striving for safety in all aspects of business create value for the client.

CREDENTIALS

Years of Experience: 29

Certifications: OSHA 10 Hour Supervisor Training, OSHA Competent Person Training, OSHA 500 Construction Industry Safety Management, OSHA 501 General Industry Safety Management, 40 Hour HazWoper Training

Industry / Civic Involvement: Associated General Contractors of KC (AGC) – Member, Heavy Constructors of KC – Member, National Utility Contractors of America – Member

PROJECT EXPERIENCE HIGHLIGHT

Project: Missouri American Water Master Service Agreement

Owner: Missouri American Water Company

2024 Total Contract Amount: \$11,339,000.00

2025 To Date Contract Amount: \$6,926,000.00

Role on Project: Project Executive

TRUSTED TEAM. RELIABLE PARTNER.



Kissick Construction Principal Members



David Kissick

Vice President

dkissick@kissickco.com

In his 25 year-career, David has steadily increased his experience and technical capabilities with estimating and project management. His work with utilities includes new installation, tie-ins, and rehabilitation. In addition to utilities, David manages other heavy civil endeavors including mass grading, mass excavation, and concrete placement on a variety of challenging urban projects.

Most recently, David expanded the firm's technical services in the field of trenchless technology for underground utility rehabilitation. Given the condition of the region's aging infrastructure, particularly in urban settings where surface disruptions should be minimized, he recognized a need for a CIPP

lateral lining team to add to Kissick's already diverse list of services. Considering Kissick's outstanding reputation for heavy utility installation and repair, this self-perform tool further adds to the firm's efficient services and unique skill sets.

The legacy of his late father and Kissick Construction co-founder, Lloyd J. "Jim" Kissick III, inspires him to bring a positive and upbeat personality to the company and his project teams. He will continue the legacy of his late father's philosophy of giving back to the community.

CREDENTIALS

Years of Experience: 25

Certifications: OSHA 30

Education: Bachelor of Arts – The University of Missouri – Columbia

Industry / Civic Involvement: The Welcome House – Vice Chair of the Board of Directors, Heavy Constructors Association of KC (AGC) – Former President, National Institute for Construction Excellence (NICE) – Board of Directors

PROJECT EXPERIENCE HIGHLIGHT

Project: KCI Airport Roadway & Airside Wet Utilities

Owner: Edgemoor Infrastructure

Contract Amount: \$34,088,000.00

Completion: 2024

Role on Project: Project Executive



Christine M. Hibdon, CPA

Chief Financial Officer / Corporate Secretary Officer

chibdon@kissickco.com

With a career rooted in public accounting and a deep specialization in construction and real estate, Chris has built more than two decades of financial leadership grounded in precision, strategy, and commitment to long-term organizational success. She began her career as a CPA with CBIZ MHM Public Accounting, where she developed robust technical expertise while serving a diverse portfolio of clients in the construction industry.

In 2004, she expanded her professional reach by co-founding Hoover & Hibdon PC Accounting Firm. For more than 20 years, Kissick Construction was among her key clients, relying on her for monthly closings, annual audit coordination, year-end planning, financial analysis, and comprehensive tax strategies. Her long-standing relationship with the firm created a deep understanding of its operations, mission, and financial needs.

In August 2020, Chris transitioned from external advisor to full-time leader when she joined Kissick Construction as Chief Financial Officer. In this role, she continues to oversee the financial functions she previously supported, while also directing all accounting operations including accounts receivable, accounts payable, and accounting personnel. In addition, she provides executive oversight in financial planning, budgeting, and risk management to support the company's stability, growth, and strategic vision.

With a blend of entrepreneurial experience and industry-specific financial expertise, Chris brings a thoughtful, forward-looking approach to the company's fiscal health and long-term success.

CREDENTIALS

Years of Experience: 26

Certifications: Certified Public Accountant

Education: Bachelor of Science and Business Administration – University of Missouri – Kansas City

Affiliations: Association of International Certified Professional Accountants (AICPA) – Member, Missouri Society of CPAs – Member

TRUSTED TEAM. RELIABLE PARTNER.



<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
<u>PICKUP TRUCKS</u>		
P-069	P-69	2009 Ford F-150 4x4 4 door Gas
P-071	P-71	2010 Ford F-150 4x4 4 door Gas
P-077	P-77	2012 GMC Sierra 1500 4x4 4 door Gas
P-078	P-78	2012 GMC Sierra 1500 4x4 4 door Gas
P-079	P-79	2012 GMC Sierra 1500 4x4 4 door Gas
P-080	P-80	2013 GMC Sierra 2500HD 4x4 4 door Diesel
P-081	P-81	2013 GMC Sierra 2500HD 4x4 4 door Diesel
P-083	P-83	2013 Ford F250 4x4 4door Gas
P-084	P-84	2013 Ford F250 4x4 4door Gas
P-085	P-85	2013 Ford F250 4x4 4door Gas
P-089	P-89	2009 Chevy 2500HD 4x4 reg cab flatbed Gas
P-090	P-90	2014 GMC Sierra 2500HD 4x4 4 door Diesel
P-091	P-91	2013 GMC Sierra 1500 SLT 4x4 4 door Gas
P-093	P-93	2014 GMC Sierra 1500HD 4x4 4 door Gas
P-094	P-94	2015 GMC Sierra 2500 HD 4x4 4 door Gas
P-095	P-95	2015 GMC Sierra 2500 HD 4x4 ext cab Gas
P-096	P-96	2015 GMC Sierra 2500 HD 4x4 4 door Diesel
P-097	P-97	2015 GMC Sierra 2500 HD 4x4 4 door Diesel
P-098	P-98	2015 GMC Sierra 2500 HD 4x4 ext cab Gas
P-100		2015 GMC Sierra 2500 4x4 4door Gas LB
P-101		2015 GMC Sierra 1500 4x4 4door V6 Gas SB
P-102		2015 GMC Sierra 1500 4x4 4door V8 Gas LB
P-103		2015 GMC Sierra 2500 4x4 4door Diesel LB
P-104		2011 Ford F150 4x4 Ext. cab Gas
P-105		2012 Ford F150 4x4 4door Gas
P-108		2007 GMC Sierra 2500 reg cab 4x4
P-111		2012 Ford F250 4x4 ext cab longbed gas
P-113		2011 Ford F250 2WD reg cab gas
P-114		2008 Ford F250 2WD reg cab gas
P-117		2015 Ford F150 Platinum 4x4 4door Gas
P-120		2015 Ford F150 Lariat 4x4 4door gas
P-121		2015 GMC 2500HD 4x4 gas ext cab gas
P-122		2015 GMC 2500HD 4x4 4door gas
P-125		2016 GMC 2500HD 4x4 4door Diesel
P-126		2013 Ford F250 4x4 4door Utility Bed Gas
P-127		2016 GMC Sierra 1500 4x4 4door gas SB
P-128		2016 GMC Sierra 1500 4x4 4door gas SB
P-129		2016 GMC 2500HD 4x4 4door Diesel LB
P-130		2016 GMC 2500HD 4x4 4door Diesel LB
P-131		2016 GMC 2500HD 4x4 4door Diesel LB

<u>New EQ#</u>	Old EQ#	ITEM
P-132		2016 GMC 2500HD 4x4 4door Diesel LB
P-134		2017 GMC Sierra 1500 4x4 4door Gas
P-135		2017 GMC Sierra 1500 4x4 4door Gas
P-136		2017 GMC Sierra 1500 4x4 4door Gas
P-137		2017 GMC Sierra 1500 4x4 4door Gas
P-138		2011 Ford F250 Ext Cab 4x4 gas LB
P-139		2011 Ford F250 Ext Cab 4x4 gas LB
P-140		2012 Ford F250 Ext Cab 4x4 gas LB
P-141		2017 GMC 2500HD 4x4 4door Diesel LB
P-142		2017 GMC 2500HD 4x4 4door Diesel LB
P-143		2011 Ford F250 Ext Cab 4x4 gas LB
P-144		2012 Ford F250 Ext Cab 4x4 gas LB
P-145		2011 Ford F350 Ext Cab 4x4 Gas flatbed
P-146		2017 GMC 2500HD 4x4 4door Gas LB
P-147		2013 Chevy C2500HD 4door Utility bed gas
P-148		2017 GMC 2500HD 4x4 4door Diesel LB
P-149		2017 GMC Sierra 1500 4x4 4door Gas
P-150		2017 GMC Sierra 2500 4x4 4door gas SB
P-151		2014 Ford F250 4door 4x4 Gas
P-152		2014 Ford F250 4door 4x4 Gas
P-153		2018 GMC Sierra 1500 4x4 4door gas
P-154		2018 GMC Sierra 1500 4x4 4door gas
P-155		2019 GMC Sierra 2500 4x4 4door diesel LB
P-156		2018 GMC Sierra 1500 4x4 4door gas
P-157		2018 GMC Sierra 1500 4x4 4door gas
P-159		2019 GMC Sierra 3500 4x4 4door diesel LB
P-160		2019 GMC Sierra 2500 4x4 4door gas SB
P-161		2019 GMC Sierra 2500 4x4 4door diesel LB
P-162		2019 Ford F250 4x4 4door Diesel LB
P-164		2015 Ford F250 4x4 ext cab Gas LB
P-165		2019 GMC Sierra 2500 4x4 4door diesel SB
P-166		2019 Chevy 2500HD 4x4 4door Gas LB
P-168		2017 Ford F150 4x4 4door Gas SB
P-169		2019 Chevy 2500HD 4x4 4door Gas LB
P-170		2019 Chevy 2500HD 4x4 4door Gas LB
P-171		2019 Chevy 2500HD 4x4 4door Gas LB
P-172		2020 GMC Sierra 1500 4x4 4door gas SB
P-173		2020 GMC Sierra 1500 4x4 4door gas SB
P-174		2020 GMC Sierra 2500 4x4 4door diesel LB
P-175		2021 GMC Sierra 2500 4x4 4door diesel LB
P-176		2020 Ford F150 XLT 4x4 4door Gas SB
P-177		2021 GMC Sierra 2500 4x4 4door diesel LB

<u>New EQ#</u>	Old EQ#	ITEM
P-178		2021 GMC Sierra 2500 4x4 4door diesel LB
P-179		2021 GMC Sierra 2500 4x4 4door diesel LB
P-180		2021 GMC Sierra SLT 1500 4x4 4 door gas
P-181		2022 GMC Sierra 2500 4x4 4door Gas SB
P-182		2022 GMC Sierra 2500 4x4 4door Gas SB
P-183		2022 GMC Sierra 2500 4x4 4door Gas LB
P-184		2022 GMC Sierra 3500HD 4x4 4door Diesel LB
P-185		2022 GMC Sierra 3500HD 4x4 4door Diesel LB
P-186		2022 GMC Sierra 3500HD 4x4 4door Diesel LB
P-187		2022 GMC Sierra 3500HD 4x4 4door Diesel LB
P-188		2022 GMC Sierra 3500HD 4x4 4door Diesel LB
P-189		2022 GMC Sierra 3500HD 4x4 4door Diesel LB
<u>TRUCKS:</u>		
T-007	T-7	1991 GMC TOPKICK DUMP TRK (WH)
T-018	T-18	2004 FORD F750 Fuel Truck 1000gal
T-025	T-25	2001 FREIGHTLINER FLS112 WATER TRUCK
T-026	T-26	2003 FREIGHTLINER FL70 DUMP TRUCK (CDL)
T-027	T-27	2006 PETERBILT 335 Fuel Truck 600gal
T-028	T-28	2008 FORD F-350 FLATBED
T-031	T-31	2003 Sterling LT9500 Vacuum Truck 1992 Ford F700 Flatbed Fuel w/700 gal.
T-032	T-32	Tank(diesel)
T-035	T-35	2007 Peterbilt 335 Dump Truck(CDL)
T-036	T-36	2008 Peterbilt 335 Service Truck
T-039	T-39	2007 Peterbilt 335 Dump Truck(CDL)
T-042	T-42	1998 Peterbilt 357 Water Truck w/4000 gal tank
T-045	T-45	2006 CHEVY TC8500 septic/vac truck
T-046	T-46	2007 Sterling LT9500 tri-axle dump
T-047	T-47	2012 Kenworth T370 Rollback Truck
T-048	T-48	1999 International 8100 4000 Gal Water Truck
T-052	T-52	2003 International 2574 Vacuum/jetter truck
T-054	T-54	2004 Ford F350 crew cab flat bed (gas)
T-056	T-56	2008 Ford 4x4 gas engine F350 mechanic truck
T-057	T-57	2015 GMC 3500 4x4 4 door diesel flatbed
T-058	T-58	2006 International 4300 Boiler truck
T-058E		2022 Sullivan Palatek D260UJD4PTOW Air Comp
T-059	T-59	2013 Ford F550 Camera truck
T-060	T-60	2016 Kenworth T800 tandem rollback w/29'bed
T-061	T-61	2015 Kenworth T370 Mechanic Truck(2010 body)
T-063	T-63	2015 Peterbilt 337 Fuel truck 800gal
T-064	T-64	2015 GMC 3500 4x4 4 door diesel flatbed

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
T-065	T-65	2009 GMC 3500 4x4 flatbed Gas
T-067	T-67	2011 Ford F750 2200 gallon water truck
T-068	T-68	2006 Mack CHN613 4000 gallon water truck
T-069	T-69	2003 FREIGHTLINER FL70 DUMP TRUCK(CDL)
T-070	T-70	2003 FREIGHTLINER FL70 DUMP TRUCK(CDL)
T-071	T-71	1998 Volvo W6 19 ton Boom Truck 74' boom
T-073	T-73	2015 Kenworth T800 w/Guzzler NX Vacuum body
T-075	T-75	2005 Freightliner M2-106 4000gallon water truck
T-076	T-76	2016 Kenworth T370 Mechanic Truck
T-077	T-77	2003 International 4400 Single Axle Dump(CDL)
T-078	T-78	2003 International 4400 Single Axle Dump(CDL)
T-079	T-79	2016 GMC 3500 4x4 4 door diesel flatbed
T-080	T-80	2016 GMC 3500 4x4 4 door gas flatbed
T-081	T-81	2007 Peterbilt 378 3500gal Water Truck
T-082	T-82	2015 Ford F750 Single Axle dump(non CDL)
T-083	T-83	2007 International 7500 tandem dump(CDL)
T-084	T-84	2012 Freightliner M2112 tandem dump(CDL)
T-085	T-85	2013 Peterbilt 365 tandem dump(CDL)
T-086	T-86	2008 International 4200 2000gal water truck(CDL)
T-087	T-87	2016 GMC 3500 4x4 4 door gas flatbed
T-089		2007 Peterbilt 378 3500gal Water Truck(CDL)
T-090		2006 Peterbilt 378 3500gal Water Truck(CDL)
T-091		2016 Ford F550 Cues 16' Camera Truck
T-092		2011 Ford F350 Flatbed 2wd gas
T-093		2007 Sterling Acterra Vactor Ramjet water jetter
T-094		2017 Ford F550 dump truck(CDL)
T-095		2018 Kenworth T800 tandem rollback w/29' bed(CDL)
T-096		2018 Kenworth T370 Mechanic Truck(CDL)
T-097		2017 Ford F550 Camera truck
T-098		2011 Peterbilt 367 water truck 4250 gallon(CDL)
T-099		2018 Peterbilt 348 Vacuum/Jetter truck(CDL)
T-100		2005 Ford E450 20 passenger bus(CDL)
T-101		2017 GMC 3500 flatbed gas
T-102		2016 Ford F350 12' flatbed gas
T-104		2018 GMC 3500 4x4 4door Utility bed diesel
T-105		2014 Isuzu NRR w/14' flat/dump bed (non CDL)
T-106		2018 Freightliner M2 2000gal water truck w/cann
T-107		2020 Kenworth T370 Fuel Truck 1000 gal(CDL)
T-108		2018 Freightliner 114SD Vac Truck V6116SMDX(CDL)
T-109		2012 Freightliner 16M Tandem Dump(CDL)
T-110		2014 Freightliner 16M Tandem Dump(CDL)
T-111		2020 F350 flatbed 4door 4x4 diesel

<u>New EQ#</u>	Old EQ#	ITEM
T-112		2019 F550 Mechanic Truck IMT Body
T-113		2021 GMC 3500 4 door 4x4 flatbed diesel
T-114		2011 Peterbilt 367 water truck 4250 gallon(CI
T-115		2022 GMC 3500 4 door 4x4 flatbed diesel
T-116		2012 Kenworth T800 T/A Truck Tractor
<u>UTILITY AND VAN TRAILERS:</u>		
TL-02	TL-2	Utility Trailer 20' SIMT(1995)
TL-05	TL-5	CargoTrailer CM 8'x14' (1996)
TL-07	TL-7	Utility Trailer Haul (1983)
TL-10		Utility Trailer, Morrison (1996)
TL-11		SAW-1 Trailer, Eagle (1992)
TL-15		Tandem Dually EQ trailer,Belh (1993)
TL-19		Tandem Dually EQ trailer (1981)
TL-21		Utility Trailer Faim (1989)
TL-22		Utility Trailer Stav (1997)
TL-23		Utility Trailer Simt (1989)
TL-24		Cargo Trailer Cnmi (2001)
TL-27		Utility Trailer Morris 16" (2002)
TL-28		Utility Trailer Morris 16" (2002)
TL-29		Single Axle Utiltiy W/Ramp Morris (2001)
TL-30		Semi Flatbed Trailer Fruehauf (1987)
TL-33		Cargo Trailer CM tandem(2004)
TL-34		Utility Trailer Load Max(2004)
TL-35		Cargo Trailer,14' tandem(2004)
TL-39		Utility Trailer Load Trail (2006)
TL-40		Utility Trailer Load Trail (2006)
TL-41		Utility Trailer Load Max (2007)
TL-42		Utility Trailer Load Max (2007)
TL-43		Utility Trailer Load Max (2007)
TL-44		Cargo Trailer CM (2007)
TL-45		Single Axle Pressure washerTrailer J&W 10' (200
TL-46		Cargo Trailer Pace single axle (2007)
TL-47		Utility Trailer Load Trail (2007)
TL-48		Cargo Trailer tandem 8x16
TL-49		20' CON-EX TRAILER
TL-50		50' PIPE TRAILER
TL-51		Tandem Dually EQ trailer Hold (2001)
TL-53		1,000 gallon fuel trailer 17'
TL-54		1,000 gallon waste oil trailer 16'4"
TL-55		1,000 gallon waste oil trailer 13'9"
TL-56		Cargo Trailer Tandem Axle CM (2008)

New EQ#	Old EQ#	ITEM
TL-59		Utility Trailer Load Trail (2013)
TL-60		2015 Fabrique Par 25' cargo for LMK Tech work
TL-61		2015 LGS Ca28' cargo for LMK Tech work
TL-62		Utility Trailer,22' Load Trail (2015)
TL-63		Utility Trailer Single Axle W/Ramp Load Trail (2015)
TL-64		Utility Trailer,22' Load Trail (2015)
TL-65		Utility Trailer,22' Load Trail (2015)
TL-66		Utility Trailer,22' Load Trail (2015)
TL-67		Safety Panel Trailer (2015)
TL-68		Utility Trailer,18' Tophat (2015)
TL-69		Utility Trailer,18' Tophat (2015)
TL-70		Cargo Trailer 14' Sure Trac Str714ta2d (2014)
TL-71		John Bean Sewer-jet 704020 (2015)
TL-73		Utility Trailer 22' Load Trail (2016)
TL-74		Utility Trailer 24' Load Trail (2017)
TL-75		Single axle trailer 83"x10' w/ramp Load Trail (2017)
TL-76		Utility Trailer 77"x12' Load Trail (2017)
TL-77		Utility Trailer 22' Load Trail (2017)
TL-78		Utility Trailer 24' Load Trail (2017)
TL-79		Utility/Gooseneck Dually Trailer Elite (2017)
TL-81		Utility Trailer 22' Load Trail (2017)
TL-82		Utility Trailer 24' Load Trail, heavy duty (2018)
TL-84		53' Landoll 440 tilt deck used w/T-103 (2015)
TL-85		Utility Trailer 25' Load Trail, heavy duty (2018)
TL-86		Utility Trailer 22' Load trail,heavy duty(2018)
TL-87		Dump Trailer 7' x 12' LoadTrail tandem(2019)
TL-88		Utility/Gooseneck Dually Trailer Elite (2020)
TL-89		Dump Trailer 7' x 14' LoadTrail tandem(2021)
TL-90		Single Axle 7'x14' Carry On Trailer w/ramp (2021)
TL-91		H&H Cargo trailer 7x16' w/ramp (2022)
TL-92		Load Trail Utility Trailer 12' w/ramp (2022)
TL-93		Load Trail 83"x16 T/A Utility Trailer (2014)
TL-94		H&H Cargo trailer 8x16' w/doors (2022)
		<u>OFFICE TRAILERS:</u>
TO-03	TO-3	DOUBLE WIDE MODULAR- 24' x 60'
TO-05	TO-5	1997 Technical Space 8'x30' office trailer
		<u>FRAC TANKS</u>
FRAC-1		Wichita Frac Tank 500BBL (2006)
FRAC-2		Wichita Frac Tank 500BBL (2006)

<u>New EQ#</u>	Old EQ#	ITEM
		<u>CONNEX BOXES</u>
CNX-01		8 X 20 CONNEX BOX
CNX-02		8 X 20 CONNEX BOX
CNX-03		8 X 40 CONNEX BOX
CNX-04		8 X 20 CONNEX BOX
CNX-05		8 X 20 CONNEX BOX
CNX-06		8 X 20 CONNEX BOX
CNX-07		8 X 10 CONNEX BOX
CNX-08		8 X 20 CONNEX BOX
CNX-09		8 X 20 CONNEX BOX
CNX-10		8 X 40 CONNEX BOX
CNX-11		8 X 40 CONNEX BOX
CNX-12		8 X 40 CONNEX BOX
CNX-13		8 X 20 CONNEX BOX
CNX-14		8 X 20 CONNEX BOX
CNX-15		8 X 40 CONNEX BOX
CNX-16		8 X 20 CONNEX BOX
CNX-17		8 X 20 CONNEX BOX
CNX-18		8 X 20 CONNEX BOX
CNX-19		8 X 20 CONNEX BOX
CNX-20		8 X 40 CONNEX BOX
CNX-21		8 X 20 CONNEX BOX
CNX-22		8 X 20 CONNEX BOX
CNX-23		8 X 40 CONNEX BOX
CNX-24		8 X 40 CONNEX BOX
CNX-25		8 X 40 CONNEX BOX
CNX-26		8 X 20 CONNEX BOX
CNX-27		8 X 20 CONNEX BOX
CNX-28		8 X 20 CONNEX BOX
CNX-29		8 X 20 CONNEX BOX
CNX-30		8 X 40 CONNEX BOX
CNX-31		8 X 40 CONNEX BOX
CNX-32		8 X 40 CONNEX BOX
		<u>BOATS & BARGES</u>
BT-2		2007 TRACKER
BT-2B		1978 Johnson 9.9HP(part of BT-2)
BT-5		2017 Lowe L1648MT Big Jon
BT-5B		2019 Mercury 9.9HP(part of BT-5)
BT-5C		2022 Mercury 20HP (part of BT-5)
BARGE-03	Barge 3	P1-32x8x32 PB sectional barge (2012)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
BARGE-04	Barge 4	P1-32x8x32 PB sectional barge (2012)
BARGE-05	Barge 5	P1-32x8x32 PB sectional barge (2012)
BARGE-06		P1-32x8x32 PB sectional barge (2012)
BARGE-07		P1-32x8x32 PB sectional barge (2012)
BARGE-08		P1-32x8x32 PB sectional barge (2012)

EXCAVATORS

EX-210-1		TB210 Takeuchi Ultra mini-ex (2017)
EX-35-02	PC35-2	PC35MR-2 KOMATSU (2005)
EX-35-03	PC35-3	PC35MR-2 KOMATSU (2006)
EX-35-04	PC35-4	PC35MR-3 KOMATSU (2008)
EX-45-03	PC45-3	PC45MR-3 Komatsu (2014)
EX-45-04		PC45MR-5 Komatsu (2017)
EX-305E-01	305E-1	305E CR series 4 Caterpillar (2012)
EX-305E-02	305E-2	305E CR series 4 Caterpillar (2012)
EX-305E-03	305E-3	305E CR series 4 Caterpillar (2012)
EX-55-01	PC55-1	PC55MR-3 KOMATSU (2012)
EX-55-02	PC55-2	PC55MR-3 KOMATSU (2012)
EX-55-03	PC55-3	PC55MR-3 KOMATSU (2014)
EX-55-04		PC55MR-5 Komatsu (2015)
EX-55-05		PC55MR-5 Komatsu (2017)
EX-55-06		PC55MR-5 Komatsu (2017)
EX-55-07		PC55MR-5 Komatsu (2017)
EX-55-08		PC55MR-5 Komatsu (2017)
EX-55-09		PC55MR-5 Komatsu (2018)
EX-55-10		PC55MR-5 Komatsu (2018)
EX-55-11		PC55MR-5 Komatsu (2019)open ROPS
EX-88-02	PC88-2	PC88MR-8 KOMATSU (2012)
EX-88-03	PC88-3	PC88MR-8 Komatsu (2013)
EX-88-04		PC88MR-10 Komatsu (2014)
EX-88-05		PC88MR-10 Komatsu (2016)
EX-88-06		PC88MR-10 Komatsu (2016)
EX-88-07		PC88MR-8 Komatsu w/thumb (2011)
EX-88-08		PC88MR-10 Komatsu (2017)
EX-88-09		PC88MR-10 Komatsu (2017)
EX-88-10		PC88MR-10 Komatsu w/thumb (2018)
EX-88-11		PC88MR-10 Komatsu (2019)
EX-88-12		PC88MR-10 Komatsu (2019)
EX-88-13		PC88MR-10 Komatsu (2019)
EX-88-14		PC88MR-10 Komatsu (2019)
EX-88-15		PC88MR-10 Komatsu (2020)
EX-138-03	PC138-3	PC138USLC-10 Komatsu (2014)

<u>New EQ#</u>	Old EQ#	ITEM
EX-138-04	PC138-4	PC138USLC-10 Komatsu (2014)
EX-138-05	PC138-5	PC138USLC-10 Komatsu (2014)
EX-138-06	PC138-6	PC138USLC-10 Komatsu (2013)
EX-138-07		PC138USLC-10 Komatsu (2013)
EX-138-08		PC138USLC-11 Komatsu (2016)
EX-138-09		PC138USLC-11 Komatsu (2016)
EX-138-10		PC138USLC-10 Komatsu (2015)
EX-138-11		PC138USLC-11 Komatsu (2017)
EX-138-12		PC138USLC-11 Komatsu (2017)
EX-315-01		315-079X Caterpillar (2021)
EX-160-01	PC160-1	PC160LC-7 Komatsu (2006)
EX-160-02	PC160-2	PC160LC-7EO Komatsu (2007)
EX-170-01		PC170LC-10 Komatsu (2014)
EX-228-02	PC228-2	PC228USLC-10 Komatsu (2014)
EX-228-03		PC228USLC-10 Komatsu (2015)
EX-228-04		PC228USLC-10 Komatsu (2015)
EX-228-05		PC228USLC-10 Komatsu (2015)
EX-228-06		PC228USLC-10 Komatsu (2015)
EX-238-01		PC238USLC-11 Komatsu (2019)
EX-238-02		PC238USLC-11 Komatsu (2021)
EX-300-08	PC300-8	PC300LC-7E0 KOMATSU (2007)
EX-350-01	PC350-1	PC350LC-8 Komatsu (2011)
EX-360-01	PC360-1	PC360LC-10 KOMATSU (2013)
EX-360-02	PC360-2	PC360LC-10 KOMATSU (2013)
EX-360-03	PC360-3	PC360LC-10 KOMATSU (2014)
EX-360-04	PC360-4	PC360LC-10 Komatsu (2015)
EX-360-05	PC360-5	PC360LC-10 Komatsu (2015)
EX-360-06		PC360LC-10 Komatsu (2016)
EX-360-07		PC360LC-10 Komatsu (2016)
EX-360-08		PC360LC-10 Komatsu (2016)
EX-360-09		PC360LCi-11 Komatsu (2019)
EX-360-10		PC360LC-10 Komatsu (2016)
EX-470-01		ZX470LC-6 Hitachi (2019)
EX-490-01	PC490-1	PC490LC-10 Komatsu(2013)
EX-490-02	PC490-2	PC490LC-11 Komatsu (2015)
EX-490-03	PC490-3	PC490LC-10 Komatsu (2014)
EX-490-04		PC490LCi-11 Komatsu (2016)
EX-490-05		PC490LC-11 Komatsu (2016)
EX-490-06		PC490LC-10 Komatsu (2014)
EX-490-07		PC490LC-10 Komatsu (2014)
EX-490-08		PC490LC-11 Komatsu (2020)
EX-490-09		PC490LC-11 Komatsu (2021)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
EX-600-01	PC600-1	PC600LC-7 Komatsu (2005)
EXL-322-01	322-1	CAT 322CL 60' Long Reach (2006)
EXL-324-01	324-1	CAT 324EL 60' Long Reach (2012)
EXL-325-01	325-1	CAT 325BL 60' Long Reach (1997)
EXL-270-01	PC270-1	Komatsu PC270-7 65' Long Reach(2004)

EXCAVATOR ATTACHMENTS

EXA-HB-001	HB-001	Okada ORV250 Breaker for Ultramini(2017)
EXA-VP-001	VP-001	Okada OAC-100 Vibra-plate for Ultramini (2017)
EXA-203-01	203-1	NPK HAMMER(MINI EX) (2004)
EXA-203-02	203-2	NPK HAMMER(MINI EX)GH-2 (2009)
EXA-203-04	203-4	NPK Hammer (MINI EX) PH-2 (2015)
EXA-203-05	203-5	NPK Hammer (MINI EX) PH-2 (2014)
EXA-HB-008		NPK Hammer (MINI EX) PH-3 (2017)
EXA-HB-010		NPK Hammer (MINI EX) PH-2(2018)
EXA-HB-012		NPK Hammer(PC45-55) PH-3(2018)
EXA-65D-01	H65D-1	CAT H65D S Hammer for 305E (2012)
EXA-65D-02	H65D-2	CAT H65D S Hammer for 305E(2012)
EXA-65D-03	H65D-3	CAT H65D S Hammer for 305E(2012)
EXA-GH4-01	GH4-1	NPK HAMMER (PC78/88) GH4 (2012)
EXA-GH4-02	GH4-2	NPK HAMMER (PC78/88) PH4 (2014)
EXA-HB-002	HB-002	NPK Breaker for PC88 (2017)
EXA-HB-003		NPK Breaker for PC88 (2017)
EXA-HB-007		NPK Breaker for PC88 (2011)
EXA-HB-011		NPK Breaker for PC88 PH-4 (2018)
EXA-HB-014		NPK Breaker for PC88 PH-4 (2019)
EXA-207-01	207-1	NPK Hammer (PC138/158) E-207 (2004)
EXA-GH6-01	GH6-1	NPK Hammer (PC138/PC158)GH6(2014)
EXA-GH6-02	GH6-2	NPK Hammer (PC138/158)GH6(2015)
EXA-HB-004		NPK Hammer (PC138/158)GH6 (2017)
EXA-HB-013		NPK Hammer (PC138/158)GH6(2018)
EXA-HB-015		NPK Hammer (PC138/158)GH6(2019)
EXA-HB-009		NPK Hammer (PC228) GH-10 (2017)
EXA-HB-016		NPK Hammer (PC228) GH-10 (2018)
EXA-GH15-1	GH15-1	NPK HAMMER (PC360)GH15 (2008)
EXA-GH15-2	GH15-2	NPK HAMMER (PC360)GH15 (2014)
EXA-HB-005		NPK Hammer (PC360) GH15 (2016)
EXA-HB-006		NPK Hammer (PC360) GH12 (2016)
EXA-GH18-1	GH18-1	NPK Hammer (PC490) GH18 (2006)
EXA-GH18-2	GH18-2	NPK Hammer (PC490) GH18 (2014)
EXA-HB-017		NPK Hammer (PC490) GH18 (2018)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
EXA-G26-01	G26-1	NPK G26 Processor/Pulverisor (1996)
EXA-MCHR-1		Fecon BH80 Tree MulcherPC228/360 (2017)
EXA-C2D-01	C2D-1	NPK C2D Vibraplate for mini-ex (2011)
EXA-C2D-02	C2D-2	NPK C2D Vibraplate for mini-ex (2015)
EXA-C2D-03		NPK C2D Vibraplate for mini-ex (2019)
EXA-VP16-1	CVP16-1	CAT PCHEXCVP16 Vibraplate for Mini-ex
EXA-C4C-01	C4C-1	NPK C4C Vibraplate for PC88 (2008)
EXA-C4C-02	C4C-2	NPK C4C Vibraplate for PC88 (2013)
EXA-C4C-03		NPK C4C Vibraplate for PC88 (2018)
EXA-C4C-04		NPK C4C Vibraplate for PC88(2015)
EXA-C4C-05		NPK C4C Vibraplate for PC88(2019)
EXA-C6C-01	C6C-1	NPK C6C Vibraplate PC138(2015)
EXA-C6C-02	C6C-2	NPK C6C Vibraplate PC138(2016)
EXA-C6C-03		NPK C6C Vibraplate PC138 (2017)
EXA-C6C-04		NPK C6C Vibraplate PC138 (2019)
EXA-C6C-05		NPK C6C Vibraplate PC138 (2018)
EXA-C8C-01		NPK C8C Vibraplate PC228/238 (2015)
EXA-C8C-02		NPK C8C Vibraplate PC228/238 (2014)
EXA-C10-1	C10C-1	NPK C10C Vibraplate PC300(2015)
EXA-C10-2		NPK C10C Vibraplate PC300(2015)
EXA-AUG-01		Auger for PC88 Arrow AD-40-48-25-H(2017)
EXA-AUG-02		Auger for PC138 Premier H130PD (2019)
EXA-KCC-04	KCC-4	Saddle Wheel Compactor attachment PC400
EXA-KCC-05	KCC-5	24" PC400/PC300 compaction Wheel
EXA-KCC-07	KCC-7	Felco 24" PC228/PC138 compaction wheel
EXA-KCC-09	KCC-9	Felco 24" PC138 compaction wheel
EXA-BRG-1		M-4500 BORING ATTACH. 4" MAX
EXA-RPR-1		Ripper Attachment JRB PC300
EXA-RPR-2		Ripper Attachment JRB PC300
EXA-RPR-3		Ripper Attachment Kenco PC400
EXA-RPR-4		Ripper Attachment PC88
EXA-RPR-5		Ripper Attachment PC138 Werk Brau (2019)
EXA-RPR-6		Ripper Attachment, ESCO for PC400/490
EXA-RPR-7		Ripper Werk Brau for PC228(2021)
EXA-SR-1		Kenco 72" Sorting Rake for PC300/360
EXA-SR-2		Kenco 84" Sorting Rake for PC400/490
EXA-SR-3		Quest 60" Skeleton sorting bucket 6" spacing
<u>TRACK LOADERS:</u>		
TC-963-02	963-2	963B CAT TRACK LOADER (1997)
TC-963-05	963-5	963B CAT TRACK LOADER (1998)
TC-963-07	963-7	963C CAT TRACK LOADER (2002)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
TC-963-09	963-9	963D Cat Track Loader W/coupler & forks (2008)
TC-963-10	963-10	963D Cat Track Loader W/coupler & forks (2012)
TC-963-11		963K Cat Track Loader w/ripper,coupler & forks (2
<u>WHEEL LOADERS</u>		
WL-001		Wacker 8085T Telescopic Wheel Loader (2019)
WL-WA200-2	WA200-2	WA200PZ-6 Komatsu (2013)
WL-WA200-3	WA200-3	WA200-7 Komatsu (2015)
WL-WA200-4	WA200-4	WA200-7 Komatsu (2015)
WL-200-5		WA200-7 Komatsu (2015)
WL-WA270-1	WA270-1	WA270-7 Komatsu (2015)
WL-270-2		WA270-7 Komatsu (2016)
WL-WA320-1	WA320-1	WA320-7 KOMATSU (2013)
WL-320-02		WA320-7 KOMATSU (2016)
WL-WA380-1	WA380-1	WA380-7 Komatsu (2014)
WL-380-2		WA380-7 Komatsu (2015)
WL-WA470-1	WA470-1	WA470-7 Komatsu (2014)
WL-WA470-2	WA470-2	WA470-7 Komatsu (2014)
WL-WA500-1	WA500-1	WA500-1L Komatsu(1990)
WL-WA500-2	WA500-2	WA500-1L Komatsu (1988)
WL-966-6	966-6	CAT 966D Wheel Loader (1988)
WL-966-7	966-7	CAT 966K Wheel Loader (2012)
WL-966-8		CAT 966M Wheel Loader (2016)
WL-966-9		Cat 966M Wheel Loader (2021)
WL-972-1		CAT 972M Wheel Loader (2019)
<u>Wheel Loader Attachments</u>		
WLA-01		JRB 72" pipe grapple forks WA200 -WA320
WLA-02		96" Forks for WA200-WA320
<u>BACKHOES:</u>		
BH-580-10	580-10	580M 4wd CASE BACKHOE series 2 (2005)
BH-580-11	580-11	580SM 4wd CASE BACKHOE (2005)
<u>BACKHOE ATTACHMENTS</u>		
BHA-01		Forks for 580 backhoe
BHA-04	305-3	OKADA 580 HOE RAM
<u>SKIDSTEERS</u>		
SS-1845-01	1845-1	1845C CASE UNILOADER (1996)
SS-1845-02	1845-2	1845C CASE UNILOADER (1998)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
SS-1845-04	1845-4	1845C CASE UNILOADER High flow(1998)
SS-S250-01	S250-1	BOBCAT S250 High flow hyd. (2007)
SS-SR240-1		Case SR240 wheeled (2019)
SS-M-01		Toro Dingo TX-525 (2019)
SS-250-03	TL250-3	TAKEUCHI TL250C (2011)
SS-250-06	TL250-6	TAKEUCHI TL250C (2011)
SS-250-12	TL250-12	TAKEUCHI TL250CR (2012)
SS-003	SS-3	TAKEUCHI TL250CR (2012)
SS-004	SS-4	CAT 289C2XPS2C (2013) HI FLOW
SS-005	SS-5	Takeuchi TL12CR (2013)
SS-006	SS-6	Takeuchi TL12CR (2013)
SS-007	SS-7	Takeuchi TL12CR (2013)
SS-008	SS-8	Takeuchi TL12CR (2013) HI FLOW
SS-009	SS-9	Takeuchi TL12CR (2014)
SS-010	SS-10	Takeuchi TL12CR (2014)
SS-011	SS-11	Takeuchi TL12CRH (2014) HI FLOW
SS-012	SS-12	Takeuchi TL12 (2014)
SS-013	SS-13	Takeuchi TL12 (2014)
SS-014	SS-14	Takeuch TL12CR (2014)
SS-015	SS-15	Takeuchi TL12CRP (2014)
SS-016	SS-16	Takeuchi TL12CRH (2015) HI FLOW
SS-017	SS-17	Takeuchi TL12CR (2015)
SS-019	SS-19	Takeuchi TL12 (2015)
SS-020	SS-20	Takeuchi TL12CR (2016)
SS-021	SS-21	Takeuchi TL12V2-CR (2016)
SS-022		Takeuchi TL12(2016) Hi Flow
SS-023		Takeuchi TL12(2017)
SS-024		Takeuchi TL12(2017)
SS-025		Takeuchi TL12(2017)
SS-026		Takeuchi TL12CR (2017)
SS-028		Takeuchi TL12V2CRH (2017) HI FLOW
SS-029		Takeuchi TL12R2-CR (2018)
SS-030		Takeuchi TL12R2-CR (2018)
SS-031		Takeuchi TL12CR (2015)
SS-032		Takeuchi TL12R2-CR (2017)
SS-034		Kubota SVL95-2SHFC(2019)
SS-035		Takeuchi TL12 HiFlow(2015)
SS-036		Takeuchi TL12 (2016)
SS-037		Takeuchi TL12V2 HiFlow (2016)
SS-038		Kubota SVL95-2SHC(2020)
SS-039		Takeuchi TL12V2 HiFlow (2017)
SS-040		Takeuchi TL12V2 (2018)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
SS-041		Takeuchi TL12V2 HiFlow(2019)
SS-042		Takeuchi TL12V2(2020)
SS-043		Takeuchi TL12V2-CR (2021)
SS-044		Takeuchi TL12V2-CRR (2021)
SS-045		Takeuchi TL12V2-CR (2021)
SS-046		Takeuchi TL12V2-CR (2021)
SS-047		CAT 262D3 (2022)
		<u>Skidsteer Attachments</u>
SSA-GF-01	GF-01	Conterra PG5500-60 Grapple Forks
SSA-GF-02	GF-02	Conterra PG5500-60 Grapple Forks
SSA-FRK-01	FRK-01	6' Heavy Duty Skid Forks, Bair Products
SSA-FRK-02	FRK-02	6' Heavy Duty Skid Forks, Bair Products
SSA-FRK-03		6' Heavy Duty Skid Forks, Bair Products
SSA-KCC-08	KCC-8	FFC 11075-022 concrete bucket 3/4 yard
SSA-KCC-11		CAT PC306 24" Cold Planer
SSA-SSM-01	SSM-1	Bradco Brush Hog Attach
SSA-SSM-02	SSM-2	Virnig RBV72 Brush Hog attach (2016)
SSA-SB-2		Express Snow Pusher 10'
SSA-SB-3		Snow Pusher 8'
SSA-HD-1	X12K-1	X12K5 HELICAL DRIVE and TORQUE KIT
SSA-SLT-02	SLT-2	Rotary Offset Silt Fence Plow RS-SFP36
SSA-SLT-03	SLT-3	Push/Pull Silt Plow PP-SFP36
SSA-SLT-04	SLT-4	Push/Pull Silt Plow PP-SFP36
SSA-SLT-05		Push/Pull Silt Plow RPPSFP-36
SSA-SRT-2		84" Skidsteer Sorting Bucket
SSA-SRT-3		Skidsteer Sorting Bucket
SSA-SRT-4		Virnig 84" Sorting bucket
SSA-SRT-5		Bobcat 81" Sorting Bucket
SSA-GPL-1	GPL-1	Bobcat Grapple Bucket 72INDL
SSA-GPL-2		Case Grapple Bucket 76"
SSA-GPL-3		Cat 65SS1GO 78" Grapple bucket
SSA-TR-03		36" Toro Dingo Trencher 22473
SSA-AUG-01	Auger-1	SKIDSTEER AUGER ATTACH.
SSA-AUG-02	Auger-2	SKIDSTEER AUGER ATTACH.
SSA-AUG-03	Auger-3	Skidsteer Auger Attach Bobcat 15C
SSA-AUG-04	Auger-4	Skidsteer Auger McMillen X1975R256
SSA-AUG-06		Skidsteer Auger McMillen X1475(2018)
SSA-AUG-08		Skidsteer Auger Case Model X (2020)
SSA-TIL-1	Tiller-1	Bobcat 62 Tiller Attachment (62")
SSA-45B-1	45B-1	OKADA TOP 45 SKIDSTEER MOUNTED
SSA-356-01	MB356-1	Stanley MB356 skidsteer mounted

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
SSA-SC-1		FFC Soil Conditioner LAF5672H-0022(80")
SSA-GRDR-2	GRDR-2	8' ATI Level Best grader blade w/dual mast lasers
SSA-MCTR-1		Mr Manhole Six Shooter Manhole saw MMSSP 28
SSA-CRMP-1		Straw Crimper RCX-88
SSA-LR-1		Rake-N-Ator 96" Land Rake
SSA-RPR-1		Titan 72" Scarifier/Ripper (2021)
SSA-B-10	B-10	Sweepster Broom - 20572M
SSA-B-13	B-13	Sweepster Broom 20572M
SSA-B-14	B-14	Sweepster Broom 20572M
SSA-B-15	B-15	Sweepster Broom 20572M
SSA-B-16	B-16	Sweepster Broom 20572M
SSA-BRM-01	BRM-1	Sweepster Broom 20572M
SSA-BRM-04	BRM-4	Sweepster Broom 20572M (2014)
SSA-BRM-05	BRM-5	Sweepster Broom 20572M (2014)
SSA-BRM-08	BRM-8	Sweepster Broom 20572M (2015)
SSA-BRM-12	BRM-12	Case Broom 20572M (2016)
SSA-BRM-13	BRM-13	Case Broom 20572M (2016)
SSA-BRM-14	BRM-14	Case Broom 20572M (2017)
SSA-BRM-15	BRM-15	Case Broom 20572M (2017)
SSA-BRM-16	BRM-16	Case Broom 20572M (2017)
SSA-BRM-17		Case Broom 20572M (2017)
SSA-BRM-19		Case Broom(2017)
SSA-BRM-20		Case Broom(2018)
SSA-BRM-21		Case Broom(2018)
SSA-BRM-22		Case Broom(2018)
SSA-BRM-23		Case Broom(2018)
SSA-BRM-24		Case Broom(2018)
SSA-BRM-25		Case Broom (2018)
SSA-BRM-26		Case Broom (2019)
SSA-BRM-27		Case Broom (2019)
SSA-BRM-28		Case Broom (2019)
SSA-BRM-29		Case Broom (2019)
SSA-BRM-30		CAT BU118 Broom(2020)
SSA-BRM-31		John Deere BA84 Angle Broom
<u>Street Sweeper Brooms</u>		
SWPR-B-08	B-8	LAY-MOR 8HC Broom , 8 foot
SWPR-B-11	B-11	Broce RJ350 Broom
SWPR-BRM-2	BRM-2	Sentinel High Dump Sweeper
SWPR-BRM-3	BRM-3	Factory Cat model 34 sweeper
SWPR-BRM-6	BRM-6	Sentinel High Dump Sweeper
SWPR-BRM-7		Sentinel High Dump Sweeper

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
SWPR-01		Broce RJT350 (2010)
		<u>Aggregate, Concrete & Milling</u>
CRS-02	CRS-2	Kleeman MS19Z Screening Plant(2013)
CRS-03	CRS-3	Kolberg Pioneer 11-3050 Conveyer30"x50'(2017)
CRS-04		Peerless 36"x20' Conveyer (2018)
CRS-05		McKloskey 36"x80' Radial Stacking Conveyor (2018)
CRS-GS-01		Shop made grizzly screen 4"minus
CRS-GS-02		Grizzly Screen 3" minus
CRS-KCC-03		Kolberg Pioneer (KPI) GT440 Portable Impact Crusher
BM1300-1		Bomag BM1300/30-2 Milling Machine(2013)
CB-01	CB-1	TEREX AMIDA PB16A concrete buggy
CB-02	CB-2	TEREX AMIDA PB16R concrete buggy
CB-03	CB-3	Multiquip WBH-16F concrete buggy (2016)
CB-04	CB-4	Multiquip WBH-16F concrete buggy (2016)
CB-05		Wacker 3001 wheel dumper(2018)
SAW-01	SAW-1	Husqvarna FS6600/36GB concrete saw
SAW-02	SAW-2	Husqvarna FS5000/26GBE concrete saw
CBKT-1		Gar-Bro 440R 1.5 yard concrete bucket
CBKT-2		Gar-Bro 413G .5 yard concrete bucket
CBKT-3		Gar-Bro 440R 1.5 yard concrete bucket
CBKT-4		Gar-Bro 440R 1.5 yard concrete bucket
CBKT-5		Gar-Bro 454R 2 yard concrete bucket
CBKT-6		Gar-Bro 440R 1.5 yard concrete bucket
CBKT-7		Gar-Bro 440R 1.5 yard concrete bucket
CBKT-8		Gar-Bro 413G .5 yard concrete bucket
		<u>ATVS</u>
RTV-05	RTV-5	John Deere Gator XUV 625I (2014)
RTV-06	RTV-6	John Deere Gator XUV 625I (2015)
RTV-08		Kubota RTV500-H (2016)
RTV-09		Kubota RTV500-H (2016)
RTV-11		Kubota RTV520 (2021)
RTV-12		Kubota RTV520 (2021)
RTV-13		Kubota RTV520 (2022)
RTV-14		Kubota RTV520 (2022)
		<u>COMPACTORS:</u>
RC-RT-01	RT-1	WACKER RT82-SC (2005)
RC-RT-03	RT-3	Wacker RT56SC2 (2011)
RC-RT-04	RT-4	Wacker RT56SC2 (2011)
RC-RT-05	RT-05	WACKER RT82-SC (2012)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
RC-RD11-01	RD11-1	WACKER RD11 Asphalt Roller (2003)
RC-RD11-02	RD11-2	Wacker RD11A Asphalt Roller
RC-120-2	120-2	Bomag BW120SL-5 Asphalt Roller(2015)
RC-120-3		Bomag BW120SL-5 Asphalt Roller(2018)
RC-323-01	CP323-1	CAT CP323C 50" 5ton Pad Foot (2008)
RC-323-02	CP323-2	CAT CP323C 50" 5ton Pad Foot (2002)
RC-156-01	BW156-1	BOMAG 156 PDH-3 PAD FOOT ROLLER(1999)
RC-177-01	BW177-1	BOMAG 177DH3 SMOOTH DRUM (2006)
RC-423-01	CS423-1	CAT CS-423E 8ton Smooth Drum (2008)
RC-8T-001		CAT CS44 66" pad or smooth (2014)
RC-8T-002		CAT CS44B 66" pad or smooth (2019)
RC-11T-01		Bomag BW211DH-5 11ton pad/smooth(2017)
RC-11T-02		Dynapac CA362D 11ton pad/smooth (2012)
RC-11T-03		Dynapac CA2500D 11ton Pad/smooth(2015)
RC-11T-04		Cat CS56B 11ton Pad/Smooth (2016)enclosed ca
RC-PB-01	PB-1	DOUBLE DRUM PULL BEHIND
RC-815-01	815-1	CAT 815F Compactor (2005)
RC-815-03	815-3	CAT 815 Compactor (1975)
RC-815-04	815-4	CAT 815B Compactor (1983)
RC-815-05		CAT 815 Compactor (2021)
<u>MOTOR GRADERS and SCRAPERS</u>		
MG-655-01	655-1	655 Komatsu Motor Grader(2005)
MG-655-02		655-5 Komatsu Motor Grader (2014)
MG-140-01	140-1	CAT 140G MOTOR GRADER(1985)
MG-772-01	772-1	John Deere 772D Motor Grader (2006)
SC-613-1	613-1	CAT 613C II Elevating scraper (2006)
<u>DOZERS</u>		
D-51-01		Komatsu D51PX-24 (2017)
D-61-01	D61-1	Komatsu D61EX-15EO(2012)
D-61-02		Komatsu D61PXi-23 (2016)
D-65-03		Komatsu D65PXi-18 (2019)30" pads
D-750-01	750-1	John Deere 750K 6way XLT(2012)
D-850-01		John Deere 850L Smart Grade(2019)
D-5-01		CAT D5-17VX 6way blade (2021)
D-5-02		CAT D5-17LGVX Smart Grade 6way blade (2021)
D-5-03		
D-6-01	D6-1	CAT D6NXL 6way (2005)
D-6-04	D6-04	CAT D6T XL 6way & ripper (2007) 22"pads
D-6-05		CAT D6NLGPVPA 6way (2015)34"pads

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
D-8-01	D8-1	CAT D8R DOZER (1999)
D-155-02		Komatsu D155EXi-8 w/ripper (2016)
<u>WATER WAGONS</u>		
SC-WWGN-04	WWGN-4	Terex 39 LOT Water Wagon(1966)
SC-WWGN-05	WWGN-5	CAT 627G Water Wagon 8000 gal. KT80D (2004)
SC-WWGN-07	WWGN-7	CAT 631E Water Wagon 10,000 gal Mega Tank(1988)
SC-WWGN-08		Cat 613C Series II Water Wagon 5000 gal Mega Tank (1997)
<u>FORKLIFTS/Vertical & Man Lifts</u>		
FL40VX-01	40VX-1	Yale Veracitor 40VX
FLM-02		Toyota 7FGCU30 5K straight mast (2003)
FL-505-01	505-1	JCB 505 EXT. FORK (1996)
FL-506-01	506-1	JCB 506B EXT. FORK (1997)
FL-6036-01	6036-1	SKYTRAK 6036 EXT. FORK (2001)
FL-644-01	644-1	LULL 644B-42 EXT. FORK (1997)
FL-8042-01	8042-1	SKYTRAK 8042 EXT. FORK (1996)
FL-943-01		Cat TL943C Ext Fork (2014)
FL-943-02		Cat TL943C Ext Fork (2014)
FLM-01	FLM-1	Hyster 110 11K straight
VL-1		Genie GS-3246 38' vertical lift (2007)
ML-1		Genie S45 4WD Manlift w/jib (2007)
<u>HAUL TRUCKS</u>		
OR-M800-1	MST800-1	Morooka MST800VD Track dump (2013)
OR-300-01	HM300-1	Komatsu HM300-1 Articulating (2006)
OR-300-03	HM300-3	Komatsu HM300-1L Articulating(2006)
OR-350-01	HM350-1	Komatsu HM350-2 Articulating(2007)
OR-350-02	HM350-2	Komatsu HM350-2 Articulating(2007)
OR-350-03	HM350-3	Komatsu HM350-2 Articulating(2007)
OR-400-01	HM400-1	Komatsu HM400-2 Articulating (2011)
OR-400-02	HM400-2	Komatsu HM400-3 Articulating (2013)
OR-400-03	HM400-3	Komatsu HM400-2 Articulating (2008)
OR-400-04	HM400-4	Komatsu HM400-5 Articulating (2016)
OR-400-05		Komatsu HM400-3 Articulating (2013)
OR-400-06		Komatsu HM400-5 Articulating (2015)
OR-400-07		Komatsu HM400-5 Articulating (2015)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
OR-400-08		Komatsu HM400-5 Articulating (2016)
OR-400-09		Komatsu HM400-5 Articulating (2016)
OR-400-10		Cat 740B Articulating (2015)
OR-400-11		Cat 740GC-04 Articulating (2019)
OR-400-12		Cat 740GC-04 Articulating (2019)
OR-400-13		Cat 740GC-04 Articulating w/tailgate (2021)
OR-400-14		Cat 740GC-04 Articulating w/tailgate (2021)
OR-EUC-01	EUC-1	Euclid R25 215FD Haul Truck (1984)
OR-EUC-02	EUC-2	Euclid R25 215FD Haul Truck (1979)
OR-EUC-04	EUC-4	Euclid R25 215FD Haul Truck (1980)
OR-EUC-05	EUC-5	Euclid R25 215FD Haul Truck (1979)
OR-EUC-06	EUC-6	Euclid R25 215FD Haul Truck (1979)
OR-EUC-07	EUC-7	Euclid R25 216FD Haul Truck (1979)
OR-EUC-08	EUC-8	Euclid R22 207FD Haul Truck
OR-EUC-09	EUC-9	Euclid R25 215FD Haul Truck (1981)
OR-EUC-10	EUC-10	Euclid R25 216FD Haul Truck (1979)
OR-EUC-12	EUC-12	Euclid R22 207FD Haul Truck
OR-EUC-13	EUC-13	Euclid R22 207FD Haul Truck
OR-EUC-14	EUC-14	Euclid R22 208FD Haul Truck
OR-EUC-15	EUC-15	Euclid R25 215FD Haul Truck
OR-EUC-16	EUC-16	Euclid R25 215FD Haul Truck
OR-EUC-17	EUC-17	Euclid R25 216FD Haul Truck
OR-EUC-18	EUC-18	Euclid R25 216FD Haul Truck
OR-EUC-19	EUC-19	Euclid R25 216FD Haul Truck (1979)
<u>Pipe Bursting/Pit Boring Equipment</u>		
HB100-03		Hammerhead 100XT pipe bursting equip
HB100-04		Hammerhead 100XT pipe bursting equip
PITBORE-1		Grundopit 4060 w/power unit & locator
PB30-01		Hammerhead Portaburst PB30 Gen II
<u>GROUT PUMPS</u>		
GP-03	PE-3	SCHWING SHOTCRETE PUMP WP750-15X
GP-07		Cretefoamer CF-CT-100D(2019)
<u>AIR COMPRESSORS</u>		
AC-03	AC-3	SULLIVAN 185Q PSI AIR COMPESSOR
AC-04	AC-4	CP 185
AC-08	AC-8	Airman 1855
AC-09	AC-9	Ingersoll Rand 185
AC-11		SULLIVAN D185Q11JD
AC-12		SULLIVAN D185PJD (2011)

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
AC-13		SULLIVAN D185PJD (2010)
AC-14		Ingersoll Rand 185
AC-15		Ingersoll Rand 185
AC-16		Ingersoll Rand P185WJD (2007)
AC-17		Ingersoll Rand P185WJD (2006)
<u>TRACTORS</u>		
TR-5100-1	5100-1	Ferris IS5100Z 72" diesel zero turn
TR-4400-1	4400-1	Kubota L4400DT-1 4x4 (2009)
TR-4400-2	4400-2	Kubota L4400DT-1 4x4 (2009)
TR-TRC-1	TRC-1	Caselh FEI45A 4x2 (2011)
TR-TRC-2	TRC-2	John Deere 5100E 4x4 (2015)
TR-TRC-4	TRC-4	DewEze ATM162 12' slope mower(2008)
TR-5050-1	5050-1	New Holland TD5050 4x4 (2012)
TR-TRC-05	TRC-05	John Deere 8630 4x4 290HP
TR-TRC-06	TRC-06	John Deere 9520 4x4 450HP (2005)
TR-TRC-07	TRC-07	John Deere 8760 4x4 300HP (1989)
TR-TRC-08		Scag Patriot Z SPZ61-23FX zero-turn(2017)
TR-TRC-10		Cat Challenger CH55 250HP (1996) 12'8"wide
TR-TRC-11		John Deere 6120M (2020)
TR-TRC-12		MTS 3630T Tractor (2016)
TR-TRC-13		Ferris ISX3300Z 61" zero turn
TR-TRC-14		Ferris ISX3300Z 61" zero turn
<u>Tractor Attachments</u>		
TRA-DSC-1	DSC-1	Amco International Disc WOH2-1828-BG 32"disk
TRA-DSC-2	DSC-2	Cook 13' offset disk
TRA-DSC-3	DSC-3	Rome TACW-16 11' wide 32"disk
TRA-DSC-4		Rome 10'wide 28" disk TAW-20S
TRA-BB-1	BB-1	Reynolds Box Blade LS14
TRA-BB-2	BB-2	Rome RALS -16 Box Bladec(2016)
TRA-BB-3	BB-3	Rome RALS -16 Box Bladec(2016)
TRA-BB-4		LandPride BB1272 6' Box Blade
TRA-LR-1		Behlen Country 72" Landscape Rake
		Rhino 8' finish mower M# FM100
		Woods 7' Finish Mower PRD8400
	"IAT-19"	Rhino FR180 15' flex wing brush hog
	LC-24	John Deere HX15 15' batwing brush hog
TRA-BH-01		LandPride RCR1872 6' brush hog
TRA-BH-02		John Deere FC15R 15' Batwing Mower
IAT-22		LandPride RCR1872 6' brush hog
IAT-23		DR3 TT130003PN fence line trimmer

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
TRA-SP18-1	SP-1810-1	John Deere 1810E 18yd scraper (2005)
TRA-SP18-2	SP-1810-2	John Deere 1810E 18yd scraper (2004)
TRA-SP33-1		MTS 28/33 Scraper (2022)
<u>LIGHT TOWERS/GENERATORS</u>		
LP-4000-01	AL4000-1	AMIDA 4000W LIGHT TOWER
LP-4200-1	MLT4200-1	MAGNUM MLT4200 LIGHT TOWER
LP-04	LP-4	MAGNUM MLT3060K Light Tower(2014)
LP-06	LP-6	MAGNUM MLT3060K Light Tower(2015)
LP-07	LP-7	MAGNUM MLT3060K Light Tower(2015)
LP-08	LP-8	MAGNUM MLT3060K Light Tower(2015)
LP-09	LP-9	Terex RL-4 4000 watt Light Tower(2014)
LP-10		Genie TML-4000N Light Tower(2008)
GEN-03	GEN-3	Multiquip Generator DCA85USJ 65KW/85KVA
GEN-04	GEN-4	Atlas Copco 20KW GENERATOR G36-QAS-25
GEN-05	GEN-5	Wacker G25 20KW (2012)
GEN-07	GEN-7	Atlas Copco QAS-25
<u>WATER PUMPS</u>		
PMP-02	PMP-2	THOMPSON 6" WATER PUMP
PMP-03	PMP-3	THOMPSON 6" WATER PUMP
PMP-07	PMP-7	6" Flygt Sub.Elect. Pump 2151-011
PMP-09	PMP-9	8" Well Submersible Elect. Pump
PMP-11		THOMPSON 6" WATER PUMP
PMP-12		6" Tsurumi elec submersible KRS2-B6
PMP-14		3" ABS elec submersible pump J54HD
PMP-18		4" Tsurumi elec submersible 9T-KRS2-100
PMP-19		Thompson 4" water pump 4TSC-DJDST-45D-M
PMP-21		3" Tsurumi KTVE electric submersible
PMP-22		3" Tsurumi KTV electric submersible
PMP-23		6" Thompson high head pump
PMP-25		6" Pioneer Greenline High head pump(2021)
PMP-26		6" Pioneer Greenline High head pump(2021)
PMP-27		6" pump Cornell Model 6NNT
PMP-28		6" Godwin CD150S water pump(2021)
<u>Cameras</u>		
CAM-01		Orpheus T-66 IBAK camera system
CAM-02		Wanco Surveillance Camera
Lasers/Locators (SEE SMALL EQUIP. LIST)		

<u>New EQ#</u>	<u>Old EQ#</u>	<u>ITEM</u>
		<u>TRENCH BOXES / SAFETY EQUIPMENT</u>
TB-001		10'x36' Speedshore TS-1036DW8-755 (2014)
TB-002		10'x24'x8" PRO HD8-1024D knife (2014)
TB-003		10'X24'X8" GME STEEL knife (2013)
TB-004		10'x24'x6" GME STEEL (2013)
TB-006		10'X24'X6" GME STEEL knife (2013)
TB-007		8'x24'x8" STEEL (1 PANEL)
TB-007		8'x24'x8" STEEL (1 PANEL)
TB-008		8'x24'x6" STEEL knife
TB-009		8'X24'X6" GME STEEL (2013)
TB-010		8'x24'x6" STEEL (knife)
TB-011		8'x20x4" STEEL
TB-012		6'x24'x4" GME STEEL (2013)
TB-013		6'x24'x4" GME STEEL (2013)
TB-014		4'x24'x8" STEEL
TB-015		4'x24'x4" STEEL
TB-016		Speedshore 8'manhole MG-08.5x8-RC-40/40/24
TB-017		Speedshore 8'manhole MG-08.5x8-RC-40/40/24
TB-018		10'x16'x6" Steel
TB-019		8'x10' Steel Pro-tec TS8X10NK4
TB-020		8'16'x4" Steel GME 4M816SKE
TB-021		10'x16'x6" Steel (2014)
TB-100		8'x10'x4" Aluminum ATS-810
TB-101		8'x12'x4" Aluminum 22"-36"
TB-102		8'x12'x4" Aluminum APS-0812
TB-103		8'x12'x4" Aluminum AS-812
TB-108		8'x16'x4" Aluminum AS-816
TB-109		8'x14'x4" Aluminum APS-0814
TB-110		8'x16'x4" Aluminum APS-0816B
TB-111		8'x16'x4" Aluminum APS-0816B
TB-112		8'x16'x4" Aluminum APS-0816B
TB-113		8'x10'x4" Aluminum APS-0810
TB-114		8'x10'x4" Aluminum APS-0810
TBA-001		SPEEDSHORE ARCH SPREADER M# 6AS (201
TBA-002		Speedshore Arch Spreader M# TS-Arch-ADP-UR
TBA-003		ARCH SPREADER
		<u>ROCK BOXES/ ROCK & DUMP HOPPERS</u>
RB-01		Rock Box 60" ID
RB-02		Rock Box 12 yard 80" ID
RB-03		Rock Box 58" ID
RB-04		Rock Box 76" ID

<u>New EQ#</u>	Old EQ#	ITEM
RB-05		Rock Box 60" ID
RB-06		Rock Box 70" ID
RB-09		Rock Box 66" ID
RB-10		HHD-4 Rock Hopper(4yard)
RB-11		Rock Box 60" ID 7.5yard (2017)
RB-12		Rock Box 64" ID
RB-13		Rock Box 72" ID
RB-14		SB39 Self Dumping Bin 4 yard
RB-15		Rock Box 76" ID

WELDERS

W-05	W-5	Whisper Weld, DLW-300ES
W-06	W-6	Miller Trailblazer 302
W-09	W-9	Miller Trailblazer 302
W-10		Miller Trailblazer 325
W-12		Miller Bobcat 250NT
		Miller Bobcat 250NT
		Miller Bobcat 250
		Miller Bobcat 260

Fuel Tanks

FUEL-01	Fuel 1	1000 gallon, gas powered
FUEL-02	Fuel 2	1000 gallon, gas powered
FUEL-03	Fuel 3	500 gallon, gas powered
FUEL-04	Fuel 4	1000 gallon, gas powered
FUEL-05	Fuel 5	1000 gallon, gas powered
FUEL-06	Fuel 6	1000 gallon, gas powered
FUEL-07	Fuel 7	500 gallon, 12 volt powered
FUEL-08	Fuel 8	1000 gallon, gas powered
FUEL-09	Fuel-9	1000 gallon, gas powered
FUEL-10		1000 gallon, gas powered
FUEL-11		300 gallon, 12 volt powered
FUEL-12		300 gallon, 12 volt powered
FUEL-13		500 gallon, 110 volt powered
FUEL-14		1000 gallon, gas powered

PIPE HOOKS/Clamps/Picking Beams

LFT-01	Kenco PH9000
LFT-02	Kenco PH30000
LFT-03	Kenco PH30000
LFT-04	Kenco PH60000
LFT-05	Kenco Jersey Barrier Picker KL12000

<u>New EQ#</u>	Old EQ#	ITEM
LFT-06		Kenco PL2250 12-16" pipe tong
LFT-07		Kenco PL1500, 4-8" pipe tong
LFT-08		Kenco PL2250 12-16" pipe tong
LFT-09		Caldwell 16-5-10 picking beam 5Ton 10'long
LFT-11		Kenco PL2000 8-12" pipe tong (2018)
LFT-12		Kenco PL4500 36-42" pipe tong (2018)
LFT-13		Kenco PL2750 18-24" pipe tong (2019)
LFT-14		Kenco PL7K8.63T13.2 pipe tong 8.5-13" (2020)
LFT-15		Kenco PL7K8.63T13.2 pipe tong 8.5-13" (2020)
LFT-16		Kenco PL7K8.63T13.2 pipe tong 8.5-13" (2020)
LFT-17		Kenco PL7K8.63T13.2 pipe tong 8.5-13" (2020)
LFT-18		Kenco PL1500, 4-8" pipe tong (2020)
LFT-19		Kenco PL1500, 4-8" pipe tong (2020)
LFT-20		Kenco PL1500, 4-8" pipe tong (2020)
LFT-21		Arrow Trailer Spotter/Lift Bar 10K 1000762
LFT-22		Arrow Fork Jib 6K Model CE60-TH
LFT-23		Kenco Fork Lifting Adapter FLA12KU22
LFT-24		Kenco KL9000 Jersey Barrier Picker
<u>MISC EQUIPMENT</u>		
IAT-20		American Jetter 9635 water jetter cart
MISC-02	KCC-1	T-400 air curtain burner (2008)
		Western 8.5' Pro Plus Ultramount snow plow
LC-21		Henderson 8' 8" salt/sand spreader 301SS
IAT-12		Henderson 8' 8" salt/sand spreader 301SS
IAT-15		Henderson 8' salt/sand spreader(for T-40)
SBY-01	SBY-1	Henderson 8' salt/sand spreader
AB-01		K&K Arrow Board (2015)
SPLOW-1		Western 8' snow plow
SPRDR-1		Western 8' Striker salt/sand spreader
STRW-1		Finn B40 Straw Blower on skid (2021)

QUALIFICATIONS STATEMENT

THE INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL TO THE EXTENT
PERMITTED BY LAWS AND REGULATIONS

1. SUBMITTED BY:

Official Name of Firm: Kissick Construction Co., INC.

Address: 8131 Indiana Ave. Kansas City, MO 64132

2. SUBMITTED TO:

City of Liberty, MO

3. SUBMITTED FOR:

Bidding Purposes

Owner: City of Liberty, MO

Project Name: 24-Inch Resilient Water Transmission Main and Vault

TYPE OF WORK:

Civil - Utility

4. CONTRACTOR'S CONTACT INFORMATION

Contact Person: Avery Purtee

Title: Pre-Construction Admin

Phone: 816-572-1938

Email: apurtee@kissickco.com

6. AFFILIATED COMPANIES:

Name: _____

Address: _____

7. TYPE OF ORGANIZATION:

☐ SOLE PROPRIETORSHIP

Name of Owner: _____

Doing Business As: _____

Date of Organization: _____

☐ PARTNERSHIP

Date of Organization: _____

Type of Partnership: _____

Name of General Partner(s): _____

☒ CORPORATION

State of Organization: Kansas

Date of Organization: 07/26/1994

Executive Officers:

- President: Pete Browne

- Vice President(s): Lloyd Kissick

David Kissick

- Treasurer: _____

- Secretary: Christine M. Hibdon

☐ LIMITED LIABILITY COMPANY

State of Organization:

Date of Organization:

Members:

☐ JOINT VENTURE

Sate of Organization:

Date of Organization:

Form of Organization:

Joint Venture Managing Partner

- Name:

- Address:

Joint Venture Managing Partner

- Name:

- Address:

Joint Venture Managing Partner

- Name:

- Address:

8. LICENSING

Jurisdiction: State of Missouri

Type of License: Certificate of Good Standing

License Number: F000405424

Jurisdiction: City of Liberty, MO

Type of License: Contractor - Plumbing

License Number: LIC-02-26-0016

9. CERTIFICATIONS

CERTIFIED BY:

Disadvantage Business Enterprise: _____

Minority Business Enterprise: _____

Woman Owned Enterprise: _____

Small Business Enterprise: _____

Other (_____): _____

10. BONDING INFORMATION

Bonding Company: Liberty Mutual Insurance Company

Address: 175 Berkeley St. Boston, MA 02116

Bonding Agent: Lockton Companies LLC

Address: 444 W 47th St. Ste 900. Kansas City, MO 64112

Contact Name: Rebecca Leal

Phone: 816-960-9631

Aggregate Bonding Capacity: \$250,000,000.00

Available Bonding Capacity as of date of this submittal: \$200,000,000.00

11. CONSTRUCTION EXPERIENCE:

Current Experience:

List on **Schedule A** all uncompleted projects currently under contract (If Joint Venture list each participant's projects separately).

Previous Experience:

List on **Schedule B** all projects completed within the last 5 Years (If Joint Venture list each participant's projects separately).

How many years' experience in the proposed type and size of construction work has your organization had:

(a) As a general contractor 31

(b) As a subcontractor 31

Has firm listed in Section 1 ever failed to complete a construction contract awarded to it?

☐ YES ☒ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Has any Corporate Officer, Partner, Joint Venture participant or Proprietor ever failed to complete a construction contract awarded to them in their name or when acting as a principal of another entity?

☐ YES ☒ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Are there any judgments, claims, disputes or litigation pending or outstanding involving the firm listed in Section 1 or any of its officers (or any of its partners if a partnership or any of the individual entities if a joint venture)?

☐ YES ☒ NO

If YES, attach as an Attachment details including Project Owner's contact information.

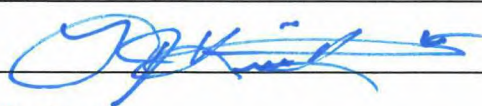
12. EQUIPMENT:

MAJOR EQUIPMENT:

List on **Schedule C** all pieces of major equipment available for use on Owner's Project.

I HEREBY CERTIFY THAT THE INFORMATION SUBMITTED HERewith, INCLUDING ANY ATTACHMENTS, IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME OF ORGANIZATION: Kissick Construction Co., INC.

BY: 

TITLE: Vice President

DATED: 04/13/2026

NOTARY ATTEST:

SUBSCRIBED AND SWORN TO BEFORE ME

THIS 13th DAY OF April, 2026

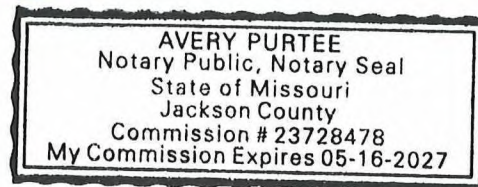
NOTARY PUBLIC - STATE OF Missouri

MY COMMISSION EXPIRES: 05/16/2027



REQUIRED ATTACHMENTS

1. Schedule A (Current Experience).
2. Schedule B (Previous Experience).
3. Schedule C (Major Equipment).
4. Evidence of authority for individuals listed in Section 7 to bind organization to an agreement.
5. Resumes of officers and key individuals of firm named in Section 1.
6. Additional items as pertinent.



CURRENT EXPERIENCE

SCHEDULE A

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
Dykes Branch Interceptor	Name: Laura Benavides Address: 4800 E 63rd St. Kansas City, MO 64130 Telephone: 816.513.0179	Name: Drew Taylor Company: Burns & McDonnell Telephone: 785.845.5588	04/2025	Utility	Active	\$6,980,000.00
Montage Apartments	Name: Mike Hollopeter Address: 11650 S State St. Ste 300, Draper, UT 84020 Telephone: 385.337.0180	Name: James Landrum Company: Olsson Telephone: 402.474.6311	06/2025	Earthwork & Utility	Active	\$7,832,871.25
Cedar Niles Force Main	Name: Jeff Le Mire Address: 120 E Main St. Gardner, KS 66030 Telephone: 913.856.7535	Name: Jacob Cox Company: GBA Telephone: 913.577.8226	10/2025	Utility	Active	\$2,304,288.00
Lawrence Jayhawk Watershed	Name: Nick Hoyt Address: 6 E 6th St. Lawrence, KS 66044 Telephone: 785.424.8139	Name: JEO Consulting Company: JEO Consulting Telephone:	01/2025	Utility	Active	\$22,314,484.01
Parkville Bell Road Water Main Replacement	Name: Mike Voltz Address: 3524 S Leonard Rd. St. Joseph, MO 64503 Telephone: 816.558.5507	Name: McClure Company: McClure Telephone:	01/2026	Utility	Active	\$1,350,637.00
Water Main Replacement Brooklyn Ave KCMO	Name: Joe Putman Address: 4800 E 63rd St. Kansas City, MO 64130 Telephone: 816.513.0211	Name: HNTB Company: HNTB Telephone:	01/2026	Utility	Active	\$9,994,000.00
Trails at Bannister Apartments	Name: Michael Edwards Address: 770 3rd Ave SW. Carmel, IN 46032 Telephone: 317.705.7944	Name: McClure Company: McClure Telephone:	12/2025	Earthwork-Utility-Concrete	Active	\$6,524,321.36

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
NWC/FD Sunflower Fire Station	Name: Public Works Address: 1800 W Old 56 Hwy. Olathe, KS 66061 Telephone: 913.715.8300	Name: Company: Bob D. Campbell & Co Telephone: 816.531.4144	06/2024	Utility	Complete	\$2,086,098.10
Panasonic 5-Mile Sewer	Name: Paul Oberle Address: Telephone: 913.827.2296	Name: Aaron Bresette Company: HDR Engineering Telephone: 816.377.5407	11/2023	Utility	Complete	\$45,611,000.00
30-Inch Quivira Transmission Main	Name: Eric Massen Address: 10747 Renner Blvd. Lenexa, KS 66219 Telephone: 913.895.5719	Name: Company: WaterOne Telephone: 913.895.1800	07/2023	Utility	Complete	\$5,055,897.00
Marr Drive Water Main Replacement Warrensburg Missouri	Name: Matt Hanna Address: 2323 Davis Blvd. Joplin, MO 64804 Telephone: 417-529-9783	Name: Company: Bartlett & West Telephone:	08/2023	Utility	Complete	\$2,305,326.09
SR Waterways Ren 2	Name: Address: 4800 E 63rd St. Kansas City, MO 64130 Telephone:	Name: Drew Taylor Company: Burns & McDonnell Telephone: 785.845.5588	12/2024	Utility	Complete	\$6,885,000.00
Maguire St Water Main Replacement Warrensburg Missouri	Name: Matt Hanna Address: 2323 Davis Blvd. Joplin, MO 64804 Telephone: 417-529-9783	Name: Company: Bartlett & West Telephone:	12/2024	Utility	Complete	\$1,601,631.00
Jackson County Detention Center	Name: Nick Tuggle Address: 1001 Locust St. Kansas City, MO 64106 Telephone: 816.474.8600	Name: Company: DLR Group Telephone:	10/2022	Earthwork & Utility	Complete	\$15,266,166.00

SCHEDULE C - LIST OF MAJOR EQUIPMENT AVAILABLE

[illegible]



April 20, 2026

Andy Noll, P.E.
Director of Utilities
City of Liberty
101 East Kansas Street
Liberty, MO 64068

**RE: 24-Inch Resilient Water Transmission Main and Meter Vault
Recommendation of Award
Project No. 26-UT-001
HDR Project No. 10411916**

Mr. Noll,

HDR reviewed the received bid packets from April 14, 2026, bid opening for the referenced project. Two bids were received. Upon preparation and review of the Tabulation of Bids, HDR has confirmed that the low bidder for the subject project was Kissick Construction Company, Inc. (Kissick) with a total Base Bid of \$1,713,967.00. This is 20% below the second low bidder, MegaKC Corporation, and 22% below the Engineer's estimate. A copy of the Tabulation of Bids is attached.

After discussing and evaluating the bids with City Staff, it was determined that Kissick was the lowest responsible Bidder. We reached out to Kissick to confirm their bid and ability to complete the project in conformance with the contract requirements. Kissick was comfortable with their bid amount and contract period. They did not have any issues with being able to do the work.

HDR has received a list of recent projects and references from Kissick. We have contacted three of them and received exceptional positive feedback and recommendations for their work from McCown Gordon, Missouri American Water, and Johnson County Water District No. 1 (WaterOne). Additionally, HDR was Engineer of Record for one other project listed in Schedule B of the bid. Below is a summary of the reference checks conducted by HDR.

- McCownGordon Construction was the General Contractor for the Johnson County (Kansas) NWCFD Sunflower Fire Station project. The project included utility work and grading for a new fire station and access road located in De Soto, Kansas. McCownGordon expressed that Kissick was great to work with in all trades. The project incurred unforeseen rock conditions during construction and Kissick surveyed the rock quantities and provided those to the GC.
- Missouri American Water is the water service provider for the City of Warrensburg, Missouri. Kissick has completed numerous water main projects for the provider including the Marr Drive Water Main Replacement project and the Maguire St Water Main Replacement project. The latter project included more than 4,000 LF of 8-12" diameter

hdrinc.com

10450 Holmes Road, Suite 600, Kansas City, MO 64131-3471
(816) 360-2700

water main replacement due to full depth road replacement along Hwy 13. Missouri American Water provided a positive overall rating of Kissick and utilizes their services almost exclusively in Warrensburg.

- WaterOne replaced approximately 5,000 LF of 12" water distribution main, 4,500 LF of 30" water transmission main, and 450 LF of service tie-ins located under pavement in Quivira Road in Shawnee, KS. Kissick performed the work using open cut methods and completed the project without any change orders. WaterOne staff provided the onsite inspections and complimented that Kissick was easy to work with and even assisted the Owner with some unforeseen activities during construction including PCCP pipe repair.

At this time, based on all information reviewed, HDR hereby recommends the award of the subject project to Kissick, dependent on available funds. Please let us know if there are any questions or if you would like to discuss any of these comments. I can be reached at 816-347-1105 or eric.farrow@hdrinc.com.

Sincerely,

A handwritten signature in blue ink, appearing to read "Eric Farrow", with a stylized flourish at the end.

Eric Farrow, P.E.
Project Manager

Encl Tabulation of Bids

Cc Mike Brink (HDR)
 File

LIBERTY, MO
24-INCH RESILIENT WATER TRANSMISSION MAIN AND METER VAULT
Project No. 26-UT-001, HDR PN: 10411916
TABULATION OF BIDS
Bid Opening: 4/14/2026, 11:00 am

				Engineer's Estimate	Kissick Construction Company, Inc.		MegaKC Corporation	
Item No.	Description	Quantity	Unit	Price \$	Unit Price \$	Price \$	Unit Price \$	Price \$
1	Watermain Extension	475	LF	\$ 351,636.30	\$ 1,225.00	\$ 581,875.00	\$ 1,232.00	\$ 585,200.00
2	Road Boring (E Ruth Ewing Rfd)	80	LF	\$ 146,154.97	\$ 1,704.00	\$ 136,320.00	\$ 1,379.00	\$ 110,320.00
3	Highway Boring (Mo HWY 291)	295	LF	\$ 610,550.62	\$ 1,580.00	\$ 466,100.00	\$ 1,343.00	\$ 396,185.00
4	Stream Crossing	1	LS	\$ 343,699.92	\$ 71,798.00	\$ 71,798.00	\$ 189,000.00	\$ 189,000.00
5	Meter and Valve Vault	1	LS	\$ 744,958.19	\$ 457,874.00	\$ 457,874.00	\$ 869,000.00	\$ 869,000.00
Base Bid Subtotal				\$ 2,197,000.00		\$ 1,713,967.00		\$ 2,149,705.00
AA-1.1	Bypass Pumping	1	Mo.	\$ -		\$ 33,875.00		\$ 58,298.00
Base Bid + Add Alternate Subtotal				\$ 2,197,000.00		\$ 1,747,842.00		\$ 2,208,003.00