University of Maine System

REQUEST FOR PROPOSALS (RFP)

COMPRESSED NATURAL GAS PURCHASE AGREEMENT

RFP # 38-14

University of Maine at Presque Isle

ISSUE DATE:
May 6, 2014

PROPOSALS MUST BE RECEIVED BY:
June 2, 2014

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Part I – Request for Proposal

REQUEST FOR PROPOSALS

SUMMARY

The University of Maine System (UMS), on behalf of the University of Maine at Presque Isle (UMPI) is soliciting proposals for a compressed natural gas (CNG) fuel gas distribution system from qualified Suppliers through this Request for Proposal (RFP).

Currently, the campus is heated with No. 2 heating oil. Market forecasts of this commodity are difficult to forecast, and past index rate performance have trended steadily upward, making the costs of heating our university buildings during northern Maine winters an ever increasing financial burden on campus operating budgets. Additionally, some of the classroom buildings and the dining commons utilize LP gas for various needs.

It is the intent of this solicitation to provide a turn-key solution to provide a new natural gas utility service for both the heating and general consumption needs of the UMPI campus. The existing No. 2 heating oil system will remain for backup purposes.

SCOPE

The scope of work for this RFP includes the following general scope items of work:

- Decompression station and secured truck staging area, with required service utilities
- Underground HDPE pipe distribution system, with valves and appurtenances
- Regulators, meters, excess flow valves and steel piping
- Dual-fuel burner replacements
- Code-triggered mechanical room upgrades, if required, such as combustion air deficiencies, replacing covers on electrical boxes, etc.
- Backup generator to provide stand-by power to decompression station
- Confirm distribution system design with consumption values shown
- The University will engage a Commissioning Agent to verify the design intent of the system once installed. Contractor will be responsible for performing and providing functional performance tests of the system, and coordinating with the Commissioning Agent as necessary.
- Any and all local, state and federal permitting as required to facilitate the work

Additional detail is provided in subsequent sections of this document, as well as in the following Part sections of the RFP.

The form of this contract will be a Fuel Purchase Agreement (FPA) over a 5 year term, with an option to renew for an additional 5 years. All costs of the installation will be amortized over the duration of the contract and be paid back to the Supplier as part of the cost of fuel delivery, paid on a monthly basis. The goal of the University is to structure any agreements that result from this RFP such that the operating cost to the University to heat the involved facilities will decrease compared with the cost the

University would have otherwise paid if it had not acted. The University seeks to realize that economic benefit beginning in the first year and for every year of operation under an agreement resulting from this RFP.

SITE VISITS

Before submitting a proposal, the Supplier must visit the site(s) of the proposed work to become fully acquainted with existing conditions, facilities, difficulties and restrictions, thoroughly examine and be familiar with the specifications and requirements of the particular campuses included in this RFP and your proposal.

A pre-bid walkthrough will be held on **MONDAY, May 19, 2014 at 1:00 p.m.**

COMMUNICATION WITH THE UNIVERSITY

It is the responsibility of the Supplier to inquire about any requirement of this RFP that is not understood. Responses to inquiries, if they change or clarify the RFP in a substantial manner, will be forwarded by addenda to all parties that have received a copy of the RFP. Addenda will also be posted on our web site, www.maine.edu/strategic/upcoming_bids.php. The University will not be bound by oral responses to inquiries or written responses other than addenda.

Inquiries must be made to:

Rachel Piper
Office of Strategic Procurement
University of Maine System
(207) 780-5633
rachel.piper@maine.edu

EVALUATION CRITERIA

Proposals will be evaluated on many criteria deemed to be in the University's best interests, including, but not limited to cost, technical merit, quality and responsiveness of the proposal, quality of the proposed installation, quality of the proposed delivery method, company history and experience, and best computed overall value to the University.

AWARD OF PROPOSAL

Presentations may be requested of two or more Suppliers deemed by the University to be the best suited among those submitting proposals on the basis of the selection criteria. After presentations have been conducted, the University may select the Supplier which, in its opinion, has made the proposal that is the most responsive and most responsible and may award the Contract to that Supplier. The University reserves the right to waive minor irregularities. Scholarships, donations, or gifts to the University, will not be considered in the evaluation of proposals. The University reserves the right to reject any or all proposals, in whole or in part, and is not necessarily bound to accept the lowest cost proposal if that proposal is contrary to the best interests of the University. The University may cancel this Request for Proposals or reject any or all proposals in whole or in part. The University reserves the right to make multiple awards, a single award or no award(s). Should the University determine in its

sole discretion that only one Supplier is fully qualified, or that one Supplier is clearly more qualified than any other under consideration, a contract may be awarded to that Supplier without further action.

After award of the contract, the University reserves the right to negotiate the final scope of the work with the successful Supplier. This includes, but is not limited to, separation of infrastructure installation costs, engineering design costs, and/ or transportation costs in order to facilitate the project.

AWARD PROTEST

Suppliers may appeal the award decision by submitting a written protest to the University of Maine System's Director of Strategic Procurement within five (5) business days of the date of the award notice, with a copy of the protest to the successful Supplier. The protest must contain a statement of the basis for the challenge.

CONFIDENTIALITY

The information contained in proposals submitted for the University's consideration will be held in confidence until all evaluations are concluded and an award has been made. At that time, the winning proposal will be available for public inspection. Pricing and other information that is an integral part of the offer cannot be considered confidential after an award has been made. The University will honor requests for confidentiality for information of a proprietary nature to the extent allowed by law. Clearly mark any information considered confidential. The University must adhere to the provisions of the Maine Freedom of Access Act (FOAA), 1 MRSA §401, et seq. As a condition of accepting a contract under this section, a contractor must accept that, to the extent required by Maine FOAA, responses to this solicitation, and any ensuing contractual documents, are considered public records and therefore are subject to freedom of access requests.

COSTS OF PREPARATION

Supplier assumes all costs of preparation of the proposal and any presentations necessary to the proposal process.

DEBARMENT

Submission of a signed proposal in response to this solicitation is certification that your firm (or any subcontractor) is not currently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal department or agency. Submission is also agreement that the University will be notified of any change in this status.

PROPOSAL UNDERSTANDING

By submitting a proposal, the Supplier agrees and assures that the specifications are adequate, and the Supplier accepts the terms and conditions herein. Any exceptions should be noted in your response.

PROPOSAL SUBMISSION

A **SIGNED** original and **5 COPIES** of the proposal plus **ONE ELECTRONIC COPY** must be submitted to the Office of Strategic Procurement, University of Maine System, 37 College Avenue, Gorham, Maine 04038, in a sealed envelope by Monday, June 2, 2014 to be date stamped by the Office of Strategic Procurement in order to be considered. Normal business hours are 8:00 a.m. to 5:00 p.m., Monday through Friday. The **ELECTRONIC COPY** of the proposal must be provided on CD or flash drive with the complete proposal submission in Adobe Acrobat PDF format. Suppliers may wish to check http://www.maine.edu/alerts/ to determine if University operations have been suspended. Proposals received after the due date will be returned unopened. There will be no public opening of proposals (see Confidentiality clause). In the event of suspended University operations, proposals will be due the next business day. Suppliers are strongly encouraged to submit proposals in advance of the due date to avoid the possibility of missing the due date because of unforeseen circumstances. Suppliers assume the risk of the methods of dispatch chosen. The University assumes no responsibility for delays caused by any package or mail delivery service. Postmarking by the due date WILL NOT substitute for receipt of proposal. Additional time will not be granted to any single Supplier, however additional time may be granted to all Suppliers when the University determines that circumstances require it. **FAXED OR E-MAIL PROPOSALS WILL NOT BE ACCEPTED**. The envelope must be **clearly** identified on the outside as follows:

Name of Supplier
Address of Supplier
June 2, 2014
RFP #38-14

TIMEFRAME

The timeframe and anticipated milestone schedule is as follows:

RFP Advertisement and Solicitation:	May 6, 2014
RFP Due Date:	June 2, 2014
Anticipated RFP Selection and Award:	June 9, 2014
Permitting Start	June 10, 2014
Engineering Start:	June 10, 2014
Construction Start:	July 15, 2014
Commissioning:	September 15, 2014
Compressed natural gas Consumption Start:	September 30, 2014

INSTALLATION CHARACTERISTICS

The RFP submission should reflect a comprehensive proposal of the necessary engineering, design and infrastructure installation required for safe, code-compliant and successful delivery of the natural gas to the University buildings. This includes, but is not limited to:

- Tanks, meters, piping, gauges and other appurtenances required for on-site fuel storage
- Security system for decompression station, including cameras and recording devices installed at UMPI facilities management building
- Piping in an approved configuration from the storage vessels to the delivery point of each building, to be determined by the University
- Metering devices at each building delivery point for monitoring by University staff, which can be remotely monitored by the campus building management system. Meters should be capable of retrofit to provide data output to the Campus' existing energy or building management system. Current control system is Honeywell EBI DDC controls. Decompression station to provide DDC output to UMPI management system for monitoring purposes.
- Facilities such as pads, driveways, fencing, security provisions, and utilities that may be required to operate the dispensing station
- Dual-fuel burners retrofitted to existing boilers. Burners to have external pump for oil, and no gas pilot direct ignition. Ability to swap fuel sources automatically through Honeywell EBI system is preferred.
- Transportation equipment required for maintaining tank fuel levels to meet University demand requirements
- Stamped professional engineering design documents as required by law for items specific and proprietary to the selected Supplier
- All permits required by local, state, and federal entities
- A Performance Bond in the amount of the proposed infrastructure upgrades must be included in the costs of this proposal
- A Lease Agreement will be executed with the successful Supplier for use of the University land that is to be occupied by the infrastructure improvements. A sample of this agreement is provided in Attachment D. It is anticipated that the rent for the purposes for this scope of work will be $0.00.

The Supplier will be required to design, install, and operate the proposed facilities and shall perform its obligations under this Agreement in full compliance with all Federal, State, and local laws, rules, and regulations, including but not limited to those laws, rules, and regulations stated herein:

- Maine Public Utilities Commission Regulations, Chapters 420 and/ or 421
- 49CFR192 and/ or 49CFR193 of the Code of Federal Regulations
- NFPA 54, 55, 58, and 101
- Maine Uniform Building and Energy Code
- OSHA Safety regulations with regards to construction and operations

- MDOT and Federal regulations regarding transport, delivery, and unloading of heating fuel products
- University of Maine System and Campus requirements and stipulations regarding design and construction on these campuses
- Any other code, regulation or local ordinance that may bear on this scope of work

The University will retain their current heating fuel systems to be used as a secondary source of fuel in the event of an unexpected loss of service from the Supplier's heating fuel system, or if market conditions warrant. The Supplier will install dual-fuel burner elements on the primary heating fuel equipment to accommodate both sources of fuel, as well a necessary piping within the campus buildings from the fuel delivery point to the heating plants. Other equipment, such as laboratory apparatus, cooking appliances and/ or hot water heaters may also be converted.

Any areas of land on the campus(s) occupied by Supplier equipment and infrastructure shall be governed by a Lease Agreement, and made part of the monthly delivery charge.

TERMS AND CONDITIONS

The following terms and conditions apply in a general sense to the future fuel purchase agreements. Attachment C provides additional terms and conditions that will additionally apply to these requirements.

1. Definitions:
    a. **Supplier.** The legal corporation or joint venture who agrees to furnish the infrastructure and Compressed Natural Gas to the UMS by this Agreement.
    b. **Compressed Natural Gas (CNG).** The heating fuel that is proposed by the Supplier and accepted by the UMS. Also synonymous with trucked natural gas.
    c. **Backup Heating Fuel.** The heating fuel and systems currently in place and being used by the UMS at the UMPI campus. These fuel systems to be kept intact and operational during CNG use to serve as a redundant heating source in the event of a CNG outage, or if market conditions warrant.
    d. **Outage.** Any point in time in excess of one (1) hour when the Supplier is unable to deliver Alternative Heating Fuel to the UMS campuses, for reasons other than force majeure. Reimbursement of losses are in effect after one (1) hour of non-service.
    e. **UMS**. The University of Maine System, acting as the agent of the University of Maine Presque Isle.
    f. **UMPI**. The University of Maine Presque Isle.
    g. **Force Majeure.** No Party shall be liable for any failure to perform its obligations where such failure is as a result of Acts of Nature (including fire, flood, earthquake, hurricane or other natural disaster), war, invasion, act of foreign enemies, hostilities (whether war is declared or not), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, nationalization, government sanction, blockage, embargo, labor dispute, strike, lockout or interruption

h. **Heating Season**. For the purpose of the Agreement, the Heating Season shall be between September 15 and May 15 of each year.
i. **Projected Consumption.** The volume of fuel identified is an estimate of past historical data compiled by UMPI.
j. **Cost of Commodity.** The cost of the fuel shall be a composite of all of the costs associated with delivering the fuel to the building meters.
k. **Unit Rate.** For all comparisons pertinent to this agreement, the unit rate of any commodity or cost associated with delivering the commodity shall be expressed in terms of US dollars per million British Thermal Units ($/MMBTU).
    i. No. 2 fuel oil shall be assumed to contain 139,000 BTU/Gallon.
    ii. Propane shall be assumed to contain 91,300 BTU/Gallon.
    iii. Natural Gas shall be measured and billed on an energy basis, expressed in $/MMBTU.
    iv. All fuel heating values and energy contents shall be assume to "Higher Heating Value" (HHV) unless otherwise specified.
l. **Cost of heating oil.** For the purposes of this solicitation and for estimating the costs or savings of proposals hereunder, all parties are to assume the cost of No. 2 heating oil paid by the University will be $3.25 per gallon for the period September 15, 2014 through September 15, 2024.

2. Consumption Requirements
    a. UMS agrees to consume and purchase heating fuel from the Supplier, using the average of the past consumption rates as a baseline for determining the unit rates, as described in Part IV.
    b. Future Commodity Competitive Costs. If, at any such time that the Cost of the Supplier's fuel exceeds the unit rate of #2 heating fuel by 5% for a sustained period of more than 10 business days, the UMS, at its discretion, reserves the right to cease consumption of Suppliers fuel until such time the price drops below the #2 heating fuel rate. The UMS shall not be liable for any lost revenues or operating costs incurred by the Supplier during this period. The UMS does agree to pay for the infrastructure cost unit rate, based on the projected consumption quantity during this period.
    c. Lower Limit. If, at any time, the quantity of fuel demand by the UMS drops by more than 30% below the Projected Consumption levels, the Supplier may propose a rate adjustment increase to be in effect until such time the actual consumption level returns to Projected Consumption level demand.
3. Site preparation. All cost for site preparation will be the responsibility of the Supplier, and reimbursed per the Cost Structure agreement.
4. Future service. The Supplier will install the underground piping infrastructure such that it can be readily adapted for piped natural gas supply, should that commodity become available in the future.
5. Sole Source. Upon execution of this agreement, the UMS agrees to purchase compressed natural gas service only from the Supplier, in accordance with the terms and duration of this

agreement. The UMS reserves the right to purchase other fuel types, such as #2 heating oil, from other Suppliers through other purchase agreements.

6. Cost Structure. Supplier shall be paid a per MMBTU rate for actual fuel consumed, comprised of the following units (all in $/MMBTU):
    a. Commodity Cost, adjusted yearly by Tennessee Zone 6 Index
    b. Transportation Costs, adjusted yearly by NYMEX Energy Index, as published by CME Group Daily Energy Bulletin
    c. Infrastructure Costs. The total cost of the infrastructure installation as required by the RFP shall be amortized over the duration of the Fuel Purchase Agreement, and translated into a unit rate as stated above. This includes both interior and exterior scopes of work.
    d. Operations and Maintenance. The total cost of the anticipated operations and maintenance effort that will be required over the lifetime of the system, amortized over the duration of the Fuel Purchase Agreement, and translated into a unit rate as stated above.
    e. Taxes. Any and all applicable taxes lawfully obligated by the UMS during this transaction shall be included in the monthly invoice from the Supplier. Any taxes due from the Supplier in the prosecution of this contract shall be included in the unit rates described above.
        i. The UMS is a tax-exempt organization.
    f. Profit. The profit margin or service fee shall be identified as a percentage above and beyond the costs and taxes described above.
7. Operations and Maintenance (O&M). The Supplier shall be responsible for all operations and maintenance of the installed infrastructure up to and including the meter station at each building. This includes all jurisdictional inspections, certifications, and licenses that may be required to operate the facility. The costs of any maintenance, overhaul, or required equipment replacement that may be required during the duration of the Fuel Purchase period will be the responsibility of the Supplier at no additional cost to the UMS.
    a. Timing. The Supplier will make arrangements for all necessary O&M activities outside of the Heating Season, to the best of its ability.
    b. Outages. If at any time there is an outage due to O&M activities during the Heating Season where the UMS is required to use its Backup Heating System, the Supplier shall be responsible for the cost difference between the Alternative Heating Fuel and the backup fuel. The UMS and Supplier will jointly investigate and agree on current backup fuel levels prior to taking the compressed natural gas delivery system offline and document levels to the UMS Facilities Director. At the completion of the outage, the UMS and Supplier will review and measure actual fuel consumed, and document consumed volumes and costs of backup fuel consumption to the UMS Facilities Director. Tally of volume consumed multiplied by the delivered unit rate cost difference will be withheld from Supplier's next monthly invoice.

c. Utility consumption costs for utilization of the decompression station, including electrical consumption to power lights and equipment and natural gas utilized for heating during the decompression process, will be borne by UMPI.
d. The Supplier will exercise the backup generator and automatic transfer switch once a month at full load for the duration suggested by the generator manufacturer. Costs of fuel for the generator shall be borne by the Supplier for the duration of the agreement. Supplier to transmit records of all testing and use of the generator to UMPI.

8. Periodic use of Backup Heating Fuel. The UMS, at its discretion, may utilize Backup Heating Fuel for the purpose of consuming old or dated Backup Heating Fuel such that the system will continue to perform reliably.
9. Other Outages. If at any time there is an outage due to reasons other than force majeure, and the UMS needs to engage its Backup Heating Fuel system, the Supplier shall be responsible for the cost difference between compressed natural gas and the backup fuel. The Supplier shall have means in place, or readily available within the Outage duration, to provide electrical power to the installation as required for delivery of the product to the University. The UMS and Supplier will jointly investigate and agree on current backup fuel levels prior as soon as possible after the CNG delivery system is offline, and document levels to the UMS Facilities Director. At the completion of the outage, the UMS and Supplier will review and measure actual fuel consumed, and document consumed volumes and costs of backup fuel consumption to the UMS Facilities Director. Tally of volume consumed multiplied by the delivered unit rate cost difference will be withheld from Supplier's next monthly invoice.
10. Property Lease. All equipment and piping installations will be subject to a land use lease agreement with the UMS. Refer to Part VIII for details.
11. Disposition of Equipment and Infrastructure. At the termination of the Fuel Purchase Agreement, the Supplier will transfer ownership of all equipment, materials, and residual fuel stores to the UMS, including the decompression station equipment.
12. Fuel Purchase Agreement Term. This Agreement will span 5 years, with an option to renew at the end of that term for an additional 5 years at the mutual agreement of both parties. In the event that the University does not wish to extend the agreement, or at the subsequent end of any Agreement, the Supplier will be responsible for purging and "making safe" all facilities and pipelines, at the discretion of the University and any local authorities having jurisdiction. The cost for potential facility "abandonment" at the end of the term to be included in the Supplier's Infrastructure Cost component of this proposal.

Part II – RFP Response Forms and Signature Page

RFP Response Form

QUESTION	RESPONSE	
Company Name?		
Is this a Joint Venture with another corporate entity(s)? If so, please list other names.		
Commodity Cost		$/MMBTU
Transportation Cost		$/MMBTU
Infrastructure Cost (Including Performance Bond)		$/MMBTU
Operations and Maintenance Cost		$/MMBTU
Taxes		$/MMBTU
Profit		$/MMBTU
Total Alternative Fuel Proposal Rate (Sum total of above)		**$/MMBTU**

Unit Pricing for Additional or Omitted Items

Item	Cost (Dollars) / UOM ADDITIONAL		Cost (Dollars) / UOM OMITTED	
Excavation & Removal (onsite material)	$	/CY	$	/CY
Excavation & Backfill (onsite material)	$	/CY	$	/CY
Excavation & Backfill (common fill)	$	/CY	$	/CY
Rock Excavation & Removal (Open)	$	/CY	$	/CY
Rock Excavation & Removal (Trench)	$	/CY	$	/CY
Horizontal Directional Drilling	$	/LF	$	/LF
Remove / Dispose & Replace Unsuitable Material	$	/CY	$	/CY
Backfill & Compact coarse aggregate	$	/CY	$	/CY
Backfill & Compact Sand	$	/CY	$	/CY
Backfill & Compact General Site Fill	$	/CY	$	/CY
Backfill & Compact Structural Fill	$	/CY	$	/CY
Backfill & Compact Gravel Base	$	/CY	$	/CY
Backfill & Compact Grave Subbase	$	/CY	$	/CY
Provide & Place Flowable Fill	$	/CY	$	/CY
Mass Concrete (including formwork)	$	/CY	$	/CY
Reinforced Concrete (including formwork & reinforcing)	$	/CY	$	/CY
Hot Mix Asphalt Binder Course 19mm	$	/SQ YD	$	/SQ YD
Hot Mix Asphalt Top Surface 12.5mm	$	/SQ YD	$	/SQ YD
Slip-form Concrete Curbing	$	/LF	$	/LF
Loam & Seed	$	/SF	$	/SF
6" HDPE	$	/LF	$	/LF
5"HDPE	$	/LF	$	/LF
4" HDPE	$	/LF	$	/LF
2" HDPE	$	/LF	$	/LF

Item	Cost (Dollars) / UOM ADDITIONAL		Cost (Dollars) / UOM OMITTED	
1" HDPE	$	/LF	$	/LF
1" Schedule 40 Steel Piping	$	/LF	$	/LF
¾" Schedule 40 Steel Piping	$	/LF	$	/LF
½" Piping - Any	$	/LF	$	/LF

Building Conversion Breakout Pricing by Building

Building	Cost (Dollars)
Gentile Hall (H,P & E Building)	
Kelley Commons	
Merriman Hall	
Normal Hall – Preble Hall	
South Hall	
President's House	
Wieden Hall	
Emerson Hall	
Folsom Hall	
Physical Plant Building and Kiln	

Supplemental Information

In addition, please provide information relative to your firm's history and experience within the scope of work requested by this RFP, including summaries of similar successfully executed agreements, experience of key personnel on your staff relative to execution of this agreement, and a summary of available resources (personnel, equipment, facilities) that are to be utilized in the successful execution of the Fuel Purchase Agreement.

Signatures

We hereby present our proposal, subject to the items defined above.

_____	_____	_____
Signature	Print Name/ Title	Date

Part III – Project Manual

DIRIGO ARCHITECTURAL
ENGINEERING • CONSTRUCTION MANAGEMENT

University of Maine at Presque Isle

Compressed Natural Gas

Request For Proposal

Project Manual

Issued for Bidding

May 6, 2014

Project No: 14-003

UMS RFP No: 38-14

Professional Seals Page

Architectural Engineer

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Presque Isle, Maine

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UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL

LOCATION MAP

PRESQUE ISLE, MAINE

PROJECT #: 14-003

University of Maine at PRESQUE ISLE
North of Ordinary

Maine's Public Universities
UNIVERSITY OF MAINE SYSTEM

UMS RFP 38-14
ISSUED FOR BID
MAY 6, 2014

ADA COMPLIANT

VICINITY MAP

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SIGNED COPY OF DRAWING ON FILE AT DIRIGO A/E OFFICE

STATE OF MAINE
THOMAS W. PERKINS
No. 11710
LICENSED PROFESSIONAL ENGINEER
4/17/14

DIRIGO ARCHITECTURAL
ENGINEERING ▲ CONSTRUCTION MANAGEMENT

"STATEMENT AND NOTICE OF COOPERATION"
RELEASE OF THESE PLANS CONTEMPLATES FURTHER COOPERATION AMONG THE OWNER, HIS CONTRACTOR AND THE ENGINEER. DESIGN AND CONSTRUCTION ARE COMPLEX. ALTHOUGH THE ENGINEER AND HIS CONSULTANTS HAVE PERFORMED THEIR SERVICES WITH DUE CARE AND DILIGENCE, THEY CANNOT GUARANTEE PERFECTION. COMMUNICATION IS IMPERFECT, AND EVERY CONTINGENCY CANNOT BE ANTICIPATED. ANY AMBIGUITY OR DISCREPANCY DISCOVERED BY THE USE OF THESE PLANS NEED TO BE REPORTED IMMEDIATELY TO THE ENGINEER. FAILURE TO NOTIFY THE ENGINEER COMPOUNDS MISUNDERSTANDING AND INCREASES CONSTRUCTION COSTS. A FAILURE TO COOPERATE BY A SIMPLE NOTICE TO THE ENGINEER RELIEVES THE ENGINEER FROM RESPONSIBILITY FOR ALL CONSEQUENCES. CHANGES MADE FROM THE PLANS WITHOUT CONSENT OF THE ENGINEER ARE UNAUTHORIZED, AND RELIEVE THE ENGINEER OF RESPONSIBILITY FOR ALL CONSEQUENCES ARRIVING OUT OF SUCH CHANGES. IN MANY CASES SUCH RELIEF OF RESPONSIBILITY INCLUDES RELIEF OF OWNER RESPONSIBILITY. THE CONTRACTOR AND HIS SUBCONTRACTORS NEED BE DILIGENT IN THESE MATTERS AT ALL TIMES PRIOR TO AND DURING CONSTRUCTION. REFER TO CONTRACT GENERAL AND SUPPLEMENTAL CONDITION AND SPECIFICATIONS (PROJECT MANUAL) FOR ADDITIONAL DETAILS AND CONDITIONS.

SITE PLAN GENERAL NOTES

1. OWNER:
   UNIVERSITY OF MAINE PRESQUE ISLE
   181 MAIN STREET
   PRESQUE ISLE, ME 04769

   APPLICANT:
   DIRIGO ARCHITECTURAL ENGINEERING LLC
   1071 AUBURN ROAD, SUITE G
   TURNER, ME

2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR THE ELEVATION OF THE EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE UMPI FACILITIES UTILITY PLANS AND DIG SAFE AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO AVOID ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS

3. MAINTENANCE OF EROSION CONTROL MEASURES IS OF PARAMOUNT IMPORTANCE TO THE OWNER AND THE MUNICIPALITY. THE CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL EROSION CONTROL MEASURES SHOWN ON THE PLANS. ADDITIONAL EROSION CONTROL MEASURES SHALL BE INSTALLED IF DEEMED NECESSARY BY ONSITE INSPECTIONS BY THE OWNER, MUNICIPAL CODE ENFORCEMENT OFFICER OR THEIR REPRESENTATIVES AT NO ADDITIONAL COST TO THE OWNER

4. ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE CITY OF PRESQUE ISLE, ME STANDARDS, UNIVERSITY OF MAINE PRESQUE ISLE, AND THESE PROJECT SPECIFICATIONS

5. THIS PROJECT IS SUBJECT TO THE TERMS AND CONDITIONS OF ALL REGULATIONS ADMINISTERED BY THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION, NATIONAL FIRE PROTECTION AGENCY, CODE OF FEDERAL REGULATIONS 49 C.F.R. PART 192 AND 193, INTERNATIONAL FUEL GAS CODE, NATIONAL FUEL GAS CODE, MAINE PUBLIC UTILITIES COMMISSION, AND LOCAL UTILITY COMPANIES

6. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE. THE OWNER, OR AN AUTHORIZED AGENT, MUST BE AVAILABLE AT ALL TIMES DURING CONSTRUCTION

7. WARNING SIGNS, FLAGGING TAPE, ETC MUST BE EMPLOYED AT ALL CONSTRUCTION LOCATIONS THAT MAY CONFLICT WITH UNIVERSITY OPERATIONS AS DEEMED NECESSARY BY OWNER OR OWNER REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER

8. ANY DAMAGE TO PUBLIC OR PRIVATE PROPERTY RESULTING FROM CONSTRUCTION ACTIVITIES SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE

9. PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED AT ALL TIMES DURING CONSTRUCTION TO INSURE INTEGRITY. IF DISTURBED THEY SHALL BE REPLACED BY A SURVEYOR REGISTERED IN THE STATE OF MAINE AT THE CONTRACTOR'S EXPENSE

10. ALL REQUIRED AND NECESSARY INSPECTIONS AND/OR CERTIFICATIONS REQUIRED BY CODES AND/OR UTILITY SERVICE COMPANIES SHALL BE PERFORMED PRIOR TO SCHEDULE AND THE FINAL SERVICE CONNECTIONS

11. ZONING DISTRICT: SUBURBAN RESIDENTIAL ZONE (SRZ)

12. ALL UNDERGROUND UTILITIES BE FIELD LOCATED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR TO PROVIDE FIELD LOCATED UTILITIES ON AN AS BUILT PLAN

13. ALL MATERIALS AND INSTALLATION SHALL MEET ALL REGULATIONS STATED IN GENERAL NOTE 5 ABOVE, CITY OF PRESQUE ISLE, AND ATTACHED SPECIFICATIONS

14. PROVIDE STREET SWEEPING DAILY DURING EARTH MOVING ACTIVITIES. CONTRACTOR TO PROVIDE DUST CONTROL MEASURES AS NEEDED OR DIRECTED BY UMPI

15. TESTING AND INSPECTION SERVICES SHALL BE PROVIDED FOR EARTHWORK, SITE WORK, AND CONCRETE. THIS SCOPE OF WORK WILL BE PAID FOR BY THE OWNER AND COORDINATED BY THE CONTRACTOR

GRADING AND DRAINAGE NOTES

1. THE PROJECT REFERENCE ELEVATIONS ARE BASED ON NAD83

2. ALL EXCESS SOIL MATERIAL EXCAVATED FROM THE PROJECT SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS

3. ALL DISTURBED AREAS NOT TO BE PAVED, SODDED OR OTHERWISE TREATED SHALL RECEIVE 6" LOAM, SEED, FERTILIZER AND MULCH PER MAINE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS
   LOAM: SECTION 615
   SEED: SECTION 618 - "PARK MIXTURE"

4. COMPACTION REQUIREMENTS:

LOCATION	MINIMUM COMPACTION
SUBBASE AND BASE GRAVEL BELOW PAVED OR CONCRETE AREAS	95%
SUBGRADE FILL BELOW PAVED AREAS	95%
TRENCH BEDDING MATERIAL AND SAND BLANKET BACKFILL	95%
BELOW LOAM AND SEED AREAS	90%

   *ALL PERCENTAGES OF COMPACTION SHALL BE OF THE MAXIMUM DRY DENSITY AT THE OPTIMUM MOISTURE CONTENT AS DETERMINED AND CONTROLLED IN ACCORDANCE WITH ASTM D-1557

5. CONTRACTOR SHALL PROVIDE A FINISH PAVEMENT SURFACE FREE OF LOW SPOTS AND PONDING

6. ALL SUBGRADE SURFACES SHALL BE SLOPED AT NO LESS THAN 1% TO PROMOTE ADEQUATE DRAINAGE TOWARDS SUBSURFACE DRAINAGE SYSTEMS

7. PROVIDE STABILIZATION OR SEPARATION GEOTEXTILE FABRIC OVER UNSTABLE SOILS AS REQUIRED

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, INSTALLATION, OPERATION AND REMOVAL OF APPROPRIATE EXCAVATION DEWATERING SYSTEMS, AS WELL AS PROTECTING EXPOSED SUBGRADE SOILS AT NO EXTRA COSTS TO THE OWNER. WATER ENTERING EXCAVATIONS SHALL BE CONTROLLED AND PROMPTLY REMOVED TO AVOID SUBGRADE DISTURBANCE. SURFACE WATER RUNOFF SHALL BE DIRECTED AWAY FROM EXPOSED SOIL BEARING SURFACES

EROSION CONTROL NOTES

1. LAND DISTURBING ACTIVITIES SHALL BE ACCOMPLISHED IN A MANNER AND SEQUENCE THAT CAUSES THE LEAST PRACTICAL DISTURBANCE OF THE SITE

2. PRIOR TO BEGINNING ANY EARTH MOVING ACTIVITIES, THE CONTRACTOR SHALL INSTALL THE PERIMETER SILT FENCES OR EROSION CONTROL BARRIERS AS SHOWN ON C2.2 DETAILS 1 AND 2

3. ALL GROUND AREAS GRADED FOR CONSTRUCTION WILL BE GRADED, LOAMED AND SEEDED AS SOON AS POSSIBLE. PERMANENT SEED MIXTURE SHALL CONFORM TO THE PROJECT

4. PRIOR TO PAVING, THE CONTRACTOR SHALL FLUSH SILT FROM ALL STORM DRAIN LINES

5. THE CONTRACTOR IS CAUTIONED THAT FAILURE TO COMPLY WITH THE SEQUENCE OF CONSTRUCTION, EROSION/SEDIMENT CONTROL PLAN, AND OTHER PERMIT REQUIREMENTS MAY RESULT IN MONETARY PENALTIES. THE CONTRACTOR SHALL BE ASSESSED ALL SUCH PENALTIES AT NO COST TO THE OWNER OR PERMITTEE

6. THE CONTRACTOR WILL REMOVE/CONTROL SEDIMENT TRACKING ONTO THE ABUTTING PUBLIC ROADWAYS AND ADJACENT PROPERTY

SITE PLAN REFERENCE NOTES:

1. CONTRACTOR TO COORDINATE WITH CITY OF PRESQUE ISLE AND UNIVERSITY OF MAINE PRESQUE ISLE FACILITIES MANAGEMENT PRIOR TO LAYOUT OR WORK

GAS LINE GENERAL NOTES

1. MINIMUM COVER AND SEPARATION STANDARDS FOR MAINS AND SERVICE LINES

   A. MAINS IN PUBLIC RIGHT-OF-WAYS. NEW OR REPLACED MAINS LOCATED IN PUBLIC RIGHTS-OF-WAY SHALL BE INSTALLED WITH AT LEAST THIRTY-SIX (36) INCHES OF COVER, EXCEPT WHERE AN OBSTRUCTION PREVENTS THAT INSTALLATION DEPTH OR WHEN PIPE IS INSERTED INTO EXISTING PIPE

   B. SEPARATION FROM SUBSURFACE STRUCTURES

      i. WHERE THERE IS INTERFERENCE WITH OTHER SUBSURFACE STRUCTURES, INCLUDING OTHER UTILITIES, THE PIPE SHALL BE LAID AT A CLEARANCE DISTANCE OF NOT LESS THAN TWELVE (12) INCHES AWAY FROM SUCH STRUCTURES UNLESS ADEQUATE SHIELDING IS PROVIDED TO PROTECT THE GAS PIPELINE AND THE OTHER UTILITY.

      ii. ANY INTERFERING STRUCTURE WHICH PROVIDES A SPACE IN WHICH AN EXPLOSIVE ATMOSPHERE MIGHT ACCUMULATE IN THE EVENT OF A LEAK SHALL BE AVOIDED WHERE POSSIBLE AND PREFERENCE SHALL BE GIVEN TO CROSSING OVER RATHER THAN UNDER SUCH STRUCTURES

   C. SHALLOW MAINS. WHEN THE INSTALLED PIPE HAS LESS THAN 24 INCHES OF COVER, IT SHALL BE PROTECTED WITH SHIELDING THAT CONFORMS WITH GAS INDUSTRY STANDARDS BOTH IN RESPECT TO MATERIAL AND MANNER OF INSTALLATION.

2. IF THE VALVE IS INSTALLED IN A BURIED BOX OR ENCLOSURE, THE BOX OR ENCLOSURE SHALL BE INSTALLED TO AVOID TRANSMITTING EXTERNAL LOADS TO THE MAIN AND SERVICE LINE. THE VALVE BOX OR ENCLOSURE SHALL BE MAINTAINED TO BE READILY ACCESSIBLE

3. VALVES AT REGULATOR STATIONS

   A. EACH REGULATOR STATION CONTROLLING FLOW OR PRESSURE OF GAS IN A DISTRIBUTION SYSTEM SHALL HAVE A VALVE INSTALLED ON THE INLET PIPING AT A DISTANCE FROM THE REGULATOR STATION SUFFICIENT TO PERMIT OPERATION OF THE VALVE DURING AN EMERGENCY THAT MIGHT PRECLUDE ACCESS TO THE STATION

   B. ALL REGULATOR STATIONS SHALL HAVE EXTERIOR SHUTOFF VALVES OR A SECTIONALIZING VALVE INSTALLED ON ALL LINES ENTERING AND LEAVING REGULATOR STATIONS FOR USE IN AN EMERGENCY TO STOP GAS FLOW. SUCH VALVES SHALL BE INSTALLED AT A READILY ACCESSIBLE LOCATION WHERE THEY CAN BE OPERATED IN AN EMERGENCY

   C. EXTERIOR SHUTOFF VALVES SHALL BE LOCATED A MINIMUM OF FORTY (40) FEET FROM THE REGULATOR STATION. VALVES SHALL BE LOCATED A MINIMUM OF 100 FEET FROM THE REGULATOR STATION

   D. A CHECK VALVE MAY BE USED IN LIEU OF AN EXTERIOR SHUTOFF VALVE ON DOWNSTREAM PIPING IF LOCATED A MINIMUM OF FORTY (40) FEET FROM THE REGULATOR STATION.

   E. THE EXTERIOR SHUTOFF VALVE MAY BE A SECTIONALIZING VALVE

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL
PRESQUE ISLE MAINE

SIGNED COPY OF DRAWING ON FILE AT DIRIGO A/E OFFICE

STATE OF MAINE
THOMAS W. PERKINS
No. 11710
LICENSED PROFESSIONAL ENGINEER

4/17/14

CIVIL/SITEWORK NOTES

REV.	DATE	DESCRIPTION
1	3/25/14	ISSUED FOR REVIEW
2	4/17/14	ISSUED FOR BID

DRAWN BY: CGB CHECKED BY: TWP

PH: (207) 225 - 3020
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DIRIGO ARCHITECTURAL
ENGINEERING • CONSTRUCTION MANAGEMENT
EM:tperkins@dirigoae.com W:www.dirigoae.com

DATE: 4/17/14

PROJECT NO. 14-003

SHEET NO.

C0.0

ALL UNDERGROUND PRIMARY DISTRIBUTION LINES IS 12470/7200 UNDERGROUND
ALL BUILDING SERVICE (OVERHEAD AND UNDERGROUND) ARE 120/208 WYE
TENNIS COURTS, SMITH HOUSE, AND MERRIMAN HOUSE ARE 120/240 SINGLE
AS MEASURED BY MAINTENANCE – MAY 2009

EXISTING LEGEND

- OE — OVERHEAD ELECTRIC
- OEP — OVERHEAD ELECTRIC PRIMARY
- UES — UNDERGROUND ELECTRIC (120/208 V)
- UEP — UNDERGROUND ELECTRIC PRIMARY
- STREET OR WALK LAMP AND POLE (12470/7200V)
- ELECTRIC UTILITY POLE (120/208V)
- PRIMARY TRANSFORMER AND PAD
- HH — ELECTRICAL HANDHOLD
- ELEC. SWITCH BOX
- J — JUNCTION BOX
- 1 — LIGHTING CIRCUIT NUMBER
- POLE WITH LAMP
- SANITARY SEWER
- STORM DRAINS
- WATER
- CB — CATCH BASIN
- MH — MANHOLE
- FUEL TANK
- FUEL LINES
- HYD — FIRE HYDRANT
- G.V. — SHUTOFF VALVE
- UC — UNDERGROUND CONDUIT
- UT — TELEPHONE
- U.G. HEATING LINES
- TREELINE

PROPOSED LEGEND

- G — GAS MAIN IN TRENCH
- GAS MAIN – HORIZ. DIRECTIONAL DRILL
- UED — PROPOSED UNDERGROUND DATA (CAT 6)
- UES — PROPOSED UNDERGROUND ELECTRIC
- PROPOSED SIDEWALK
- SHUT OFF VALVE (40 FT MIN. FROM REGULATOR LINE OF SITE DISTANCE –TYP.)
- ISOLATION VALVE ON MAIN
- 4" PVC CONDUIT FOR IT

NOTE: REFERENCE C0.0 FOR GAS LINE GENERAL NOTES

DECOMPRESSION STATION
1 C1.2
MAIN SPUR 5" HDPE
MAIN LOOP 5" HDPE
PROP. SIDEWALK
PROP. SLIP FORM CURBING
1 C1.3
5 C2.1 TYP.
6 C1.2 TYP.
4" PVC CONDUIT FOR IT CABLING
ALL BUILDING SERVICE LINES 1" HDPE (TYP.)
SEE MECHANICAL DRAWINGS - TYPICAL

SOCCER FIELD
TENNIS COURTS
KILN
FACILITIES SUPPORT BUILDING
C. GENTILE HEALTH & PHYS. ED. BUILDING
PULLEN HALL
WIEDEN HALL
LIBRARY
FOLSOM HALL
PREBLE HALL
SOUTH HALL
NORMAL HALL
PARK HALL
EMERSON HALL
MERRIMAN HALL
KELLEY COMMONS
CAMPUS CENTER
RESIDENCE
NORTON MUSEUM
MAINTENANCE BLDG.
COMMUTER PARKING LOT
UNIVERSITY DRIVE
STREAM
BASKETBALL COURT
PARKING

DEP SITE # 5441 U.G. FUEL TANK 6,000 GAL. 29.5'L x 6.25' dia.
DEP # 20994 8,000 gal U.G. OIL TANK
300 GAL LP GAS TANK
330 GAL DIESEL TANK
2-330 GAL #2 FUEL OIL TANKS
ABOVE GROUND DIESEL TANK 500 GAL 15KV SWITCH SW-3
EMERGENCY GEN XFORMER
7'-2" CIRCULAR PULLBOX
DEP SITE# 5441 TANK # 9 8,000 GAL. U.G. OIL TANK 100 GAL PROPANE TANK
DEP SITE# 5441 TANK # 11 U.G. OIL TANK 10,000 GAL
DEP # 5441 U.G.TANK 10,000 GAL
DEP# 5441 U.G. OIL TANK 6,000 GAL
DEP # 5441 5,000 GAL
RIM 535.7 INV OUT 522.9
RIM 515.1 INV IN 509.2 INV OUT 509.1
RIM 511.3 INV 507.2
RIM 509.2 INV 497.7
RIM 493.1 INV. 484.0
8" VC TO CITY SEWER IN HAINES ST
STEAM & CONDENSATE LINES
STEAM, CONDENSATE & FUEL LINES

SITE UTILITY PLAN 1 C1.1
22X34 SCALE: 1"=60'-0"
11X17 SCALE: 1"=120'-0"

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL

PRESQUE ISLE MAINE

SIGNED COPY OF DRAWING ON FILE AT DIRIGO A/E OFFICE

STATE OF MAINE — THOMAS W. PERKINS No. 11710 — LICENSED PROFESSIONAL ENGINEER

4/17/14

SITE UTILITY PLAN

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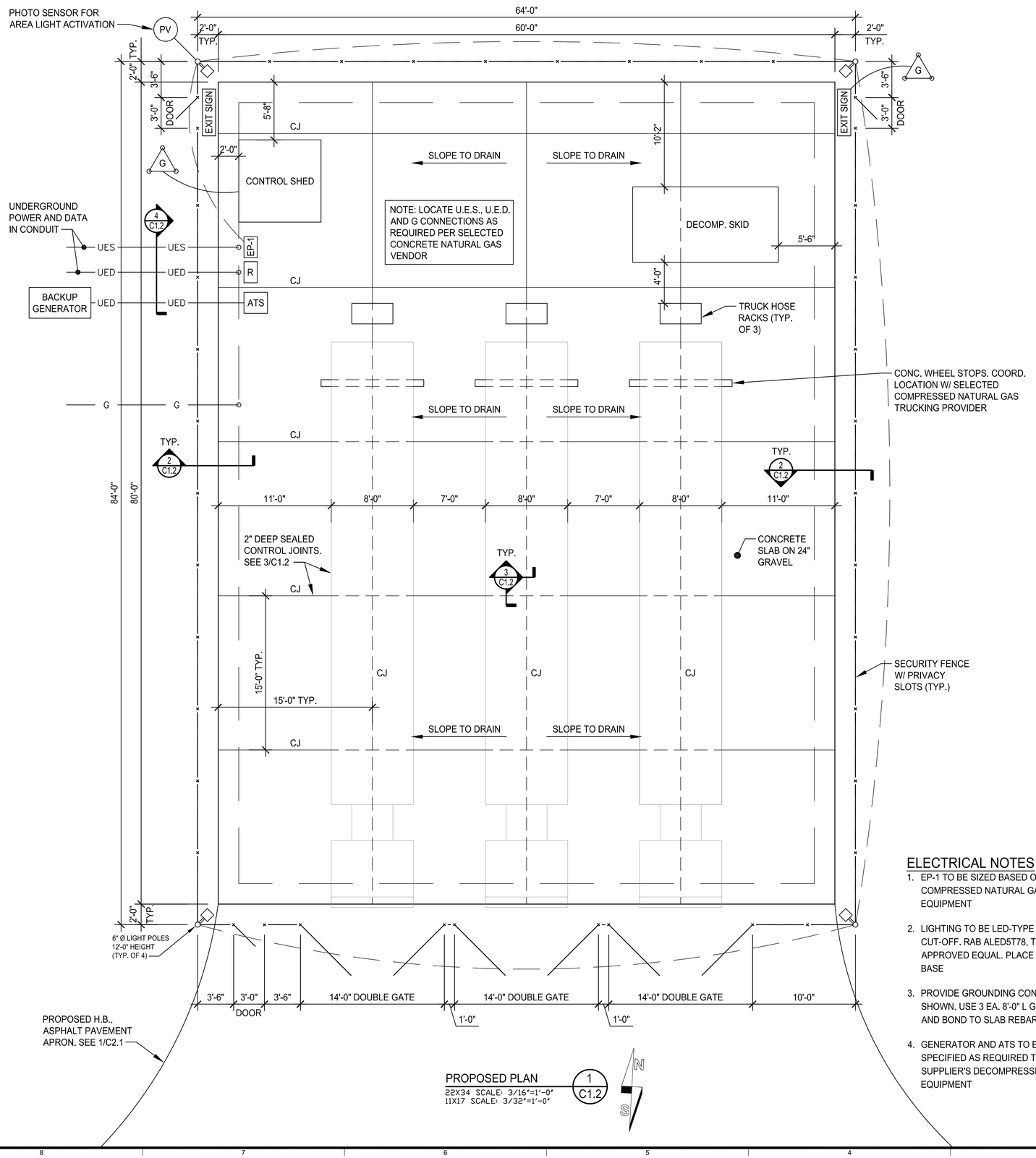
EM:tperkins@dirigoae.com W:www.dirigoae.com

DATE: 4/17/14

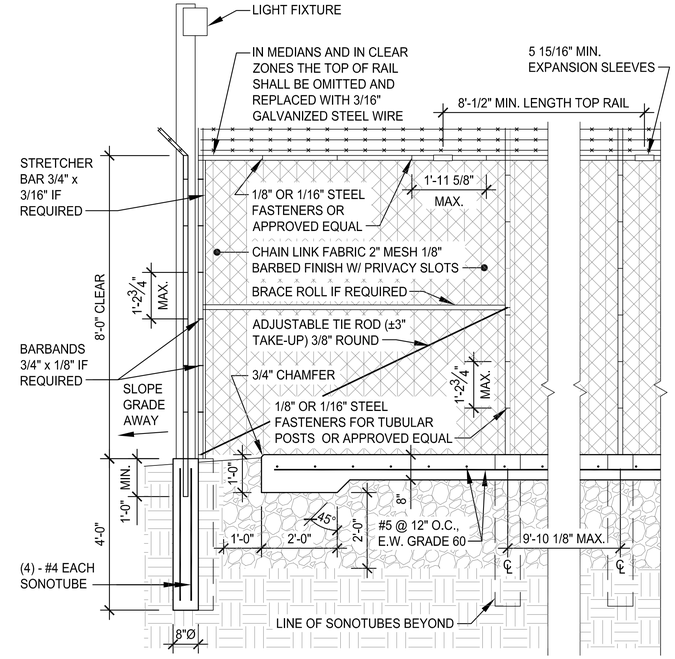
PROJECT NO. 14-003

SHEET NO.

C1.1



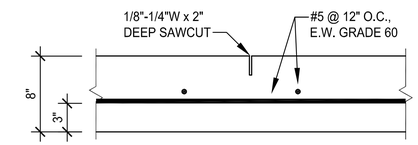
PROPOSED PLAN 1 C1.2
22X34 SCALE: 3/16"=1'-0"
11X17 SCALE: 3/32"=1'-0"



DECOMPRESSION STATION SLAB + ENCLOSURE SECTION 2 C1.2
22X34 SCALE: 3/16"=1'-0"
11X17 SCALE: 3/32"=1'-0"

CONCRETE CONTROL NOTES

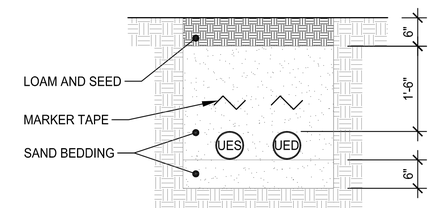
1. BROOM FINISH
2. 4000 PSI CONC. 3/4" AGG. - 5% AIR ENTRAINMENT
3. SEE SPECIFICATIONS FOR Qc AND FURTHER MATERIAL AND PLACEMENT REQUIREMENTS
4. COORDINATE W/ DECOMPRESSION SKID SUPPLIER FOR PLACEMENT AND LOCATION OF ALL REQUIRED PENETRATIONS, INSERTS, ANCHOR BOLTS, BONDOUTS, ETC.



CONTROL JOINT DETAIL 3 C1.2
22X34 SCALE: 1 1/2"=1'-0"
11X17 SCALE: 3/4"=1'-0"

ELECTRICAL NOTES

1. EP-1 TO BE SIZED BASED ON SUCCESSFUL COMPRESSED NATURAL GAS BIDDER EQUIPMENT
2. LIGHTING TO BE LED-TYPE FIXTURES, FULL CUT-OFF. RAB ALED5T78, TYPE 5, OR APPROVED EQUAL. PLACE ON PRECAST LIGHT BASE
3. PROVIDE GROUNDING CONTERPOISE AS SHOWN. USE 3 EA. 8'-0" L GROUNDING RODS AND BOND TO SLAB REBAR
4. GENERATOR AND ATS TO BE SIZED AND SPECIFIED AS REQUIRED TO WORK WITH SUPPLIER'S DECOMPRESSION STATION EQUIPMENT



PROP. UES AND UED TRENCH DET. 4 C2.1
22X34 SCALE: 3/4"=1'-0"
11X17 SCALE: 3/8"=1'-0"

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL

MAINE

PRESQUE ISLE

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THOMAS W. PERKINS No. 11710 — STATE OF MAINE — LICENSED PROFESSIONAL ENGINEER

4/17/14

DECOMPRESSION STATION LAYOUT

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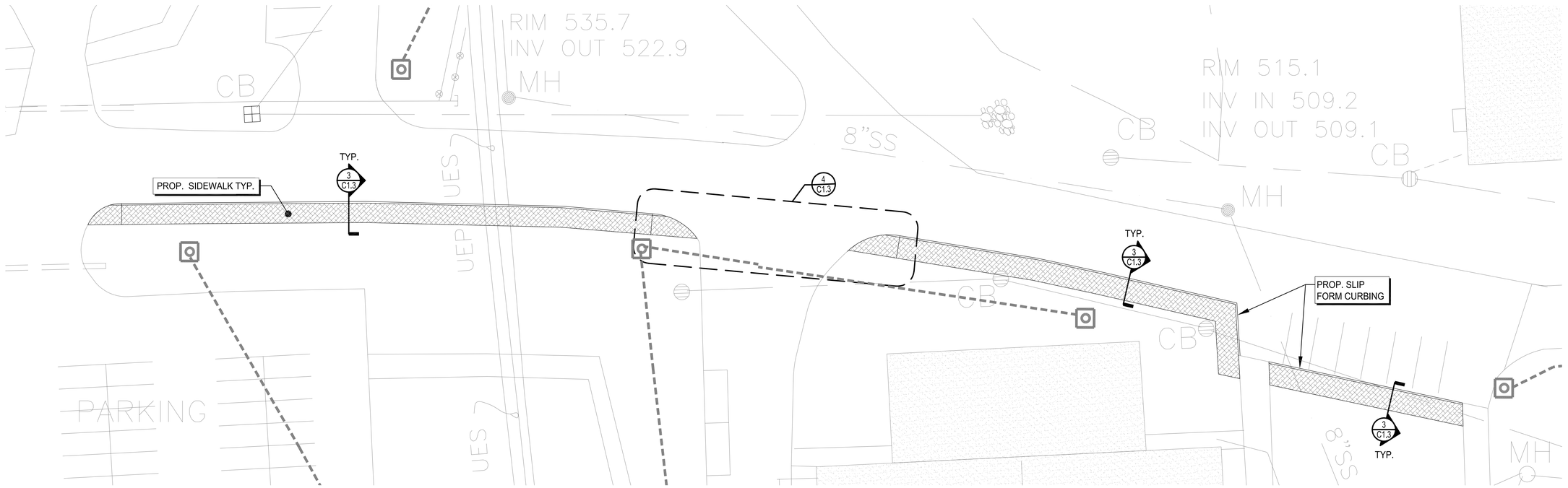
DATE: 4/17/14

PROJECT NO. 14-003

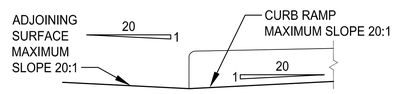
SHEET NO.

C1.2



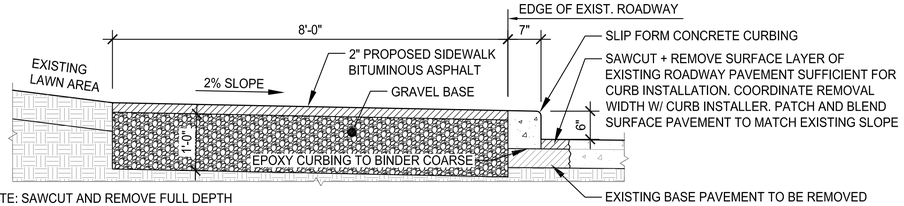
NOTE:
GAS MAIN NOT SHOWN FOR CLARITY

PROPOSED SIDEWALK PLAN 1 / C1.3
22X34 SCALE: 1/16"=1'-0"
11X17 SCALE: 1/32"=1'-0"

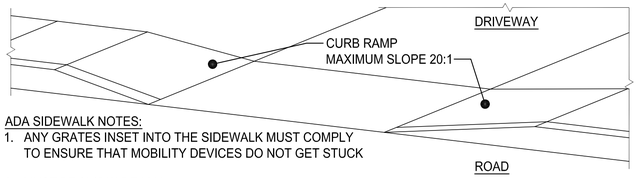


ADA CURB SLOPES DETAIL 2 / C1.3
22X34 SCALE: 1"=1'-0"
11X17 SCALE: 1/2"=1'-0"

NOTES:
1. CONCRETE:
   4000 psi
   1"-2" SLUMP
   6%± 1% AIR ENTR.
   7"x7 1/2" VERTICAL CURB
   DIRECT TO PAVEMENT
2. GRANITE CURB ALTERNATE: SAWCUT AND REMOVE FULL DEPTH PAVEMENT FOR GRANITE BASE CONCRETE INSTALLATION

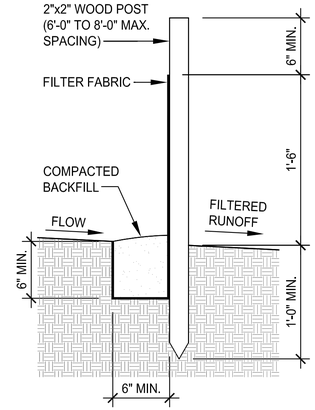


SIDEWALK AND CURB DETAIL 3 / C1.3
22X34 SCALE: 3/4"=1'-0"
11X17 SCALE: 3/8"=1'-0"

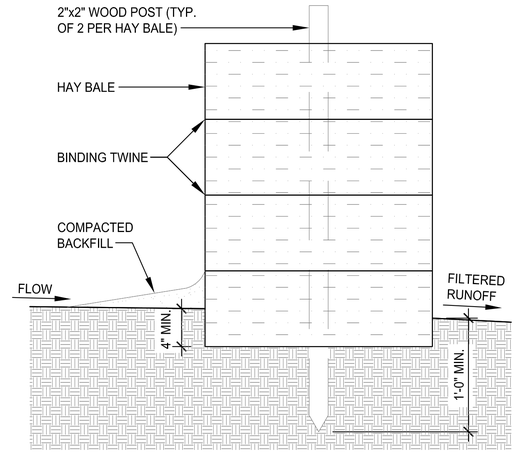


ADA SIDEWALK NOTES:
1. ANY GRATES INSET INTO THE SIDEWALK MUST COMPLY TO ENSURE THAT MOBILITY DEVICES DO NOT GET STUCK
2. MUST BE 3'-0" WIDE MIN.
3. SURFACE TEXTURES MUST BE FIRM, STABLE AND SLIP-RESISTANT

ADA DRIVEWAY TO ROAD SIDEWALK DETAIL 4 / C1.3
NOT TO SCALE



SILT FENCE DETAIL 5 / C1.3
22X34 SCALE: 1 1/2"=1'-0"
11X17 SCALE: 3/4"=1'-0"



HAY BALE DETAIL 6 / C1.3
22X34 SCALE: 1 1/2"=1'-0"
11X17 SCALE: 3/4"=1'-0"

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL
PRESQUE ISLE MAINE

SIGNED COPY OF DRAWING ON FILE AT DIRIGO A/E OFFICE

STATE OF MAINE
THOMAS W. PERKINS
No. 11710
LICENSED PROFESSIONAL ENGINEER
4/17/14

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PROP. SIDEWALK PLAN + DETAILS

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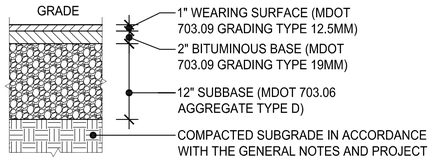
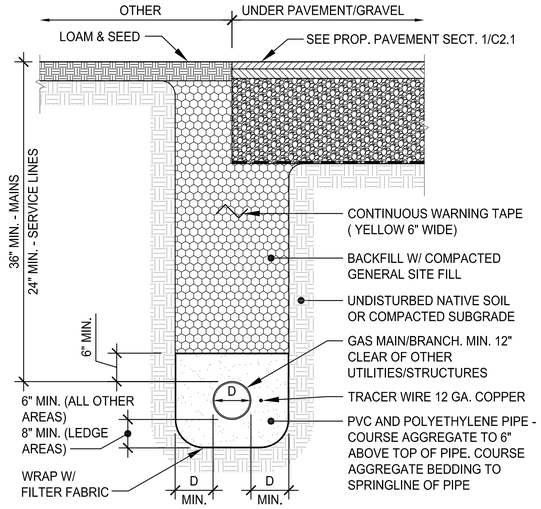
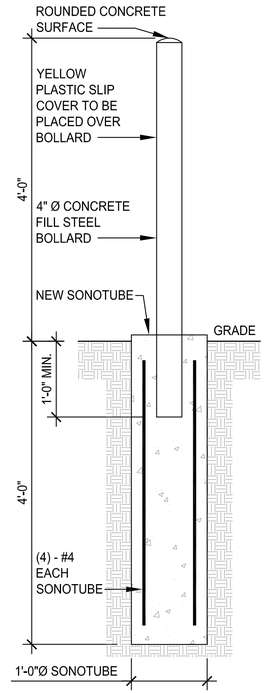


NOTES:
1. APPLY TACK COAT BETWEEN BINDER AND SURFACE COURSES
2. ALL MATERIALS SHALL CONFORM TO MDOT SPECIFICATIONS, LATEST REVISION
3. COMPACTION OF ALL MATERIALS TO BE IN ACCORDANCE WITH SPECIFICATIONS AND PROJECT GENERAL NOTES
4. WHERE PAVEMENT ABUTS LAWN CONTRACTOR SHALL OVERBUILD THE GRAVEL SECTION BY 1 FOOT IN WIDTH ON EITHER SIDE OF PAVING LIMITS

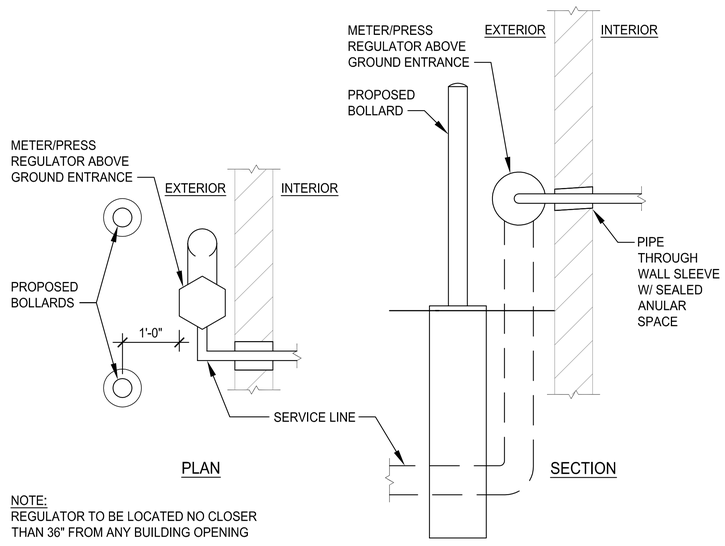
BITUMINOUS CONCRETE PAVEMENT SECTION — 1 / C2.1
22X34 SCALE: 1"=1'-0"
11X17 SCALE: 1/2"=1'-0"



PROP. GAS MAIN/BRANCH TRENCH DET. — 2 / C2.1
22X34 SCALE: 3/4"=1'-0"
11X17 SCALE: 3/8"=1'-0"

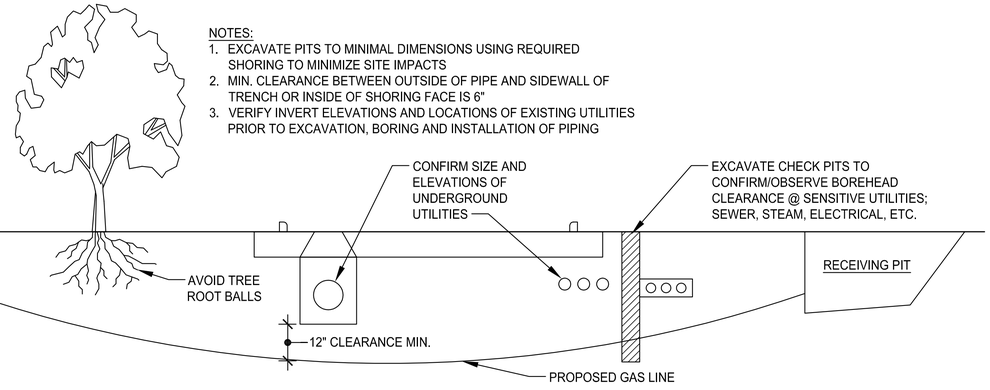


BOLLARD DETAIL — 3 / C2.1
22X34 SCALE: 1"=1'-0"
11X17 SCALE: 1/2"=1'-0"



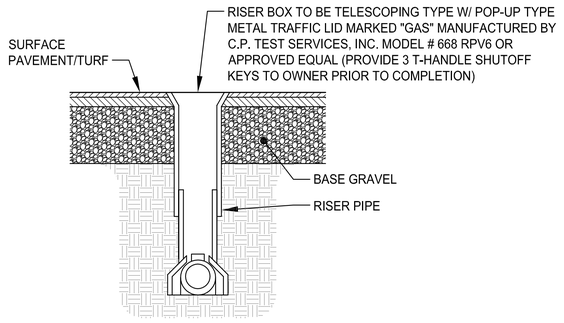
NOTE:
REGULATOR TO BE LOCATED NO CLOSER THAN 36" FROM ANY BUILDING OPENING

BUILDING ENTRANCE METER/REGULATOR PROTECTION DETAIL — 4 / C2.1
NOT TO SCALE



NOTES:
1. EXCAVATE PITS TO MINIMAL DIMENSIONS USING REQUIRED SHORING TO MINIMIZE SITE IMPACTS
2. MIN. CLEARANCE BETWEEN OUTSIDE OF PIPE AND SIDEWALL OF TRENCH OR INSIDE OF SHORING FACE IS 6"
3. VERIFY INVERT ELEVATIONS AND LOCATIONS OF EXISTING UTILITIES PRIOR TO EXCAVATION, BORING AND INSTALLATION OF PIPING

TRENCHLESS PIT DETAIL — 5 / C2.1
NOT TO SCALE



GAS SHUT OFF/ISOLATION VALVE CURB BOX DET. — 6 / C2.1
NOT TO SCALE

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL

MAINE

PRESQUE ISLE

SIGNED COPY OF DRAWING ON FILE AT DIRIGO A/E OFFICE

STATE OF MAINE — THOMAS W. PERKINS No. 11710 — LICENSED PROFESSIONAL ENGINEER

4/17/14

SITE WORK DETAILS

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EM:tperkins@dirigoae.com W:www.dirigoae.com

DATE: 4/17/14

PROJECT NO. 14-003

SHEET NO.

C2.1

MECHANICAL NOTES:

1. EXTERIOR GAS PIPING TO BE HIGH-DENSITY POLYETHYLENE (HDPE), SDR 26 RATED FOR 77 PSI

   A. SUGGESTED VENDORS

      i. DURALINE POLYPIPE

      ii. PERFORMANCE PIPE DRISCOPIPE 8100 SERIES

      iii. JM EAGLE POLYETHYLENE BLACK GAS

      iv. APPROVED EQUAL

   B. THERMAL FUSING TO BE THE PREDOMINANT JOINING METHOD. MECHANICAL COUPLINGS ALLOWED AS EXCEPTIONS AFTER APPROVAL FROM ENGINEER AND OWNER

   C. CAMPUS LOOP SIZING BASED ON THE FOLLOWING:

      i. TOTAL MAXIMUM LOADS:
      - BOILERS: 37,558 CFM/H
      - MISC. KITCHEN: 2,500 CFM/H
      - MISC. LABS: 1,000 CFM/H
      - MISC. OTHER: 1,000 CFM/H
      - MISC. FUTURE: 20,000 CFM/H
      - TOTAL LOAD: 62,558 CFM/H

      ii. DESIGN PRESSURE: 50 PSI

      iii. LOOP PRESSURE DROP: 5 PSI

   D. INSTALLATION TO BE PERFORM BY PERSONS LICENSED TO DO SO PER STATE OF MAINE LAW

2. NATURAL GAS METERS TO BE LOCATED AS SHOWN, AND PROVIDE DIGITAL SIGNAL BACK TO UMPI BUILDING MANAGEMENT SYSTEM AS SHOWN

   A. SUGGESTED VENDORS:

      i. EKG PULSE OUTPUT GAS METER AND 1X OMNIMETER PULSE V.4

      ii. FOX THERMAL INSTRUMENTS FT2A INSERTION METER

      iii. ELSTER-AMERICAN

      iv. APPROVED EQUAL

   B. METERS TO BE CALIBRATED AND ADJUSTED FOR TEMPERATURE

   C. METERS TO BE INSTALLED IN AN ENCLOSURE SUITABLE FOR THE EXPOSURE

   D. CONTRACTOR TO COORDINATE INSTALLATION, CALIBRATION, AND CONNECTION OF EQUIPMENT TO NETWORKS WITH UMPI FACILITIES MANAGEMENT STAFF

3. DUAL-FUEL BURNERS FOR NATURAL GAS AND #2 HEATING OIL TO BE INSTALLED ON ALL HEATING APPLIANCES, UNLESS NOTED OTHERWISE

   A. SUGGESTED VENDORS:

      i. POWER-FLAME

      ii. CARLIN

      iii. APPROVED EQUAL

   B. DUAL-FUEL BURNERS TO BE SIZED PER THE NAMEPLATE CAPACITY OF THE BOILERS

   C. CONTRACTOR TO INSTALL ALL PIPING, VALVES, SAFETY DEVICES AND OTHER APPURTENANCES AS REQUIRED BY CODE

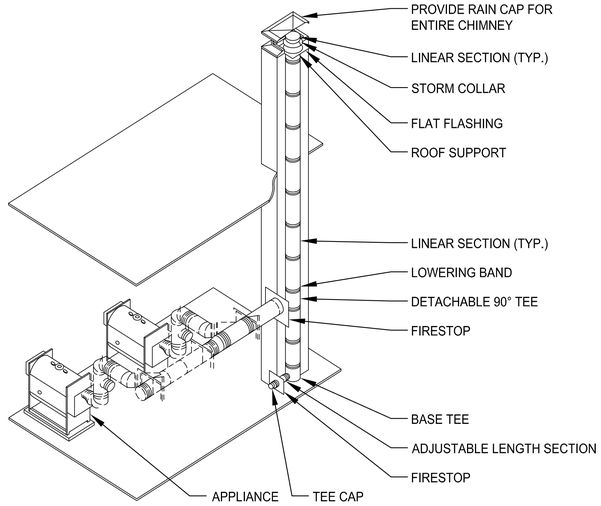
   D. INSTALLATION TO BE PERFORMED BY A LICENSED TRADESPERSON AS REQUIRED BY THE STATE OF MAINE BOARD OF BOILERS AND PRESSURE VESSELS, AND STATE OF MAINE PLUMBING CODE, AND THE MAINE FUEL BOARD

4. CONTRACTOR TO INSTALL LINERS IN ALL STACKS WHERE NATURAL GAS COMBUSTION EXHAUST IS DISCHARGED. LINER INSTALLATION TO ACCOMMODATE EITHER FUEL EXHAUST DISCHARGE

5. CONTRACTOR TO REVIEW EXISTING MECHANICAL ROOM AND EQUIPMENT AND NOTIFY ENGINEER IF ANY OF THE PROPOSED CHANGES WILL TRIGGER OTHER CODE-MANDATED UPGRADES OR CHANGES TO THE EXISTING CONDITIONS

6. CONTRACTOR TO REMOVE AND COORDINATE REMOVAL WITH LP TANK PROVIDER OF EXISTING LP GAS TANKS, SUPPORTS, PADS, BOLLARDS AND PIPING. RESTORE DISTURBED AREA TO MATCH EXISTING CONDITIONS

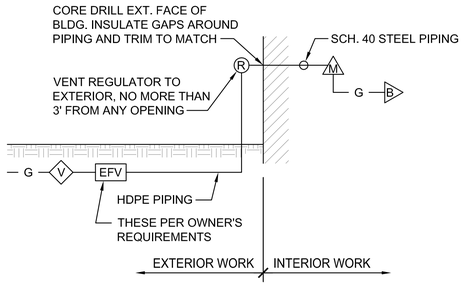
7. CONTRACTOR IS RESPONSIBLE FOR MAKING BURNING ORIFICE, NOZZLE, AND/OR OTHER MODIFICATIONS ON EXISTING LABORATORY APPARATUS, COOKING APPLIANCES AND/ OR HOT WATER HEATERS CURRENTLY USING LP GAS TO BE ABLE TO SAFELY BURN NATURAL GAS. IT IS ANTICIPATED THE EXISTING PIPING SYSTEMS CURRENTLY USED FOR LP GAS CAN BE REUSED FOR THE NATURAL GAS APPLICATION. QUANTIFY OTHER EQUIPMENT

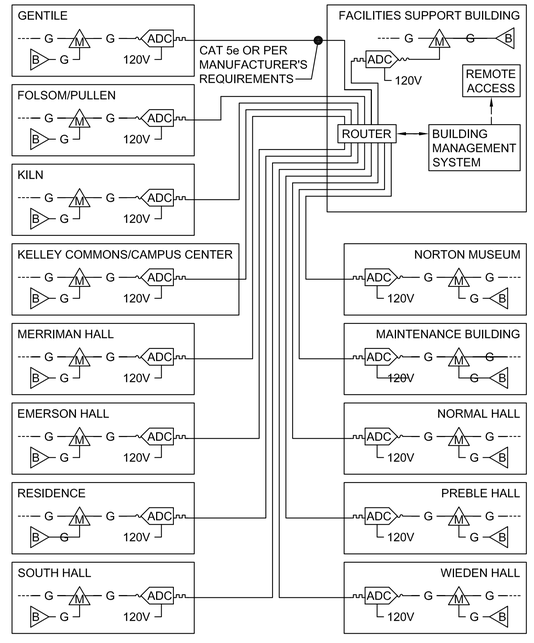


CHIMNEY LINER DETAIL TYP. — 1 / M0.0
NOT TO SCALE

MECHANICAL LEGEND:

B	BOILER
R	GAS REGULATOR W/ VENT. 50 PSI DISTRIBUTION SYSTEM REDUCED TO 2 PSI BUILDING CONSUMPTION PRESSURE, U.N.O.
B	BURNER ELEMENT, DUAL FUEL
— G —	NATURAL GAS PIPING
— O —	HEATING OIL PIPING
M	NATURAL GAS METER
	BOLLARDS - SEE CIVIL DWG.
ADC	SIGNAL CONVERTER FOR GAS METER ANALOG TO DDC
EFV	EXCESS FLOW VALVE
V	UNDERGROUND GAS VALVE





CONTROL METERING SCHEMATIC — 2 / M0.0
NOT TO SCALE

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL
PRESQUE ISLE MAINE

SIGNED COPY OF DRAWING ON FILE AT DIRIGO A/E OFFICE

STATE OF MAINE — THOMAS W. PERKINS No. 11710 — LICENSED PROFESSIONAL ENGINEER

4/17/14

MECH. NOTES, SCHEMATIC + DETAIL

REV.	DATE	DESCRIPTION
1	3/25/14	ISSUED FOR REVIEW
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DRAWN BY: CGB | CHECKED BY: TWP

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SHEET NO.

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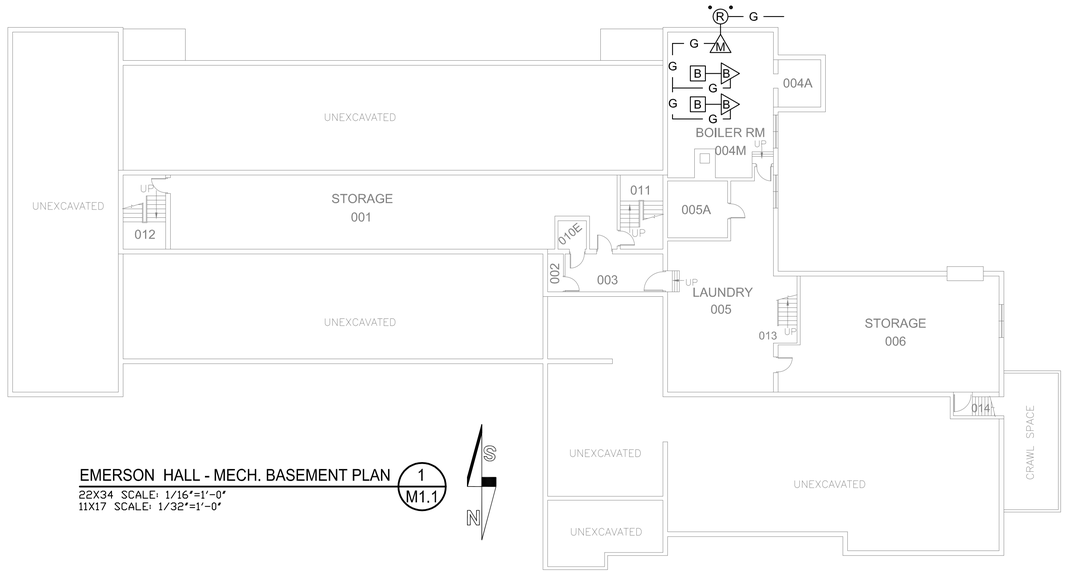

EMERSON HALL - MECH. BASEMENT PLAN 1 / M1.1
22X34 SCALE: 1/16"=1'-0"
11X17 SCALE: 1/32"=1'-0"

MECHANICAL LEGEND:

- B — BOILER
- R — GAS REGULATOR W/ VENT. 50 PSI DISTRIBUTION SYSTEM REDUCED TO 2 PSI BUILDING CONSUMPTION PRESSURE, U.N.O.
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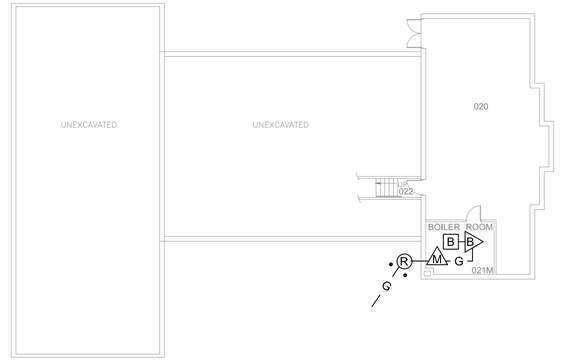
- M — NATURAL GAS METER
- BOLLARDS - SEE CIVIL DWG.



FACILITIES SUPPORT BUILDING - MECHANICAL BASEMENT PLAN 2 / M1.1
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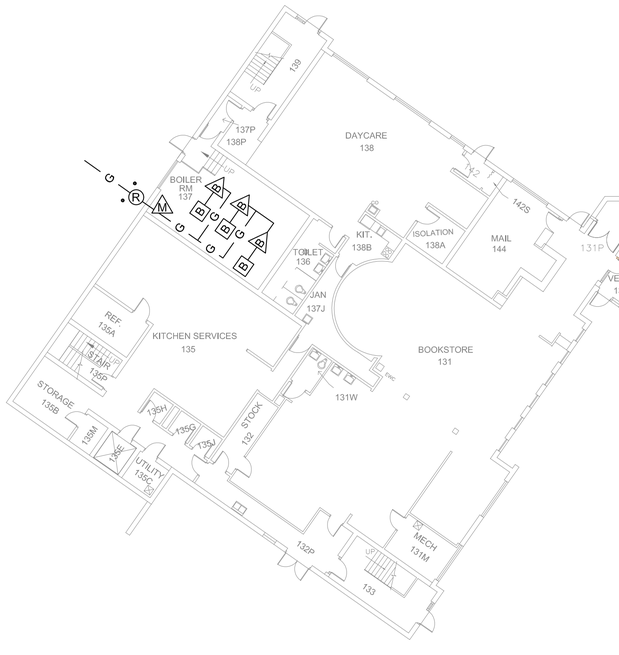
11X17 SCALE: 1/32"=1'-0"



KELLEY COMMONS - MECH. 1ST FL. PLAN 3 / M1.1
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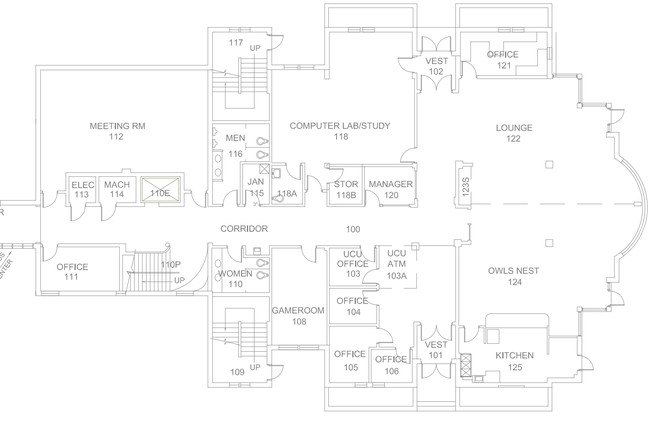
11X17 SCALE: 1/32"=1'-0"



CAMPUS CENTER - MECH. 1ST FL. PLAN 4 / M1.1
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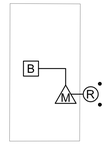
11X17 SCALE: 1/32"=1'-0"



KILN - MECH. 1ST FL. PLAN 5 / M1.1
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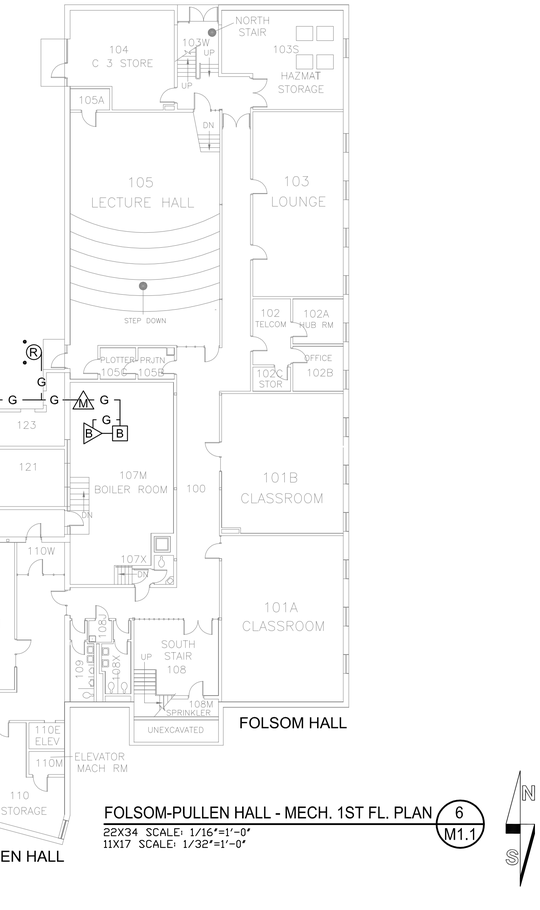

FOLSOM-PULLEN HALL - MECH. 1ST FL. PLAN 6 / M1.1
22X34 SCALE: 1/16"=1'-0"
11X17 SCALE: 1/32"=1'-0"

UMPI COMPRESSED NATURAL GAS - REQUEST FOR PROPOSAL

MAINE

PRESQUE ISLE

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STATE OF MAINE — THOMAS W. PERKINS No. 11710 — LICENSED PROFESSIONAL ENGINEER

4/17/14

MECHANICAL FLOOR PLANS

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PROJECT NO. 14-003

SHEET NO.

M1.1

MECHANICAL LEGEND:

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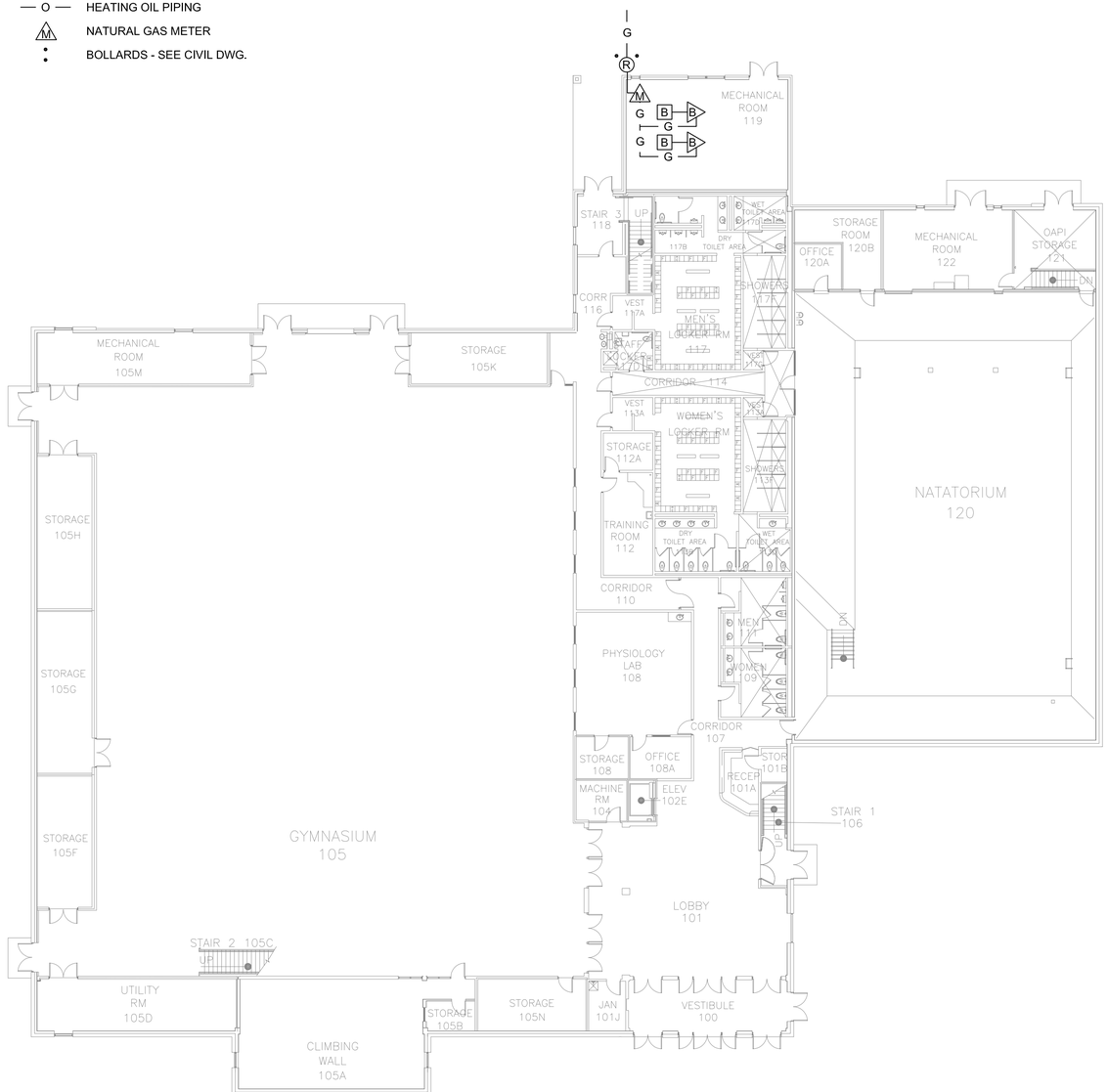
- — G — NATURAL GAS PIPING
- — O — HEATING OIL PIPING
- M — NATURAL GAS METER
- BOLLARDS - SEE CIVIL DWG.



GENTILE HALL HEALTH & PHYSICAL EDUCATION COMPLEX - MECH. 1ST FL. PLAN (1 / M1.2)
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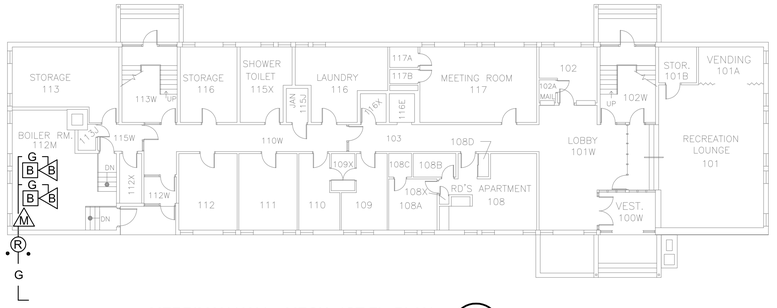
11X17 SCALE: 1/32"=1'-0"



MERRIMAN HALL - MECH. 1ST FL. PLAN (2 / M1.2)
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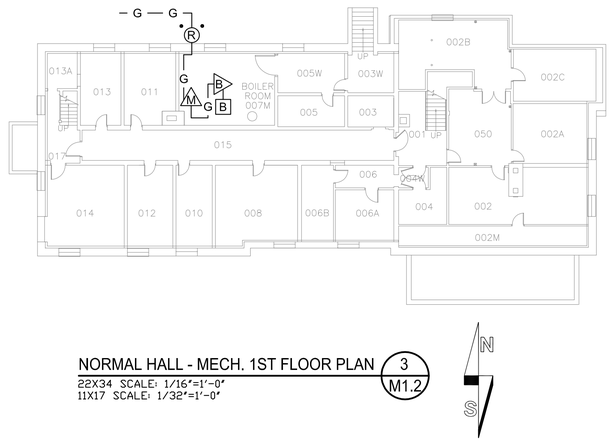

NORMAL HALL - MECH. 1ST FLOOR PLAN (3 / M1.2)
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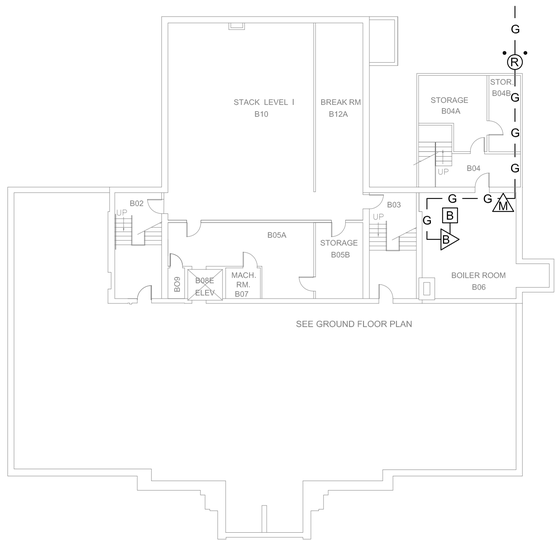

PREBLE HALL - MECH. 1ST FLOOR PLAN (4 / M1.2)
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11X17 SCALE: 1/32"=1'-0"

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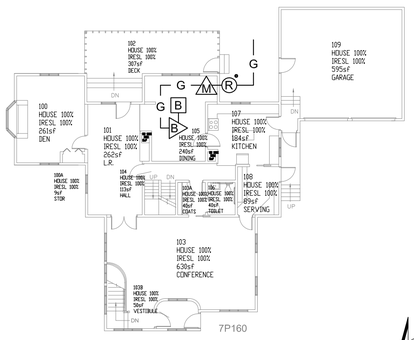
M1.2



PRESIDENT'S HOUSE - MECH. 1ST FL. PLAN (1 / M1.3)
22X34 SCALE: 1/16"=1'-0"
11X17 SCALE: 1/32"=1'-0"

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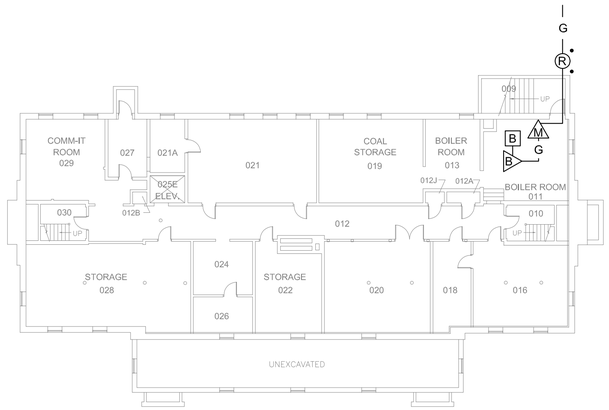

SOUTH HALL - MECH. BASEMENT FL. PLAN (2 / M1.3)
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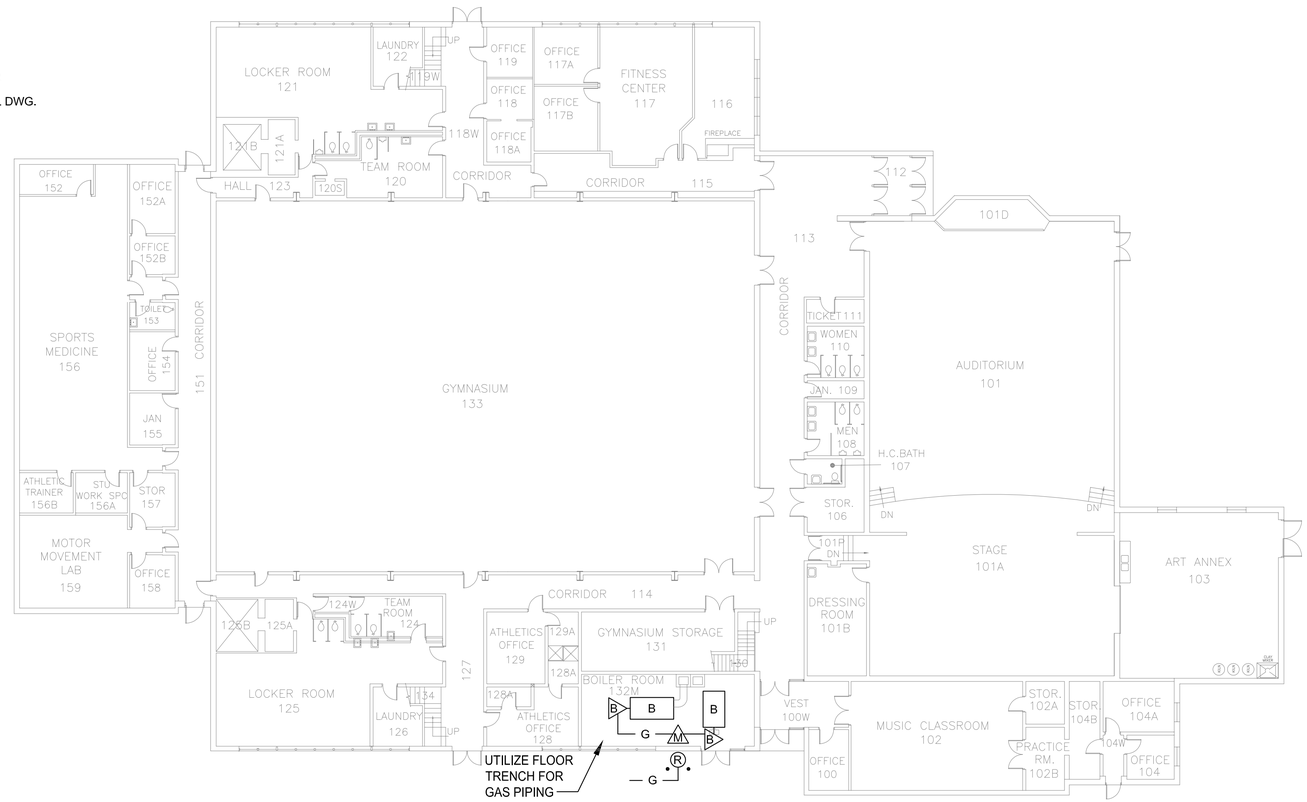

WIEDEN HALL - MECH. 1ST FL. PLAN (2 / M1.3)
22X34 SCALE: 1/16"=1'-0"
11X17 SCALE: 1/32"=1'-0"

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MECHANICAL FLOOR PLANS

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PROJECT NO. 14-003

SHEET NO.

M1.3

SECTION 01 10 00 – SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Project information.
   2. Work covered by Contract Documents.
   3. Work under separate contracts.
   4. Access to site.
   5. Work restrictions.
   6. Specification and drawing conventions.
   7. Miscellaneous provisions.

1.2 PROJECT INFORMATION

A. Project Identification: University Of Maine Presque Isle Compressed Natural Gas Installation,
   1. Project Location: Presque Isle, Maine
B. Owner: University of Maine Presque Isle
   1. Owner's Representative: TBD
C. Engineer: Dirigo Architectural Engineering, LLC
   1. Contact Thomas Perkins, PE
D. Contractor: TBD

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:
   1. Install a complete functional compressed natural gas system as specified herein and on the project plans. Work includes concrete and fenced enclosure with decompression equipment, gas main and service lines to each required building or appliance, mechanical and electrical scope.
B. Type of Contract.
   1. Project will be constructed under a single prime contract.

1.4 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts.
   1. Coordinate the Work of this Contract with work performed under separate contracts.
B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
   1. TBD
   2. TBD

1.5 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this section.
B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
    1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
B. On-Site Work Hours: Limit work in and around buildings to normal business working hours of
C. 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated. Campus activities may require adjustments to work hours.
D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to adjacent occupancy with Owner.
    1. Notify Owner not less than two days in advance of proposed disruptive operations.
    2. Obtain Owner's written permission before proceeding with disruptive operations.
E. Nonsmoking campus: Smoking is not permitted anywhere on campus.
F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations.
B. These conventions are as follows:
    1. **Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.**
    2. **Specifications are a document used to coordinate information with the drawings and other contract documents. Where there are conflicts in dimensions, depths, quantities, materials, services, equipment, etc., within the contract documents, the more expensive, and more stringent shall apply to this contract. It is expected that the contractor will request clarification from the Engineer upon discovery of these conflicts.**
    3. **Where conflicts arise between regulatory code requirements and specifications or other contract documents, the more stringent will apply. Should the applicable code be more stringent, the contractor is to adhere to the required code / regulation at no additional cost to the Owner. Should an applicable governing regulation / code be updated prior to contract award, it is expected that the contractor will adhere to the updated regulation at no additional cost to the owner.**
        A. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

B. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

4. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
5. Symbols: symbols are referenced in respective or general drawing keys or reference sheets and are recognized as part of this contract document.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. Certificates and qualification data, where applicable or requested.
    g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    i. Research reports evidencing compliance with building code in effect for Project.
    j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on

manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a request for substitution.

B. Engineer will notify Contractor of acceptance or rejection of proposed substitution within

C. 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or

D. Engineer's Supplemental Instructions for minor changes in the Work.

a. Use product specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 calendar days prior to time required for preparation and review of related submittals.

1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

b. Requested substitution will not adversely affect Contractor's construction schedule.

c. Requested substitution has received necessary approvals of authorities having jurisdiction.

d. Requested substitution is compatible with other portions of the Work.

e. Requested substitution has been coordinated with other portions of the Work.

f. Requested substitution provides specified warranty.

g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Engineer will consider requests for substitution if received within 15 calendar days after commencement of the Work.
   1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
      a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
      b. Requested substitution does not require extensive revisions to the Contract Documents.
      c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      d. Requested substitution will not adversely affect Contractor's construction schedule.
      e. Requested substitution has received necessary approvals of authorities having jurisdiction.
      f. Requested substitution is compatible with other portions of the Work.
      g. Requested substitution has been coordinated with other portions of the Work.
      h. Requested substitution provides specified warranty.
      i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 31 00 - PROJECT MANAGEMENT COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Requests for Information (RFIs).
   2. Project meetings.

B. Related Requirements:
   1. Section 017300 "Execution" for procedures for coordinating general installation and
   2. Field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   5. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
    1. Preparation of Contractor's construction schedule.
    2. Preparation of the schedule of values.
    3. Installation and removal of temporary facilities and controls.
    4. Delivery and processing of submittals.
    5. Progress meetings.
    6. Pre-installation conferences.
    7. Project closeout activities.
    8. Startup and adjustment of systems.

1.5 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
    1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
    2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
    1. Project name.
    2. Project number.
    3. Date.
    4. Name of Contractor.
    5. Name of Engineer.
    6. RFI number, numbered sequentially.
    7. RFI subject.
    8. Specification Section number and title and related paragraphs, as appropriate.
    9. Drawing number and detail references, as appropriate.
    10. Field dimensions and conditions, as appropriate.
    11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
    12. Contractor's signature.
    13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
C. Engineer's Action: Engineer will review each RFI, determine action required, and respond.
D. Allow seven working days for Engineer's response for each RFI.
E. The following RFIs will be returned without action:
    1. Requests for approval of submittals.

2. Requests for approval of substitutions.
3. Requests for coordination information already indicated in the Contract Documents.
4. Requests for adjustments in the Contract Time or the Contract Sum.
5. Requests for interpretation of Architect's actions on submittals.
6. Incomplete RFIs or inaccurately prepared RFIs.

F. Engineer's action may include a request for additional information, in which case
   1. Engineer's time for response will date from time of receipt of additional information.

G. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to
   1. Section 012600 "Contract Modification Procedures."
   2. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.

H. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number.
   1. Submit log bi-weekly. Include the following:
   2. Project name.
   3. Name and address of Contractor.
   4. Name and address of Engineer.
   5. RFI number including RFIs that were dropped and not submitted.
   6. RFI description.
   7. Date the RFI was submitted.
   8. Date Engineer's response was received.

I. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.
   1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
   2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
   3. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   4. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer within three days of the meeting. Any revisions to the minutes requested for correction will be done so and redistributed prior to the following meeting or within 3 days of request whichever should come first.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 calendar days after execution of the Agreement.
    1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
    2. Agenda: Discuss items of significance that could affect progress, including the following:
        a. Tentative construction schedule.
        b. Critical work sequencing and long-lead items.
        c. Designation of key personnel and their duties.
        d. Procedures for processing field decisions and Change Orders.
        e. Procedures for RFIs.
        f. Procedures for testing and inspecting.
        g. Procedures for processing Applications for Payment.
        h. Distribution of the Contract Documents.
        i. Submittal procedures.
        j. Preparation of record documents.
        k. Use of the premises.
        l. Work restrictions.
        m. Working hours.
        n. Owner's occupancy requirements.
        o. Responsibility for temporary facilities and controls.
        p. Procedures for moisture and mold control.
        q. Procedures for disruptions and shutdowns.
        r. Construction waste management and recycling.
        s. Parking availability.
        t. Office, work, and storage areas.
        u. Equipment deliveries and priorities.
        v. Safety and First aid.
        w. Security.
        x. Progress cleaning.
    3. Minutes: Entity responsible for conducting meeting will record and distribute meeting Minutes.
C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
    1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Engineer of scheduled meeting dates.
    2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility problems.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

4. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
5. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information within 3 business days.
6. Do not proceed with installation if the conference cannot be successfully concluded.
7. Initiate whatever actions are necessary to resolve impediments to performance of the
8. Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Attendees: In addition to representatives of Owner, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings.
2. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting.

i. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
   1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:
   1) Interface requirements.
   2) Sequence of operations.
   3) Status of submittals.
   4) Deliveries.
   5) Off-site fabrication.
   6) Access.
   7) Site utilization.
   8) Temporary facilities and controls.
   9) Progress cleaning.
   10) Quality and work standards.
   11) Status of correction of deficient items.
   12) Field observations.
   13) Status of RFIs.
   14) Status of proposal requests.
   15) Pending changes.
   16) Status of Change Orders.
   17) Pending claims and disputes.
   18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
5. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor's construction schedule.
   2. Construction schedule updating reports.
   3. Daily construction reports.
   4. Site condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. PDF electronic file.
   2. Two paper copies each size. (11 x 17) & (22 x 34)
B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
C. Construction Schedule Updating Reports: Submit reports bi-weekly
D. Daily Construction Reports: Submit at bi-weekly intervals.
E. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 15 days, unless specifically allowed by Engineer.
   2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 15 days, as separate activities in schedule. Submittal Review Time: Include review and re-submittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
   3. Startup and Testing Time: Include no fewer than 10 business days for startup and testing.
   4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
   5. Punch List and Final Completion: Include not more than 14 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
   2. Work Restrictions: Show the effect of the following items on the schedule:
      a. Use of premises restrictions.
      b. Seasonal variations.
      c. Environmental control.
   3. Work Stages: Indicate important stages of construction for each major portion of the work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   1. Unresolved issues.
   2. Unanswered Requests for Information.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.
   5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 7 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type,

A. Contractor's construction schedule within 15 calendar days of date established for commencement of the Work.
B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
    1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
    1. List of subcontractors at Project site.
    2. List of separate contractors at Project site.
    3. Approximate count of personnel at Project site.
    4. Equipment at Project site.
    5. Material deliveries.
    6. High and low temperatures and general weather conditions, including presence of rain or snow.
    7. Accidents.
    8. Meetings and significant decisions.
    9. Unusual events.
    10. Stoppages, delays, shortages, and losses.
    11. Meter readings and similar recordings.
    12. Emergency procedures.
    13. Orders and requests of authorities having jurisdiction.
    14. Services connected and disconnected.
    15. Equipment or system tests and startups.
B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities.
    1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
    2. As the Work progresses, indicate final completion percentage for each activity.
B. Distribution: Distribute copies of approved schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor and Owner with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
5.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Engineer's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.

1. Engineer will furnish Contractor one set of digital data drawing files of the Contract

B. Drawings for use in preparing Shop Drawings and Project record drawings.

1. Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
3. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Time for review shall commence on Engineers receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals. Allow time for submittal review, including time for resubmittals, as follows:
1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.

C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use form acceptable to Owner and

D. Engineer, containing the following information:
1. Project name.
2. Date.
3. Name and address of Engineer.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Specification Section number and title.
11. Specification paragraph number or drawing designation and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Location(s) where product is to be installed, as appropriate.
14. Related physical samples submitted directly.
15. Indication of full or partial submittal.

16. Transmittal number, numbered consecutively.
17. Submittal and transmittal distribution record.
18. Other necessary identification.
19. Remarks.

E. Metadata: Include the following information as keywords in the electronic submittal file metadata:
    1. Project name.
    2. Number and title of appropriate Specification Section.

F. Options: Identify options requiring selection by Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form as initial submittal.
    1. Note date and content of previous submittal.
    2. Note date and content of revision in label or title block and clearly indicate extent of revision.
    3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:
    1. Submit electronic submittals via email as PDF electronic files.
        a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
    2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
        a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
        b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
    1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
    2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
    a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 36 inches.
3. Submit Shop Drawings in the following format:
    a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
    a. Generic description of Sample.
    b. Product name and name of manufacturer.

c. Sample source.
d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    a. Number of Samples: Submit three full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    a. Number of Samples: Submit three sets of Samples. Engineer will retain two
7. Sample sets; remainder will be returned.
    a. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least sets of paired units that show approximate limits of variations.

E. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
F. Application for Payment and Schedule of Values: Comply with requirements specified in
    1. Section 012900 "Payment Procedures.
G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

I. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects/engineers and owners, and other information specified.
K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
L. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that
    1. Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
M. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
N. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
O. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
P. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
Q. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency
R. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
S. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "QA/QC Testing Requirements."
T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations.
    1. Include list of assumptions and other performance and design criteria and a summary of loads.
    2. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
    1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
    1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

C. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

D. Requirements for Contractor to provide quality-assurance and -control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

E. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
    1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

C. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
    1. Date of issue.
    2. Project title and number.
    3. Name, address, and telephone number of testing agency.
    4. Dates and locations of samples and tests or inspections.
    5. Names of individuals making tests and inspections.
    6. Description of the Work and test and inspection method.
    7. Identification of product and Specification Section.
    8. Complete test or inspection data.
    9. Test and inspection results and an interpretation of test results.

10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on re-testing and re-inspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Costs for re-testing and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
   3. Where quality-control services are indicated as Contractor's responsibility, submit a Certified written report, in duplicate, of each quality-control service.
   4. Testing and inspecting requested by Contractor and not required by the Contract.
   5. Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
    1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the
    2. Work during performance of its services.
    3. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
    4. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
    5. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
    6. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
    7. Do not perform any duties of Contractor.
F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
    1. Access to the Work.
    2. Incidental labor and facilities necessary to facilitate tests and inspections.
    3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
    4. Facilities for storage and field curing of test samples.
    5. Delivery of samples to testing agencies.
    6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
    7. Security and protection for samples and for testing and inspecting equipment at Project site.
G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
H. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
    1. Date test or inspection was conducted.

2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Engineer.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

C. Protect construction exposed by or for quality-control service activities.

D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections include the following:

1. Division 1 Section "Summary of Work" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Divisions 2 through 41 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
4. Division 31 Section "Dewatering" for disposal of ground water at Project site.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Sewer service from Owner’s existing system is available for use without metering and without payment of use charges, as required for construction operations.

C. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities. Permanently installed HVAC units are not to be used prior to owner occupancy.

PART 2 PRODUCTS

2.1 MATERIALS

A. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
B. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
C. Paint: Comply with requirements in Division 9 painting Sections.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
    1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
    1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
    2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
    1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
    1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
D. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
    1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
F. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. No open flame heaters.
G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
H. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
    1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
    2. Install lighting for Project identification sign.

J. Telephone Service: Provide temporary telephone service in a common-use facility for use by all construction personnel.
    1. At each telephone, post a list of important telephone numbers.
        a. Police and fire departments.
        b. Ambulance service.
        c. Contractor's home office.
        d. Architect's office.
        e. Engineers' offices.
        f. Owner's office.
        g. Principal subcontractors' field and home offices.
    2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
    1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
    2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.
    1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain
A. Project site, excavations, and construction free of water.
    1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
    2. Remove snow and ice as required to minimize accumulations.
E. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project.
B. Unauthorized signs are not permitted.
    1. Provide temporary, directional signs for construction personnel and visitors.
    2. Maintain and touchup signs so they are legible at all times.
    1. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

2. Comply with Division 1 Section 017000, EXECUTION, for progress cleaning requirements.

F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

G. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

H. Existing Stair Usage: Use of Owner's existing stairs will not be permitted.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Division 1 Section "Summary."

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
   1. Inspect, repair, and maintain erosion and sedimentation-control measures during construction until permanent vegetation has been established.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Comply with requirements specified in Division 2 Section "Tree Protection and Trimming."

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
   1. Prohibit smoking in construction areas.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.

A. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves the right to take possession of Project identification signs.
2. Remove temporary paving not intended for or acceptable for integration into permanent paving.

B. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 70 00 – Execution

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section consists of execution and closeout requirements, and includes but is not limited to the following:
   1. Examination and Preparation
   2. Execution
   3. Cleaning
   4. Starting and Adjusting
   5. Protecting Installed Construction

B. Related Sections include the following:
   1. Section 018115 LEED Requirements Summary.
   2. Section 017310 Cutting and Patching
   3. Section 017419 Construction Waste Management
   4. Section 017810 Project Record Documents
   5. Section 017820 Operation Maintenance Data
   6. Section 018200 Demonstration and Training

1.2 EXECUTION

A. Execution Summary
   1. 1 Construction layout.
   2. Field engineering and surveying.
   3. General installation of products.
   4. Coordination of Owner-installed products.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

B. Execution Submittals
   1. Submit Certified Surveys
   2. Submit Final Property Survey
   3. Submit Certificates certifying that location and elevation of improvements comply with requirements.
   4. Submit Land Surveyor Qualifications

PART 2 PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned, and that meet requirements.

B. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examination
   1. Existing Structures: Research, investigate, explore location of existing above and below-ground structures.
   2. Existing Utilities: Research, investigate, explore location of existing above and below-ground utilities.
      a. Coordinate with "Dig Safe" and or private utility locating company, where required.
   3. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

C. Preparation
   1. Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with AHJ.
   2. Take field measurements as required to fit the Work properly
   3. Verify space requirements and dimensions.
   4. Review Contract Documents with field conditions. Request necessary clarifications from Architect.

D. Construction Layout
   1. Verify existing benchmark, control point, and property corner locations.
      a. Coordinate with Owner.
   2. Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
   3. Site Improvements: Locate and lay out site improvements, including pavements, grading and fill, utility slopes, and invert elevations
   4. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical Work.
   5. Record Log: Maintain a log of layout control Work.

E. Field Engineering
   1. Reference Points: Locate and protect existing permanent benchmarks, control points, and similar reference points.
   2. Site Benchmarks: Establish and maintain a minimum of two permanent site benchmarks on Project site, referenced to data established by survey control points.

3. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

F. Installation
   1. Locate the Work and components of the Work accurately, in correct alignment and elevation, plumb and level.
   2. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
   3. Obtain, distribute and use necessary templates.
   4. Check, coordinate and ensure installed items correspond to approved Shop Drawings.
   5. Anchors and Fasteners: Provide anchors and fasteners required to anchor each component securely in place, accurately located and with items being fastened aligned with other portions of the Work.
      a. Allow for building movement, including thermal expansion and contraction.
      b. Verify finish of exposed anchors and fasteners with Architect.
   6. Joints: Make joints of uniform width.
      a. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect.
      b. Fit exposed connections together to form hairline joints.
   7. Hazardous Materials: Use products, cleaners, and installation materials that are not hazardous.

G. Owner-Installed Products
   1. Site Access: Provide access to Project site for Owner's construction forces.
   2. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
      a. Construction Schedule: Coordinate mutually acceptable work schedules.
      b. Pre-installation Conferences: Both work forces are to attend and participate in pre-installation conferences covering portions of the Work that are to receive Owner's work.

H. Maintenance of Pedestrian Traffic. Contractor shall at all times be aware and make provisions to divert and protect pedestrian traffic from construction activities. This includes detours, signage, barriers, notices, and advanced planning as required by UMPI Facilities Management.

3.2 PROJECT CLEANING

A. Construction Cleaning:

1. Clean Project site and Work areas broom clean daily.
   a. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
   b. Enforce requirements strictly.
   c. Dispose of materials lawfully.

2. Clean and protect construction in progress and adjoining materials already in place during handling and installation.
    a. Apply protective covering where required to ensure protection from damage or deterioration at

A. Substantial Completion

3. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.
    a. Adjust and lubricate operable components to ensure operability without damaging effects.
4. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.3 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field assembled components and equipment installation, comply with qualification requirements in SECTION 014000, QUALITY REQUIREMENTS.

3.4 PROTECTING INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
B. Comply with manufacturer's written instructions for temperature and relative humidity.
C. Correction of The Work
    1. Repair or remove and replace defective construction.
    2. Restore damaged substrates and finishes to previous condition.
    3. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
    4. Restore permanent facilities used during construction to their specified condition.
    5. Repair components that do not operate properly.
    6. Remove and replace operating components that cannot be repaired.
    7. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

B. Related Requirements:
   1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   2. Section 017839 "Project Record Documents" for submitting record Drawings, record
   3. Specifications, and record Product Data.

C. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
    1. Advise Owner of pending insurance changeover requirements.
    2. Complete startup and testing of systems and equipment.
    3. Perform preventive maintenance on equipment used prior to Substantial Completion.
    4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
    5. Advise Owner of changeover in heat and other utilities.
    6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
    7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
    8. Complete final cleaning requirements, including touchup painting.
    9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after

inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
   1. Submit a final Application for Payment
   2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial
   3. Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   4. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Submit list of incomplete items in the following format:
   4. PDF electronic file. Engineer will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title
4. "WARRANTIES," Project name, and name of Contractor.
5. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Remove labels that are not permanent.
j. Wipe surfaces of mechanical and electrical equipment and similar equipment.
k. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
m. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.
C. Restore damaged construction and permanent facilities used during construction to specified condition.
D. Touch up and otherwise repair and restore marred or exposed finishes and surfaces.
E. Replace finishes and surfaces that that already show evidence of repair or restoration.
F. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
G. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE MANUAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Product maintenance manuals.
   5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
   1. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Engineer will return copy with comments.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system.

C. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

D. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.

5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Engineer.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Engineer that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

E. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

F. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual.
3. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
4. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
    1. Fire.
    2. Flood.
    3. Gas leak.
    4. Water leak.
    5. Power failure.
    6. Water outage.
    7. System, subsystem, or equipment failure.
    8. Chemical release or spill.
C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
D. Emergency Procedures: Include the following, as applicable:
    1. Instructions on stopping.
    2. Shutdown instructions for each type of emergency.
    3. Operating instructions for conditions outside normal operating limits.
    4. Required sequences for electric or electronic systems.
    5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
    1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
    2. Performance and design criteria if Contractor is delegated design responsibility.
    3. Operating standards.
    4. Operating procedures.
    5. Operating logs.
    6. Wiring diagrams.
    7. Control diagrams.
    8. Piped system diagrams.
    9. Precautions against improper use.
    10. License requirements including inspection and renewal dates.
B. Descriptions: Include the following:
    1. Product name and model number. Use designations for products indicated on Contract Documents.
    2. Manufacturer's name.
    3. Equipment identification with serial number of each component.
    4. Equipment function.
    5. Operating characteristics.

6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish.
   1. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
    1. Standard maintenance instructions and bulletins.
    2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
    3. Identification and nomenclature of parts and components.
    4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
    1. Test and inspection instructions.
    2. Troubleshooting guide.
    3. Precautions against improper maintenance.
    4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    5. Aligning, adjusting, and checking instructions.
    6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents.

E. Identify data applicable to the Work and delete references to information not applicable.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

G. Do not use original project record documents as part of operation and maintenance manuals.

H. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

I. Copies to:

1. Presque Isle Fire Department: 1 Hardcopy
2. UMPI Facilities Management: 1 Hardcopy, 1 electronic copy
3. UM System Office: 1 electronic copy
4. Dirigo A/E: 1 electronic copy

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit copies of record Drawings as follows:
      a. Initial Submittal: 3 copies
   2. Submit PDF electronic files of scanned record prints and one paper-copy set(s) of marked-up record prints.

B. Final Submittal:
   1. Submit PDF electronic files of scanned record prints and three set(s) of Paper prints. Print each drawing, whether or not changes and additional information were recorded.

C. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

D. Record Product Data: Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Record data as soon as possible after obtaining it.
      c. Record and check the markup before enclosing concealed installations.
   2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
   3. Mark record sets with, red-colored pen. Use other colors to distinguish between changes for different categories of the Work at same location. Cloud the modified item, paragraph note etc in red and tie with a leader to the RFI, Change, or field modification number and info.

4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, RFI numbers and similar identification, where applicable.
5. Format: Identify and date each record Drawing; include the designation “PROJECT RECORD DRAWING” in a prominent location.
6. Identification as follows:

    a. Project Name
    b. Date
    c. Name of Engineer
    d. Name of Contractor

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
    1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
    2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
    3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
    4. Note related Change Orders, record Product Data, and record Drawings where applicable.
B. Format: Submit record Specifications as paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Updates should be done weekly and will be verified for payment purposes prior to requisition approval. Provide access to project record documents for Engineer 's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 03 30 00 - CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcing, concrete materials, mix design, placement procedures, and finishes.

B. Cast-in-place concrete includes the following:

1. Slabs-on-grade.
2. Equipment pads and bases.

C. Related Sections: The following Sections contain requirements that relate to this

B. Section:

1. N/A

1.3 SUBMITTALS

A. Cementitious Materials: Portland cement alone or in combination with fly ash.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Indicate amounts of mix water to be withheld for later addition at Project site.

D. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing materials.
5. Bonding agents.
6. Joint-filler
7. Repair materials.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose Work has resulted in construction with a record of successful in-service performance.

B. Manufacturer qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
    1. Manufacturer must be certified according to the National Ready Mixed Concrete
    2. Association's Certification of Ready Mixed Concrete Production Facilities.

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
    1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

C. ACI Publications: Comply with the following, unless more stringent provisions are indicated.
    1. ACI 301, "Specification for Structural Concrete."
    2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

E. Before placing any concrete, review concrete mix designs and examine procedures for ensuring quality of concrete materials, review detail requirements, placement operations, testing, Work progress schedule, and so on. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    1. Contractor's superintendent.
    2. Independent testing agency responsible for concrete design mixes.
    3. Ready-mix concrete producer.
    4. Concrete subcontractor.
    5. Gas Skid Contractor.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

A. Forms: Plywood, metal, metal-framed plywood faced, or other acceptable paneltype materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.

B. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

C. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal.
    1. Provide units that will leave no metal closer than 1-1/2 inches (38 mm) to the plane of the exposed concrete surface.
    2. Provide ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in the concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615M, Grade 420, or ASTM 615, Grade 60, deformed.
B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706M, deformed where indicated to be welded.
C. Plain -Steel Wire: ASTM A 82, as drawn.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete.
B. Joint Dowel Bars: Plain-steel bars, ASTM A 36M. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I/II.
    1. Fly Ash: ASTM C 618, Class C or F, CaO < 30 percent.
B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
    1. Class: Moderate weathering region, but not less than 3M.
    2. Nominal Maximum Aggregate Size: ¾ inch (19 mm).
    3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.
C. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
B. Air-Entraining Admixture: ASTM C 260.
C. Water-Reducing Admixture: ASTM C 494, Type A.
D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.6 VAPOR RETARDERS

A. Crawl space and below exterior concrete slab Encapsulation System; by Stego Industries, LLC, or Raven Industries Vapor Block 20 meeting the above specifications.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlappolyethylene sheet.
C. Water: Potable.
D. Provide A.H. Harris and Sons, Inc. "Konkure Clear Emulsion" followed by Consolideck
E. "Saltguard WB" to be applied per manufacturer's recommendations on slabs as follows: Sally Port slab; mechanical slab, garage slab and sidewalk. Clear, Solvent-
F. Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1,
G. Class A.

2.8 RELATED MATERIALS

A. Joint Filler Strips: ASTM D 1752, cork or self-expanding cork.
B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.9 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
    1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
B. Use a qualified independent testing agency for preparing and reporting proposed mix design for the laboratory trial mix basis.
C. Proportion normal-weight concrete mix as follows:
    1. Compressive strength (28 Days): 4000 psi.
    2. Minimum Cementitious Materials Content:
    3. Slump: 2 to 4 inches (51 to 102 mm), footings and foundation walls.
    4. Slump: 3 to 6 inches (76 to 152 mm), slabs-on-grade.
    5. Maximum Slump for Concrete Containing High-Range Water-Reducing
    a. Admixture: 8 inch (203 mm) after admixture is added to concrete with 2 to 4 inches (51 to 102 mm) slump.
    6. Maximum Water-Cementitious Materials Ratio: 0.45
    7. Air Content: For concrete elements exposed to weather, add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 5.0 percent within a tolerance of plus 1.0 or minus 1.5 percent.
D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
    1. Fly Ash: Maximum 25 percent.
    2. No fly ash used if the average temperature will be below 55 deg F (12.8 deg C).
E. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
F. Admixtures: Use admixtures according to manufacturers written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

G. Floor Hardener: Hardening agent for exposed concrete floors (Section 03300, 3.12 for location) shall be dry-shake surface hardener Masterplate 200 by Master Builders, Inc., or approved equal. The standard application rate for this product shall be in accordance with the manufacturer's recommendations.

H. Concrete Curing and Sealing Compound: Where a sealer is necessary, use a concrete sealing and curing compound. Compound shall be Master Builders "Masterkure CR" (Clear) or approved equal. Application of this product shall be in accordance with the manufacturer's recommendations.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information describing actual weight or quantities of all materials comprising the mix including fine aggregate moisture content.
    1. When air temperature is between 84 to 90 deg F (29 and 32 deg C), reduce mixing and delivery time form 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Need to add Concrete Finishes: sealer, epoxy coating, etc

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

A. General: Erect and maintain formwork to support loads that might be applied until concrete structure can support such loads. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 117 limits:
    1. Footing Top Elevation: Plus 1 to minus 1-9/16 inch (25 mm to minus 40 mm).
    2. Foundation Wall Top and Pilaster Elevations: +/-1/4 inch (+/- 7 mm), 3/8 inch (10 mm) maximum, variation over 10 feet (3050 mm).

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, recesses, and the like for easy removal.

C. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Locate temporary openings in forms at inconspicuous locations.
D. Chamfer exposed corners and edges as indicated.
E. Provisions for Other Trades: Provide openings in concrete formwork to accommodate
F. Work of other trades. Determine size and location of openings from trades providing such items. Accurately place and securely support items built into forms.
G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete.

3.3 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete. Use setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    1. Install anchor bolts, accurately located within 1/8 inch (3.2 mm) in plan and 1/2 inch (12.5 mm) to elevations indicated.
    2. Install embedment plates, accurately located within 1/4 inch (6.4 mm) of indicated.
    3. Coordinate with Decompression Skid supplier for all penetrations, inserts, anchor bolts, bond outs, etc.

3.4 REMOVING AND REUSING FORMS

A. General: Formwork for sides of walls and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than
B. 50 deg F (10 deg C)for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable or exposed surfaces. Apply new form-release agent
D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by CM.

3.5 VAPOR RETARDER INSTALLATION

N/A

3.6 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by CM
D. Do not use masonry blocks, piles of concrete, or similar means to support and position reinforcing for concrete slabs-on-grade.
E. Place reinforcement to maintain minimum coverage as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.7 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure.
B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise.
C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete, intended to create a continuous monolithic surface.
D. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
E. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."
F. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch (3 mm) wide by one-fourth of slab depth or inserts 1/4 inch (6 mm) wide by one-fourth of slab depth, unless otherwise indicated.
    1. Form contraction joints by inserting pre-molded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
    2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
    3. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.8 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their Work.

B. Before placing concrete, water may be added at Project site if specified slump and water-cementitious ratio is not exceeded.
    1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 600 mm and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
    1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309 R.
    2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
    1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
    2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
    3. Maintain reinforcing in proper position on chairs during concrete placement.
F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete Work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
    1. When air temperature has fallen to or is expected to fall below 39 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 81 deg F (27 deg C) at point of placement.
    2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
    3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
G. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or choppedice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and sub-grade just before placing concrete. Keep sub-grade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to CM.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 6 mm in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
    1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
    1. Combine one part Portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland cement and white Portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
    2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent

formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushed, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10 feet (3050 mm) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:
    a. 1/4 inch (6.4 mm).
3. Finish and measure surface elevation so maximum elevation difference, compared to that specified, does not exceed the following:
    b. Plus 3/8 inch (10 mm), minus 5/8 inch (15 mm), slabs on grade.
    c. Plus 3/8 inch (10 mm), minus 3/8 inch (10 mm), slabs on deck.

E. Trowel and Fine Broom Finish: Apply a partial finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, follow by slightly scarifying the surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with CM before application.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of Work by other trades, unless otherwise shown or directed, after Work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 7 days.

C. Curing Methods: Cure concrete by curing compound, by moist curing, or by combining these methods, as specified.

D. Provide moisture curing by the following methods:
   1. Keep concrete surface continuously wet by covering with water.
   2. Use continuous water-fog spray.

E. Apply curing compound on all exposed concrete as follows:
   1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared).
   2. Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
   3. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

F. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

G. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

3.13 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to CM.

B. Mix dry-pack mortar, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 1/16 inch (1.2 mm) sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch (6 mm) in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch (25 mm). Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
2. For surfaces exposed to view, blend white Portland cement and standard
    a. a. Portland cement so that, when dry, patching mortar will match surrounding color.
    b. b. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of CM. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of .010 inch (0.25 mm) wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to CM.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch (25 mm) in diameter, by cutting out and replacing with fresh concrete.
5. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes 1 inch (25 mm) or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

F. Perform structural repairs with prior approval of CM for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of CM.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to sample materials, perform test, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yards plus one set for each additional 52 cu. Yards or fraction thereof.
   2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below, and when 81 deg F (27 deg C) and above, and one test for each composite sample.
   5. Unit Weight: ASTM C 567, fresh unit weight; one test for each composite sample.
   6. Compression Test Specimens: ASTM C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
   7. Compressive-Strength Tests: ASTM C 39, test one laboratory-cured specimens at 7 days and two at 28 days, hold one. A compressive strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 3.4 MPa.
D. Test results will be reported in writing to CM, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests. Reports shall be clearly stamped as conforming or non-conforming.
E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by CM. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 30 00

SECTION 07 84 00 – FIRE STOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Firestopping systems including the following:
   1. Fire resistive joint fire containment.
   2. Fire containment for single membrane penetrations.
   3. Penetrations through fire-rated vertical and horizontal assemblies.
   4. Firestop sealants.
   5. Firestop pillows.
   6. Firestop composite sheets.
   7. Firestop tapes.
   8. Firestop wrap strips.
   9. Firestop putty.
   10. Firestop mortar.
   11. Firestop sprays.
   12. Through penetration firestopping.

1.2 RELATED SECTIONS

A. Section 079200 - Joint Sealers.

1.3 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI/UL 263 - Fire Tests of Building Construction and Materials.
   2. ANSI/UL 723 - Surface Burning Characteristics of Building Materials.
   3. ANSI/UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.
   4. ANSI/UL 1709 - Rapid Rise Fire Tests of Protection Materials for Structural Steel.
   5. ANSI/UL 2079 - Tests for Fire Resistance of Building Joint Systems.

B. ASTM International (ASTM):
   1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   3. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
   4. ASTM E 1399 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
   5. ASTM E 1966 - Standard Test Method for Fire Resistive Joint Systems.
   6. ASTM E 1529 - Standard Test Methods for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies.
   7. ASTM E 1725 - Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for

Electrical System Components.

8. ASTM E 2307 - Fire Tests of Perimeter Fire Barrier Systems Using Intermediate Scale, Multi-Story Test Apparatus.

C. FM Global (FM) - FM4991 - Standard for Approval of Firestop Contractors.

D. International Code Congress (ICC):
   1. International Building Code (IBC).
   2. International Residential Code (IRC).

E. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code.
   2. NFPA 101 - Life Safety Code.

F. Underwriters Laboratories (UL) - UL Building Materials Directory; Through-Penetration Firestops Systems (XHEZ), Joint Systems (XHBN), Firestop Devices (XHJI), Forming Materials (XHKU), Wall Opening Protective Materials (CLIV), and Fill, Void or Cavity Materials (XHHW).

1.4 PERFORMANCE REQUIREMENTS

A. Provide systems that are listed by at least one the following:
   1. Underwriters Laboratories Inc. (UL), in "Fire Resistance Directory".
   2. Intertek Testing Service (Formerly known as Omega Point Laboratories), in "Directory of Listed Products."
   3. Any other qualified independent testing and inspection agency that conducts periodic follow-up inspections and is acceptable to authorities having jurisdiction.

B. Provide firestop products that are flexible enough to allow for pipe vibration in a through penetration application.

C. Provide firestop sealants and sprays for construction joint applications that are flexible enough to satisfy the movement criteria per the test standards ASTM E 1399, ASTM E 1966 or ANSI/UL 2079.

D. Provide products that meet the intent of the L rating classification for the movement of smoke per ANSI/UL 1479 for through penetrations and ANSI/UL 2079 for construction joints.

E. Provide products identical to those tested and listed for classification by UL, Intertek or any other qualified independent testing agency.

F. Provide products that bear classification marking of qualified independent testing agency.

G. Where firestop systems not listed by any listing agency are required due to project conditions, submit a substitution proposal with evidence specified.

H. Use only products specifically listed for use in listed systems.

I. Provide products that are compatible with each other, with the substrates forming openings, and with the items, if any, penetrating the firestopping, under the conditions represented by this project, based on testing and field performance demonstrated by manufacturer.

J. Firestopping materials must meet and be acceptable for use by all building codes and NFPA codes cited in this section.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300.
B. Shop Drawings: For each firestopping system, provide the following:
    1. Listing agency's detailed drawing showing opening, penetrating item(s), and firestopping materials, identified with listing agency's name and number or designation and fire rating achieved. .
    2. For proposed systems that do not conform strictly to the listing, submit listing agency's drawing marked to show modifications and approved by firestop system manufacturer.
C. Product Certificates: Submit certificates of conformance signed by firestop system manufacturer certifying that materials furnished comply with requirements.
D. Product Data: Furnish manufacturer's product data sheets on each material to be used in firestop systems. Information on manufacturer's product data sheet should include:
    1. Product characteristics including compliance with appropriate ASTM/UL/ANSI test standards.
    2. Storage and handling requirements and recommendations.
E. Installation Instruction: Furnish manufacturer's installation instructions.

1.6 QUALITY ASSURANCE

A. General: All through-penetration firestop systems shall be installed with approved methods using materials that have been tested and classified to produce an approved assembly.
B. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of twenty five (25) years experience.
C. Installer Qualifications: Firm must be qualified by having experience, staff, and be properly trained to install the specified products, and meets the following criteria:
    1. Contractor is acceptable to manufacturer.
    2. Contractor is acceptable to authority having jurisdiction.
    3. Contractor has completed the manufacturer's certified product installation training, if applicable.
    4. Contractor must provide a list of completed projects as evidence of experience; include project name and address, owner's name and address, and architect's name and phone number.
    5. Certificate: Contractor should provide certificate of qualification.
D. Codes: Where manufacturer's application procedures are in conflict with those of the code authority having jurisdiction, the more strict guidelines will prevail.
E. Pre-installation Meetings: Meetings to agree on firestop requirements, conditions, manufacturer's instructions.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products until ready for installation in manufacturer's original unopened packaging, legibly marked with manufacturer's name and product identification, date of manufacture, lot number, shelf life, listing agency's classification marking, curing time, and mixing instructions if applicable.

B. Store and handle in such a manner as to prevent deterioration or damage due to moisture, temperature changes, contaminants, and other causes; follow manufacturer's instructions.
C. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Coordinate construction and cutting of openings so that each particular firestop system may be installed in accordance with its listing, including sizing, sleeves, and penetrating items.
B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install firestopping under environmental conditions outside manufacturer's absolute limits.
C. Provide ventilation as required by firestopping manufacturer, including mechanical ventilation if required.

1.9 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Single Source: To maintain control and integrity of the firestop applications a single manufacturer should be used. Specific UL or approved listing agencies systems applicable to each type of firestop condition should be supplied by one manufacturer.

2.2 SCOPE/APPLICATION

A. Provide installed firestop protects that limit the spread of fire, heat, smoke, and gasses through otherwise unprotected openings in rated assemblies, including walls, partitions, floors, roof/ceilings, and similar locations. Restore the integrity of the fire rated construction to its original fire rating.
B. Provide firestop systems listed for the specific combination of fire rated construction, type of penetrating item, annular space requirements, and fire rating, and the following criteria:
    1. F-Rating: Equal to or greater than the fire-resistance rating of the assembly in which the firestopping will be installed.
    2. T-Rating: In habitable areas where penetrating items are exposed to potential contact with materials on fire side(s) of rated assembly, T-rating must equal its F-rating.
    3. L-Rating: L-rating of 1 cfm per linear foot (5.5 cu m/h/m) maximum at ambient temperatures.
    4. Wall Penetrations: Systems must be symmetrical, with the same rating from both sides of the wall.
    5. Testing: Determine ratings in accordance with ASTM E 814 or UL 1479.
C. Provide firestopping systems listed for construction gaps per the specific combination of fire-

rated construction type, configuration, gap dimensions, and fire rating, and the following criteria:

1. Fire resistance rating must be equal to or greater than that of the assembly in which it is to be installed.
2. Movement capability must be appropriate to the potential movement of the gap, demonstrated by testing in accordance with ASTM E 1399 for minimum of 500 cycles at 10 cycles per minute.
3. L-Rating: L-rating of 1 cfm per linear foot (5.5 cu m/h/m) maximum.
4. Determine ratings in accordance with UL 2079.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. Conduct tests according to manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt and other foreign substances capable of impairing bond of firestopping.
C. Verify that items penetrating fire rated assemblies are securely attached, including sleeves, supports, hangers, and clips.
D. Verify that openings and adjacent areas are not obstructed by construction that would interfere with installation of firestopping, including ducts, piping, equipment, and other suspended construction.
E. Verify that environmental conditions are safe and suitable for installation of firestopping.
F. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Prepare substrates in accordance with manufacturer's instructions and recommendations.
B. Install masking and temporary coverings as required to prevent contamination or defacement of adjacent surfaces due to firestopping installation.

3.3 INSTALLATION

A. Install in strict accordance with manufacturer's detailed installation instructions and procedures.
B. Install so that openings are completely filled and material is securely adhered.
C. Where firestopping surface will be exposed to view, finish to a smooth, uniform surface flush with adjacent surfaces.
D. After installation is complete, remove combustible forming materials and accessories that are not part of the listed system.
E. Repair or replace defective installations to comply with requirements.
F. At each through penetration, attach identification labels on both sides in location where label will be visible to anyone seeking to remove penetrating items or firestopping.
G. Clean firestop materials off surfaces adjacent to openings as work progresses, using methods and cleaning materials approved in writing by firestop system manufacturer and which will not

damage the surfaces being cleaned.

H. Notify authority having jurisdiction when firestopping installation is ready for inspection; obtain advance approval of anticipated inspection dates and phasing, if any, required to allow subsequent construction to proceed.

I. Do not cover firestopping with other construction until approval of authority having jurisdiction has been received.

3.4 FIELD QUALITY CONTROL

A. Owner will engage an independent testing agency to inspect installed firestopping and to prepare reports indicating whether the installed work complies with the contract documents.

B. Notify testing agency at least 7 days prior to date when firestopping installation will be ready for inspection; obtain advance approval of general schedule and phasing, if any, required to allow subsequent construction to proceed.

3.5 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Install identification Labels for Through Penetration and Construction Joint Systems: Pressure sensitive self-adhesive vinyl labels, preprinted with the following information:

1. The words "Warning - Through Penetration Firestop System - Do not Disturb. Notify Building Management of Any Damage."
2. Listing agency's system number or designation.
3. System manufacturer's name, address, and phone number.
4. Installer's name, address, and phone number.
5. General contractor's name, address, and phone number (if applicable).
6. Date of installation.

END OF SECTION 07 84 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes sealants as indicated on the drawings and joint sealer schedule in Part 4 of this Section.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and Governments, and other information specified.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion

F. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

G.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
    1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
    2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F (4.4 deg C).
    3. When joint substrates are wet.
B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 4.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    1. Architectural Sealants: 250 g/L.
    2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

C. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full-range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 4, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule; Part 4.

2.5 ACOUSTICAL JOINT SEALANTS/FIRE STOPPING SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule; Part 4, provide manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule; Part 4, provide manufacturer's standard, non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.6 JOINT FILLERS FOR EXTERIOR CONCRETE PAVING

A. General: Provide joint fillers of thickness and widths indicated.

B. Bituminous Fiber Joints: Preformed strips of composition below, complying with ASTM D 1751:

1. Asphalt saturated fiberboard.

2.7 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
    1. Type O: Open-cell material.
C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
    1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
    2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
    3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.
5. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.
    a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

PART 4 - SCHEDULES

4.1 JOINT SEALERS

A. Products: Subject to compliance with requirements, provide one of the following:
    1. Two-Part Pourable Urethane Sealant: Exterior and interior joints in horizontal surfaces of concrete; between metal and concrete between masonry and concrete.
        a. "Vulkem 245"; Mameco International, Inc.
        b. "NR-200 Urexpan"; Pecora, Corp.
        c. "Sonolastic Paving Joint Sealant"; Sonneborn Building Products Div.,
        d. Chem Rex, Inc.
        e. "THC-900"; Tremco, Corp.

    2. Two-Part Non-Sag Urethane Sealant: Exterior and interior joints in vertical surfaces of concrete and masonry; between concrete or masonry; between metal and concrete or masonry; perimeters of metal frames or sleeves in exterior walls; overhead or ceiling joints; and on interior of glazed storefront system.
        a. "Vulkem 922"; Mameco International, Inc.
        b. "Sikaflex 2c NS"; Sika Corporation.
        c. "Sonolastic NP2"; Sonneborn Building Products Div., Chem Rex, Inc.

3. Acoustical Joint Sealants: Interior joints between stud framing and concrete floor slabs, concrete or masonry walls or overhead floor or roof structure. Around and behind electrical, mechanical, or plumbing devices or penetrations in walls which also contain acoustical batt insulation.
    a. Acoustical sealant for exposed joints:
        i. "SHEETROCK Acoustical Sealant"; United States Gypsum Co.
        ii. "AC-20 FTR Acoustical and Insulation Sealant"; Pecora Corp.
    b. Acoustical sealant for concealed joints:
        i. "BA-98"; Pecora Corp.
        ii. "Tremco Acoustical Sealant"; Temco, Inc.

    NOTE: Install sealant indicated in joints fitting descriptions and locations listed and as indicated on drawings.

END OF SECTION 07 92 00

SECTION 23 11 23 – FACILITY NATURAL GAS PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Fuel gas systems, including piping, equipment and all necessary accessories as designated in this section. Fuel gas piping for central boiler plants is not included.

1.2 RELATED WORK

A. Section 07 84 00 – FIRESTOPPING SEALANT
B. Section 23 51 01 – BOILER STACK LINERS

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures
B. Manufacturer's Literature and Data:
   1. Natural Gas Piping
   2. Unions & Fittings.
   3. Valves.
   4. Strainers.
   5. Regulators
   6. Relief Valves
   7. Pipe Markers
   8. Bedding and Cover materials
   9. All items listed in Part 2 - Products.
C. Detailed shop drawing of clamping device and extensions when required in connection with the waterproofing membrane.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
B. Federal Specifications (Fed. Spec.):
   A-A-59617 ..... Unions, Brass or Bronze Threaded, Pipe Connections and Solder-Joint Tube Connections
C. American National Standards Institute (ANSI):
   American Society of Mechanical Engineers (ASME): (Copyrighted Society)
   A13.1-(2007) ..... Scheme for Identification of Piping Systems
   B16.3-(2006) ..... Malleable Iron Threaded Fittings: Classes 150 and 300 ANSI/ASME
   B16.9-2007 ..... Factory-Made Wrought Steel Buttwelding Fittings ANSI/ASME
   B16.11-2009 ..... Forged Steel Fittings, Socket-Welding and Threaded ANSI/ASME
   B16.15-2006 ..... Cast Copper Alloy Threaded Fittings: Classes 125 and 250 ANSI/ASME
   B31.8-2010 ..... Gas Transmission and Distribution Piping Systems ANSI/ASME
D. American Society for Testing and Materials (ASTM):
   A47-99(2009) ..... Standard Specification for Ferritic Malleable Iron Castings
   A53-10 ..... Standard Specification for Pipe, Steel, Black And Hot-Dipped, Zinc-coated Welded and Seamless

A183-09.....Standard Specification for Carbon Steel Track Bolts and Nuts
A536-09.....Standard Specification for Ductile Iron Castings
A733-03(2009)e1 .....Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
B687-99(2005)e1 .....Standard Specification for Brass, Copper, and Chromium-Plated Pipe Nipples

E. National Fire Protection Association (NFPA):
54-2009 .....National Fuel Gas Code
F. International Code Council
IPC 2009 .....International Plumbing Code
IFGC 2009.....International Fuel Gas Code
G. International Association of Plumbing and Mechanical Officials (IAPMO):
Uniform Plumbing Code – 2009
IS6-06 .....Installation Standard
H. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
SP-72-2010 .....Ball Valves with Flanged or Butt-Welding For General Service
SP-110-2010.....Ball Valve Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
I. Underwriters Laboratory (UL)
J.... American Gas Association (AGA)

1.5 SYSTEM PRESSURE

Natural gas systems, unless otherwise noted, are designed and materials and equipment selected to prevent failure under gas pressure of 50 psi entering the property and 1.5 - 2 psi at downstream side of pressure regulator.

1.6 SYSTEM DESCRIPTION

A. When more than one piping system is specified, provide compatible system components and joints. Use non-conducting dielectric connection when joining dissimilar metals in systems.
B. Provide flanges, unions, or couplings at location requiring servicing. Use unions, flanges, or couplings downstream of valve and at equipment locations. Do not use direct welded connections at valves and equipment
C. Use plug, ball, or butterfly valves for shut-off and to isolate equipment, parts of systems, or vertical risers.

PART 2 - PRODUCTS

2.1 FUEL GAS SERVICE CONNECTIONS TO BUILDING

A. From inside face of exterior wall to a distance of approximately 5 feet outside of building, use coated piping.
B. Pipe: Black steel, ASTM A53, Schedule 40. Shop-applied pipe coating shall be one of the following types:
1. Coal Tar Enamel Coating: Exterior of pipe and fittings shall be cleaned, primed with Type B primer and coated with hot-applied coal tar enamel with bonded layer of felt wrap in accordance with AWWA C203. Asbestos felt shall not be used; felt material shall be fibrous glass mat as specified in Appendix Section A2.1 of AWWA C203.

2. Adhesive-thermoplastic Resin Coating: Fed. Spec. L-C-530, Type I
3. Thermosetting Epoxy Coating: Fed. Spec. L-C-530, Type II
4. Field-applied plastic tape material used on pipe joints and for repairing damaged areas of shop-applied coatings, Fed. Spec. L-T-1512, Type I, 10 mils nominal thickness for pipe joints, and Type II, 20 mils nominal thickness for coating repairs.

C. Holiday Inspections: Procedure for holiday inspection: Holiday Inspection shall be conducted on all coatings to determine the presence and number of discontinuities in those coatings referenced in 2.6/B - 1, 2, 3, and 4 using a Tinker & Rasor model AP/W Holiday Detector. Holiday inspection shall be performed in a manner spelled out in the Tinker & Rasor operating instructions and at a voltage level recommended by the coating manufacturer or applicable NACE International Standard such as RPO 274-93 or RPO 490-90 in the case thermosetting epoxy coating. Holiday Detectors shall be calibrated and supplied with a certificate of calibration from the factory. A calibration of the Holiday Detector shall be performed once every 6 months to verify output voltages are true and correct.

D. Fittings:
1. Butt weld fittings, wrought steel, ANSI B16.9.
2. Socket weld and threaded fittings forged steel, ANSI B16.11.
3. Grooved End: Ductile iron (ASTM A536, Grade 65-45-12), malleable iron (ASTM A47, Grade 32510), or steel (ASTM A53, Type F or Type E or S, Grade B).

E. Joints: Welded, ANSI B31.8.

2.2 FUEL GAS PIPING

A. Pipe: Black steel, ASTM A53, Schedule 40.
B. Nipples: Steel, ASTM A733, Schedule 40.
C. Fittings:
1. Sizes 50 mm (2 inch) under ANSI B 16.3 threaded malleable iron.
2. Over 50 mm (2 inch) and up to 100 mm (4 inch) ANSI B16.11 socket welded.
3. Over 100 mm (4 inch) ANSI 16.9 butt welded.

D. Joints: Provide welded or threaded joints.

2.3 EXPOSED FUEL GAS PIPING

A. Finished Room: Use full iron pipe size chrome plated brass piping for exposed fuel gas piping connecting fixtures, casework, cabinets, equipment and reagent racks when not concealed by apron including those furnished by the Government or specified in other sections.
1. Pipe: Fed. Spec. WW-P-351, standard weight
2. Fittings: ANSI B16.15 cast bronze threaded fittings with chrome finish, (125 and 250).
3. Nipples: ASTM B 687, Chromium-plated.
4. Unions: 50 mm (2 inches and smaller) Mss SP-72, SP-110, Brass or Bronze threaded with chrome finish. Unions 65 mm (2-1/2 inches) and larger shall be flange type with approved gaskets.
5. Valves: Mss SP-72, SP-110, Brass or bronze with chrome finish.

B. Unfinished Rooms, Mechanical Rooms and Kitchens: Chrome-plated brass piping is not required. Paint piping systems Safety Yellow for identification.

2.4 VALVES

A. Ball Valve: Bronze body, rated for 1025 kPA at 185ºC (150 psi at 365ºF), 1725 kPa at 121ºC (250 psi at 250ºF), reinforced TFE seat, stem seal and thrust washer; end entry, threaded ends, UL-listed for natural or LP gas shut off service when used on those services.
B. Gas Vent Cocks: Type 701: Bronze body, tee handle, rated for 205 kPa at 38ºC (30 psi at 100ºF), ground plug, rated for tight shut-off on fuel gas service.

2.5 WATERPROOFING

A. Provide at points where pipes pass through membrane waterproofed floors or walls in contact with earth.
B. Floors: Provide cast iron stack sleeve with flashing device and a underdeck clamp. After stack is passed through sleeve, provide a waterproofed caulked joint at top hub.
C. Walls: See detail shown on drawings.

2.6 STRAINERS

A. Provide on high pressure side of pressure reducing valves, on inlet side of indicating and control instruments and equipment subject to sediment damage and where shown on drawings. Strainer element shall be removable without disconnection of piping.
B. Gas Lines: "Y" type with removable mesh lined brass strainer sleeve.
C. Body: Smaller than 80 mm (3 inches), brass or bronze; 80 mm (3 inches) and larger, cast iron or semi-steel.

2.7 DIELECTRIC FITTINGS

A. Provide dielectric couplings or unions between ferrous and non-ferrous pipe.

2.8 GAS EQUIPMENT CONNECTORS

A. Flexible connectors with teflon core, interlocked galvanized steel protective casing, AGA certified design.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with the International Fuel Gas Code and the following:
    1. Install branch piping for fuel gas and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other sections.
    2. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe, shall be reamed to full size after cutting.
    3. All pipe runs shall be laid out to avoid interference with other work.
    4. Install valves with stem in horizontal position whenever possible. All valves shall be easily accessible.
    5. Install union and shut-off valve on pressure piping at connections to equipment.
    6. Pipe Hangers, Supports and Accessories:
        a. All piping shall be supported per the International Fuel Gas Code, Chapter No. 4.
        b. Shop Painting and Plating: Hangers, supports, rods, inserts and accessories used for Pipe supports shall be shop coated with red lead or zinc Chromate primer paint.

Electroplated copper hanger rods, hangers and accessories may be used with copper tubing.

c. Floor, Wall and Ceiling Plates, Supports, Hangers:
   1) Solid or split unplated cast iron, chrome plated in finished areas.
   2) All plates shall be provided with set screws.
   3) Pipe Hangers: Height adjustable clevis type.
   4) Adjustable Floor Rests and Base Flanges: Steel.
   5) Concrete Inserts: "Universal" or continuous slotted type.
   6) Hanger Rods: Mild, low carbon steel, fully threaded or Threaded at each end with two removable nuts at each end for positioning rod and hanger and locking each in place.
   7) Riser Clamps: Malleable iron or steel.
   8) Rollers: Cast iron.
   9) Self-drilling type expansion shields shall be "Phillips" type, with case hardened steel expander plugs.
   10) Miscellaneous Materials: As specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories.

7. Install cast chrome plated escutcheon with set screw at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
8. Penetrations:
   a. Fire Stopping: Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between piping and openings with the fire stopping materials.
   b. Waterproofing: At floor penetrations, completely seal clearances around the pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS.

B. Piping shall conform to the following:
   1. Fuel Gas:
      a. Entire fuel gas piping installation shall be in accordance with requirements of NFPA 54.
      b. Provide fuel gas piping with plugged drip pockets at low points.

3.2 CLEANING OF SYSTEM AFTER INSTALLATION

A. Clean all piping systems to remove all dirt, coatings and debris. Remove all valves, controls etc., and reinstall after piping system has been cleaned.

3.3 TESTS

A. General: Test system either in its entirety or in sections after system is installed or cleaned.
B. Test shall be made in accordance with Section 406 of the International Fuel Gas Code. The system shall be tested at a minimum of 1.5 times maximum working pressure, but not less than 3 psig and 100 psig.
C. Provide testing documentation confirming compliance with all applicable codes and requirements.

END OF SECTION 23 11 23

SECTION 23 51 01 – BOILER STACK LINERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
    1. Listed single or double-wall vents and chimneys

1.2 SUBMITTALS

A. Product Data: For the following:
    1. Chimney liners.
    2. Type B and BW vents.
    3. Type L vents.
    4. Special gas vents.
    5. Building-heating-appliance chimneys.
B. Shop Drawings: For each building where liner will be installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
    1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
    2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 LISTED CHIMNEY LINERS

A. Manufacturers:
    1. American Metal Products; MASCO Corporation.
    2. Cleaver-Brooks
    3. Deflect-O Corp.
    4. Heat-Fab Inc.
    5. Industrial Chimney Company.
    6. Metal-Fab, Inc.
    7. Pringle Power-Vac, Inc.
    8. ProTech Systems Inc.
    9. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
    10. Shook Manufactured Products, Inc.
    11. Simpson Dura-Vent Co., Inc.; Subsidiary of Simpson Manufacturing Co.
    12. Tru-Flex Metal Hose Corp.
    13. Approved Equal

B. Description: Straight of Corrugated, single-wall chimney liner tested according to UL 1777 and rated for 1000 deg F continuously, or 2100 deg F for 10 minutes; with negative or positive flue pressure complying with NFPA 211 and suitable for general usage.
C. Straight Liner Materials: ASTM A 666, Type 316 stainless steel.
D. Corrugated Liner Materials: ASTM A 240/A 240M, Type 321, ASTM A 240/A 240M, Type 430, or ASTM A 959, Type 29-4C.
E. Accessories:
    1. Fittings: Tees, elbows, increasers, draft-hood connectors, metal caps with bird barriers, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar or compatible materials and designs.
    2. Sealant: Manufacturer's standard high-temperature sealant.
    3. Insulating Fill: Manufacturer's standard high-temperature insulation fill material in annular space surrounding chimney liner including high-temperature, ceramic-fiber insulation required to seal chimney at top and bottom.

2.3 LISTED TYPE B AND BW VENTS

A. Manufacturers:
    1. American Metal Products; MASCO Corporation.
    2. FAMCO.
    3. Hart & Cooley, Inc.
    4. Heat-Fab Inc.
    5. Industrial Chimney Company.
    6. LSP Products Group, Inc.
    7. Metal-Fab, Inc.
    8. ProTech Systems Inc.
    9. Schebler Co. (The).
    10. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
    11. Simpson Dura-Vent Co., Inc.; Subsidiary of Simpson Manufacturing Co.
    12. Tru-Flex Metal Hose Corp.
    13. Van-Packer Co.
    14. Approved Equal
B. Description: Double-wall metal vents tested according to UL 441 and rated for 480 deg F continuously for Type B, or 550 deg F continuously for Type BW; with neutral or negative flue pressure complying with NFPA 211 and suitable for certified gas-fired appliances.
C. Construction: Inner shell and outer jacket separated by at least a 1/4-inch airspace.
D. Inner Shell: ASTM A 666, Type 430 stainless steel.
E. Outer Jacket: Galvanized steel.
F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
    1. Termination: Stack cap designed to exclude 90 percent of rainfall.
    2. Termination: Round chimney top designed to exclude 98 percent of rainfall.

3. Termination: Exit cone with drain section incorporated into riser.

2.4 LISTED TYPE L VENT

A. Manufacturers:
   1. American Metal Products; MASCO Corporation.
   2. FAMCO.
   3. Heat-Fab Inc.
   4. Industrial Chimney Company.
   5. LSP Products Group, Inc.
   6. Metal-Fab, Inc.
   7. ProTech Systems Inc.
   8. Schebler Co. (The).
   9. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
   10. Simpson Dura-Vent Co., Inc.; Subsidiary of Simpson Manufacturing Co.
   11. Tru-Flex Metal Hose Corp.
   12. Van-Packer Co.
   13. Approved Equal

B. Description: Double-wall metal vents tested according to UL 641 and rated for 570 deg F continuously, or 1700 deg F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211 and suitable for low-heat appliances.

C. Construction: Inner shell and outer jacket separated by at least a 1-inch airspace filled with high-temperature, mineral-wool insulation.

D. Inner Shell: ASTM A 666, Type 316 stainless steel.

E. Outer Jacket: Galvanized steel.

F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
   1. Termination: Stack cap designed to exclude 90 percent of rainfall.
   2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
   3. Termination: Exit cone with drain section incorporated into riser.

2.5 LISTED SPECIAL GAS VENT

A. Manufacturers:
   1. Heat-Fab Inc.
   2. Metal-Fab, Inc.
   3. ProTech Systems Inc.
   4. Z-FLEX.
   5. Approved Equal

B. Description: Double-wall metal vents tested according to UL 1738 and rated for 480 deg F continuously, with positive or negative flue pressure complying with NFPA 211 and suitable for condensing-gas appliances.

C. Construction: Inner shell and outer jacket separated by at least a 1/2-inch airspace.

D. Inner Shell: ASTM A 959, Type 29-4C stainless steel.
E. Outer Jacket: Stainless steel.
F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
    1. Termination: Stack cap designed to exclude 90 percent of rainfall.
    2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
    3. Termination: Exit cone with drain section incorporated into riser.

2.6 LISTED BUILDING-HEATING-APPLIANCE CHIMNEYS

A. Manufacturers:
    1. American Metal Products; MASCO Corporation.
    2. FAMCO.
    3. Hart & Cooley, Inc.
    4. Heat-Fab Inc.
    5. Industrial Chimney Company.
    6. LSP Products Group, Inc.
    7. Metal-Fab, Inc.
    8. ProTech Systems Inc.
    9. Schebler Co. (The).
    10. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
    11. Simpson Dura-Vent Co., Inc.; Subsidiary of Simpson Manufacturing Co.
    12. Tru-Flex Metal Hose Corp.
    13. Van-Packer Co.
    14. Approved Equal
B. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 deg F continuously, or 1700 deg F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211 and suitable for dual-fuel boilers, oven vents, water heaters, or exhaust for engines.
C. Construction: Inner shell and outer jacket separated by at least a 2-inch annular space filled with high-temperature, ceramic-fiber insulation.
D. Inner Shell: ASTM A 666, Type 316 stainless steel.
E. Description: Double-wall metal vents tested according to UL 103 and 959 and rated for 1400 deg F continuously, or 1800 deg F for 10 minutes; with positive or negative flue pressure complying with NFPA 211 and suitable for dual-fuel boilers, oven vents, water heaters, or exhaust for engines.
F. Construction: Inner shell and outer jacket separated by at least a 2 inch annular space filled with high-temperature, ceramic-fiber insulation.
G. Inner Shell: ASTM A 666, Type 316 stainless steel.
H. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 deg F continuously, or 2100 deg F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211 and suitable for fireplaces and other solid-fuel-burning appliances.

I. Construction: Inner shell and outer jacket separated by at least a 2 inch annular space filled with high-temperature, ceramic-fiber insulation.
J. Inner Shell: ASTM A 666, Type 316
K. Outer Jacket: Galvanized steel.
L. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
    1. Termination: Stack cap designed to exclude 90 percent of rainfall.
    2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
    3. Termination: Exit cone with drain section incorporated into riser.

PART 3 - EXECUTION

3.1 INSTALLATION OF LISTED LINERS, VENTS AND CHIMNEYS

A. The chimney and flue must meet UL standards and carry the appropriate approval labels.
B. All seams in component parts to be joined by continuous laser welds. Component parts to be joined by manufacturers required seals, bands, and jointing materials.
C. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
D. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
E. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
F. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.

END OF SECTION 23 51 01

SECTION 31 22 13 - ROUGH GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of topsoil and subsoil.

B. Cutting, grading, filling and rough contouring the site.

1.2 RELATED SECTIONS

A. Section 311000 - Site Clearing

B. Section 312316 - Excavation

C. Section 312317 - Trenching

D. Section 312323 - Fill

E. Section 321216 – Bituminous Asphalt Paving

F. Section 329119 - Landscape Grading

1.3 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 78 39.

B. Accurately record actual locations of utilities remaining, by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Excavated material, graded, free of roots, rocks larger than one inch, subsoil, debris, and larger weeds.

B. Subsoil: Excavated material, graded, free of lumps larger than six inches, rocks larger than three inches, and debris.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

B. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag utility locations.

C. Notify utility company to remove and relocate utilities.

D. Protect above and below grade utilities that remain.

E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

F. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

A. Do not excavate wet topsoil.
B. Stockpile topsoil for reuse from site if suitable material.

3.4 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
B. Stockpile in area designated on site. Remove excess subsoil, not being reused, from site.
C. Stockpile subsoil and cover to protect from erosion.
D. D. When excavating through roots is necessary, perform work by hand and cut roots with a sharp axe.

3.5 FILLING

A. Fill areas to contours and elevations with unfrozen materials.
B. Subsoil and Topsoil Fill: Place and compact material in continuous layers not exceeding 12 inches compacted depth, compacted to 95 percent.
C. Maintain optimum moisture content of fill materials to attain required compaction density.
D. Make grade changes gradual. Blend slope into level areas.
E. Remove surplus fill materials from site.

3.6 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1 in.

3.7 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Section 01 40 00.
B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION 31 22 13

SECTION 31 23 16 - EXCAVATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation for site structures.

1.2 RELATED SECTIONS

A. Section 311000 - Site Clearing.
B. Section 312213 - Rough Grading.
C. Section 312317 - Trenching.
D. Section 312318 - Rock Removal.
E. Section 312323 - Fill.

1.3 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

PART 2 - EXECUTION

2.1 PREPARATION

A. Identify required lines, levels, contours, and datum.
B. Identify known underground, above ground and aerial utilities. Stake and flag locations.
C. Erect sheeting, shoring, and bracing as necessary for protection of persons, improvements, and excavations and as indicated on the Drawings.
D. Provide dewatering and drainage as required to accomplish work of this section.
E. Protect new construction, existing structures, existing utilities, plants, trees, etc. at all times. Report any damages immediately to Engineer and proper authorities.
F. Use extreme caution when excavating near underground utilities. Employ manual excavation where necessary.
G. Inform appropriate utility or agency of all actions in vicinity of underground pipes, mains, conducts, wires, etc. Coordinate all work with appropriate utility or agency and comply with all requirements.

2.2 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.
B. Excavate subsoil required to accommodate paving and site structures.
C. Machine slope banks to angle of repose or less, until shored.
D. Excavate all materials regardless of nature of elevations and dimensions indicated plus sufficient space for forming, shoring, draining, inspection, etc. Excavate using open cut method unless otherwise indicated or permitted.
E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
F. Hand trim excavation. Remove loose matter.

G. Allow Engineer to inspect bottom of excavation for suitability of base material.
H. Remove unsuitable base material to a depth of at least 12 inches below any pipe or
A. structure or to a depth directed by the Engineer and replace with compacted screened gravel or crushed stone or provide proper base as otherwise directed by Engineer. Place no footing, wall, structure, pipe, etc. on unsuitable material.
I. Place no structure, pipe, etc. partially on earth and partially on rock. Remove rock and replace with compacted screened gravel or crushed stone.
J. Protect excavation bottoms from frost and weathering. Place no structure, pipe, etc. on frozen or weathered ground.
K. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
L. Correct unauthorized excavation at no extra cost to Owner.
M. Correct areas over-excavated by error in accordance with Section 31 23 23.
N. Stockpile excavated material in area designated on site and remove excess material not being reused, from site.

2.3 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01 40 00.
B. Provide for visual inspection of bearing surfaces.

2.4 PROTECTION

A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

END OF SECTION - 31 23 16

SECTION 31 23 17 – TRENCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavate trenches for utilities from property lines to municipal utilities and for municipal
A. utilities within right-of-ways.
B. Compacted bedding under fill over utilities to subgrade elevations.
C. Backfilling and compaction.

1.2 RELATED SECTIONS

A. Section 312313 - Rough Grading.
B. Section 312316 - Excavation.
C. Section 312323 - Fill.
D. Section 321216 - Asphalt Paving.

1.3 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

1.4 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as shown on drawings.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Types as specified in Section 312323.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be reused, are acceptable and obtain Engineer's approval.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.
B. Maintain and protect existing utilities remaining, which pass through work area.
C. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
E. Protect above and below grade utilities which are to remain.

F. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with approved granular material and compact to density equal to, or greater than, the requirements for subsequent backfill material.
G. Cut pavement using masonry saw, pavement breaker, or other appropriate device to provide a uniform edge and to minimize damage to remaining pavement. Do not use removed pavement as fill.

3.3 EXCAVATION

A. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
B. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
C. Hand trim excavation. Remove loose matter.
D. Remove lumped subsoil, boulders, and rock.
E. Correct unauthorized excavation at no cost to Owner.
F. Correct areas over-excavated by error in accordance with Section 312323.
G. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.4 BEDDING

A. Support pipe and conduit during placement and compaction of bedding fill.
B. Do not compact crushed stone over any flexible plastic pipe.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen materials.
B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
C. Granular Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.
D. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
E. Employ a placement method that does not disturb or damage pipe in trench.
F. Maintain optimum moisture content of fill materials to attain required compaction density.
G. Remove surplus fill materials from site.
H. Leave fill material stockpile areas completely free of excess fill materials.

3.6 TOLERANCES

A. Top Surface of Backfilling: Under Paved Areas plus or minus one half inch from required elevations.
B. Top Surface of General Backfilling: Plus or minus one inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Section 014000.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and Section 014000.
C. Compaction testing will be performed in accordance with ANSI/ASTM D698 and with Section 014000.
D. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no cost to Owner.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 015000.

END OF SECTION 31 23 17

SECTION 31 23 23 - FILL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Site filling and backfilling.
B. Fill and aggregate subbase under paving.
C. Consolidation and compaction.
D. Fill for over-excavation.

1.2 RELATED SECTION

A. Section 312213 - Rough Grading.
B. Section 312316 - Excavation.
C. Section 312317 - Trenching.
D. Section 312318 - Rock Removal.
E. Section 321216 - Asphalt Paving.
F. Section 329119 - Landscape Grading.

1.3 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
B. ANSI/ASTM D698 - Test Method for Moisture Density Relations of Soils and oil Aggregate Mixtures, Using 5-lb Rammer and 12-inch Drop.
C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
D. ASTM D2922 - Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).
E. ASTM D2487 - Classification of Soils for Engineering Purposes.
F. ASTM 4318 - Test Method For Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
G. ASTM D1140 - Test Method For Amount of Material in Soils Finer than the No. 200 (75 -µm) sieve.

PART 2 - PRODUCTS

2.1 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENT

A. General: Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock or sand, free from grass, roots, brush, or other vegetation.
B. Fill and backfill to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension no larger than three inches for structures and 1 inch for tape coated pipe or PVC pipe.
C. Suitable Materials: Soils not classified as unsuitable as defined in paragraph entitled, "Unsuitable Material" herein, are defined as suitable material and may be used in fills, backfilling, and embankment construction subject to approval by Engineer, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
D. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required to meet the requirements of the section or to meet the quantity requirements of the project, the Contractor shall provide the imported materials at no additional expense to the Owner, unless a unit price item is included for imported materials in the bidding schedule.
E. The following types of suitable materials are designated and defined as follows:

1. COMMON BORROW

   Common borrow shall consist of earth, suitable for embankment construction. It shall be free from frozen material, perishable rubbish, peat, and other unsuitable material. The moisture content shall be sufficient to provide the required compaction and stable embankment. In no case shall the moisture content exceed four percent above optimum. The optimum moisture content shall be determined in accordance with ASTM D698.

2. CRUSHED STONE

   Crushed stone shall be durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock and reasonably free from thin, flat, elongated, or other objectionable pieces. The crushed stone shall be reasonably free from sand, clay, loam, chemical decay, or deleterious materials and not more than one percent of material passing a No. 200 sieve will be allowed to adhere to the crushed stone. The crushed stone shall be uniformly blended according to the grading requirements listed in the following tables:

   3/4" inch crushed stone:

Sieve Size	Weight Passing (%)
1"	100
3/4"	95-100
1/2"	35-70
3/8"	0-25

   1 1/2" inch crushed stone:

Sieve Size	Weight Passing (%)
2"	100
1 1/2"	95-100
1"	35-70
3/4"	0-25

3. SAND

   Sand shall be well graded coarse sand without excessive fines and free from loam, clay, and organic matter. Beach sand shall not be used. The grading requirements are as follows:

Sieve Size	Weight Passing (%)
3/8"	100
No. 4	95-100
No. 16	50-85
No. 50	10-30
No. 100	2-10

4. AGGREGATE SUBBASE

Aggregate sub-base shall be sand or gravel consisting of hard durable particles which are free from vegetable matter, lumps, or balls of clay, and other deleterious substances. The gradation of the portion which will pass a 3 inch sieve shall meet the grading requirements of the following table:

Sieve Size	Weight Passing (%)
1/4"	25-70
No. 40	0-30
No. 200	0-7

Granular subbase and gravel subbase shall not contain particles of rock which will not pass the six inch square mesh sieve. Gradation tests shall conform to ASTM C136 except that the material may be separated on the 1/2 inch sieve.

5. AGGREGATE BASE

Aggregate Base shall be screened or crushed gravel consisting of hard durable particles which are free from vegetable matter, lumps or balls of clay, and other deleterious substances. The gradation of the part that passes a 3 inch sieve shall meet the grading requirements of the following table:

Sieve Size	Weight Passing (%)
1/2"	45-70
1/4"	30-55
No. 40	0-20
No. 200	0-5

Screened gravel base shall not contain particles or rock which will not pass the 4 inch square mesh sieve. Crushed gravel base shall not contain particles or rock which will not pass the two inch square mesh sieve. Gradation tests shall conform to ASTM C136 except that the material may be separated on the 1/2 inch sieve.

6. STRUCTURAL FILL AND BACKFILL

Structural fill shall be a material free from organic matter, frozen material and other deleterious substances. Maximum particle size should not exceed two-thirds of the proposed loose lift thickness. All fill that will support foundations and fill that is placed within the building area be compacted to at least 95% of it's maximum dry density as determined by ASTM D-1557. Fill placed adjacent to foundations as backfill will be a clean granular material meeting the gradation requirements of the following table:

Sieve Size	Weight Passing (%)
4"	100
3"	90-100
¼"	25-90
#40	0-30
#200	0-5

7. REFILL MATERIAL
   Refill material for replacement of unsuitable material or rock excavation below grade shall be aggregate subbase material or crushed stone of 3/4 inch maximum size, free from silt, loam, and clay.

8. BEDDING MATERIAL
   Where any of the above material is to be used for bedding materials, it shall further meet the following additional criteria. Bedding material shall be so graded that 100% will pass a one (1) inch screen and not more than 10% will pass a 200-mesh sieve. Gradation test results of the bedding material shall be submitted to the Engineer for approval. In the event abnormally unstable or wet conditions are encountered, bedding material shall be crushed stone, if directed by the Engineer.

2.2 UNSUITABLE MATERIAL

A. Unsuitable soils for fill and backfill material shall include soils which, when classified under the standard method for "Classification of Soils for Engineering Purposes"(ASTM D2487), fall in the classifications of Pt, OH, CH, MH, or OL.
B. In addition, any soil containing organic matter, having a plastic limit of less than 8 percent when tested in accordance with the requirements of ASTM D4318 and containing more than 25 percent of material, by weight, passing the No. 200 sieve when analyzed according to the requirements of ANSI/ASTM D1140, or any soil which cannot be compacted sufficiently to achieve the percentage of maximum density specified for the intended use, shall be classed as unsuitable material.

2.3 SUBMITTALS

A. Contractor shall submit testing in accordance with Section 014000.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be reused are acceptable.

3.2 PREPARATION

A. Scarify and re-compact sub-grade to density required for subsequent backfill materials.
B. Cut out soft areas of sub-grade not capable of in-situ compaction. Backfill with an approved granular material. Compact to a density equal to or greater than requirements for subsequent backfill material.
C. Prior to placement of aggregate sub-base course material at paved areas, compact subsoil to 95 percent of its maximum dry density in accordance with ANSI/ASTM D698.

3.3 BACKFILLING

A. Use suitable materials from excavations which conform to the requirements herein or are approved by the Engineer for backfill up to rough grade lines except where these specifications have more stringent or special requirements for certain parts of the contract work. Supply extra fill if there is not enough fill to complete the project. Use no material from any excavation as backfill unless approved by the Engineer.
B. Material within two feet of finished grade in any areas to be paved or within five feet horizontally of any structure shall contain no stone having any dimension exceeding six inches satisfactorily disposed of. In the event sufficient suitable excavated material is not available for backfill, supply a granular backfill.
C. Place materials in layers of thicknesses specified herein but in no case greater than 12 inches before compaction. Wet backfill when necessary, uniformly, to obtain required density. Compact each layer with vibratory compactors before placing next layer.
D. In cross-country runs, trenches shall be backfilled and mounded six inches above surrounding grade in addition to the normal compaction procedure.
E. In street work, backfill above the haunching to a depth of 18 inches below finish grade will be placed in 12 inch layers and then compacted. Backfill in the remaining 18 inches will be placed in six inch layers of base or sub-base as specified and then compacted.
F. In backfilling around structures, place material in 8 inch layers and then compact. Allow no heavy machinery within 5 feet of structure during placement. Place no material until structure can withstand the load. Place temporary backfill where required and remove when no longer required. Bring backfill up evenly on all sides of the structure.
G. Systematically backfill to allow maximum time for natural settlement. Do not backfill Over-porous, wet, frozen, or spongy sub-grade surfaces.
H. Maintain moisture content within two percent, plus or minus, of optimum moisture content of backfill materials to attain required compaction density.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000.
B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 014000.
C. Compaction testing will be performed in accordance with ANSI/ASTM D698 and with Section 014000.
D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
E. Frequency of Tests: Compaction Tests -
    1. Trench - 1 test every 300 feet varying lifts.
    2. Site work - 1 test every 5,000 S.F., each lift.
F. Proof roll compacted fill surfaces under paving.
G. Minimum densities following compaction shall be as follows:

Fill and Backfill Location	Standard Proctor Density %
Top two feet under pavement	95
Under or within five feet of structures	95
Fill For Erosion Repair Areas	92
Under pavements below top two feet	90

Trenches through unpaved areas	90
In embankment (including temporary)	90
Pipe bedding and trenching	90

H. Compaction shall be accomplished by appropriate methods, i.e., vibratory compaction of granular materials, sheepsfoot compaction of cohesive materials, etc. In no case shall trench compaction be deemed adequate with the use of a non-compactive device such as a bulldozer. The Engineer may withhold 5 percent of the monthly requisition if in his opinion proper compaction was not met. Improperly compacted materials shall be removed, replaced, or re-compacted.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 015000.
B. Re-compact fills subjected to vehicular traffic.

END OF SECTION 31 23 23

SECTION 31 56 80 - EROSION SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water Control.
B. Dust Control.
C. Erosion and Sediment Control.
D. Pollution Control.

1.2 RELATED SECTIONS

A. Section 011000 - Summary.
B. Section 013000 - Administrative Requirements.

1.3 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.4 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.
B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.5 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
B. Minimize amount of bare soil exposed at one time.
C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.6 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

END OF SECTION 31 56 80

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Asphaltic concrete paving.
B. Chip Seal Walkways.

1.2 RELATED SECTIONS

A. Section 312213 - Rough Grading.
B. Section 312323 - Fill.
C. Section 329119 - Landscape Grading.

1.3 REFERENCES

A. Maine Department of Transportation Standard Specifications Highways and Bridges, current edition.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Maine Department of Transportation Standard Specification - Highway and Bridges.
B. Mixing Plant: Conform to State of Maine Department of Transportation Standards.
C. Obtain materials from same source throughout.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable standards for paving work on public property.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F, or surface is wet or frozen.
B. Apply bituminous prime and tack coats only when the ambient temperature in the shade is at least 50F for 12 hours immediately prior to application.
C. Do not apply when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.

PART 2 - PRODUCTS

2.1 AGGREGATE SUBBASE

A. As specified in Section 312323 - Fill.

2.2 BITUMINOUS CONCRETE BASE COURSE

A. MDOT Specification, Section 702 and 703.
B. 19.0 mm HMA, Binder.

2.3 BITUMINOUS TACK COAT

A. MDOT Specification, Section 702.
B. Type AE-90, Emulsified Asphalt, Mixing.

2.4 BITUMINOUS CONCRETE SURFACE COURSE

A. MDOT Specification, Sections 702 and 703.
B. 12.5 mm HMA, Regular Surface

2.5 SIDEWALKS, DRIVES AND SHIM

A. MDOT Specification, Sections 702 and 703.
B. 9.5 mm HMA, Sidewalks, Drives.
C. Type E, Shim.

2.6 TEMPORARY PATCHING

A. Hot or cold, at Contractor's option.

2.7 ACCESSORIES

A. Tack Coat: Homogeneous, medium curing, liquid asphalt, in accordance with State of Maine Specifications.

PART 3 - EXECUTION

3.1 AGGREGATE SUBBASE

A. As specified in Section 312323 - Fill

3.2 BITUMINOUS CONCRETE BASE COURSE

A. MDOT Specification, Section 301.

3.3 BITUMINOUS TACK COAT

A. Apply emulsified asphalt tack coat to curbing, gutters, manholes, pavement, etc. if required by Engineer to promote adequate bond. Generally a tack coat will not be required for pavement placed immediately following the rolling of the underlying course.
B. Apply at a rate of 0.05 to 0.15 gallons/square yard; excess coating and/or fat spots will not be permitted.

3.4 BITUMINOUS CONCRETE SURFACE COURSE

A. MDOT Specification, Section 403.

3.5 SIDEWALKS, DRIVES, AND SHIM

A. MDOT Specification, Section 608.

3.6 COMPACTION

A. Bituminous compaction shall take place at as high a temperature as possible without the mix bulging excessively in front of the rolls. For most dense graded mixes this is between 260 F and 285 F. At no time shall the pavement be allowed to fall below 175 F without compaction. Table 1, at the end of this Section, illustrates recommended laydown temperatures for various mix thickness giving 15 minutes until 175 F mat temperature is reached.

3.7 TOLERANCES

A. Flatness: Maximum variation of ¼ inch measured with 10 foot straight edge.
B. Scheduled Compacted Thickness: Within ¼ inch.
C. Variation from True Elevation: Within ½ inch.

3.8 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Section 014000.

3.9 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for 3 days.

3.10 SCHEDULES

A. Paved Areas
    1. Sidewalk: 2" of 9.5 mm HMA.
B. Trench Paving: Leave no more than 300 linear feet of trench unpaved at any time.

TABLE 1
CESSATION REQUIREMENTS
Recommended Minimum Laydown Temperature (F)

Base Temp.	½"	¾"	1"	1½"	2"	3" and Greater
20 - 32	---	---	---	---	---	285*
+32 - 40	---	---	---	305	295	280
+40 - 50	---	---	310	300	285	275
+50 - 60	---	310	300	295	280	270
+60 - 70	310	300	290	285	275	265
+70 - 80	300	290	285	280	270	265
+80 - 90	290	280	275	270	265	260
+90	280	275	270	265	260	255
Rolling Time, Minutes	4	6	8	12	15	15

* Increase by 15 degrees (F) when placement is on base or subbase containing frozen moisture.

END OF SECTION 32 12 16

SECTION 32 91 14 - TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to this Section.

1.2 DESCRIPTION OF WORK

A. The extent of landscape work is shown on the Drawings and in schedules. Tree and plant protection includes, but is not limited to, the following:
    1. Protection of existing trees and shrubs to remain.
    2. Work around existing trees to remain.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 329119 – Landscape Grading.

1.4 PROJECT CONDITIONS

A. Install snow fencing when site areas, utility corridors and construction access ways have been determined and work limits established, prior to beginning clearing and grubbing, topsoil stripping, earthwork and other construction. Maintain in repair throughout construction period.
B. Throughout construction period, protect existing trees and shrubs to remain and vegetated areas to be left undisturbed from damage by construction activity including:
    1. Root area compaction.
    2. Materials and equipment storage stockpiles.
    3. Contaminated runoff from equipment cleaning and spillages of harmful substances.
    4. Disposal of boulders, rocks, soil, stumps, limbs, vegetative matter, debris, rubbish or waste.
    5. Avoidable cutting of roots.
    6. Breakage and de-barking.
    7. Nailing, hanging, cutting or attaching.
    8. Unapproved pruning.
    9. Grading within shrub masses and within the drip line of trees.
    10. Unapproved cutting of major roots.
    11. Damage to root system by flooding, ponding, filling mud or silt buildup.
    12. Damage by moving vehicles and equipment.
    13. Trampling, foot traffic, congregations and other intrusions by workmen.
    14. Other damaging occurrences.
C. If trees and shrubs to remain are severely injured or killed by construction operations and inadequate care, or die within one year after project completion, Contractor shall:
    1. Replace trees and shrubs with new plants of same size (up to a maximum of 3” caliper), quality, and species meeting same requirements and installed and maintained as new plants under Landscaping Section.

D. Restore vegetated areas to be left undisturbed which are damaged with grasses and ground covers according to applicable provisions of Landscaping Section to satisfaction of Engineer and replace or pay for trees and shrubs within areas as required in paragraphs above.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Snow fencing shall be approved by Engineer.

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to beginning work, examine trees and shrubs to remain and vegetated areas to be left undisturbed in review with Engineer.
    1. Engineer will review type, locations and extent of protective barriers to be installed as indicated on Drawings. In order to minimize damage to trees, shrubs and undisturbed areas, to account for construction and field conditions and improve protection, Engineer may direct that:
        a. Locations of layouts, corridors, access ways and work limits be adjusted.
        b. Locations of area protection fencing and individual tree protection be adjusted.
        c. Contractor shall determine what additional protective barriers may be needed for adequate protection.

3.2 INSTALLATION OF PROTECTIVE BARRIERS

A. Vegetated Area Protection: Install snow fencing attached to posts set no more than 8' on center along perimeter of each area.
B. Individual Tree Protection: Install snow fence at drip line of tree canopy or where surface roots are evident, whichever is further from tree trunk. Drive posts and/or excavate and backfill to make secure and plumb. Secure all necessary hardware to meet specifications and provide a fence system to meet requirements for intended use.
C. Modify configuration only where conditions do not permit as directed by Engineer.
D. Secure signs to fencing and maintain; minimum one per individual tree or 25 foot spacing on area fencing.

3.3 WORKING AROUND EXISTING TREES AND SHRUBS TO REMAIN VEGETATED AREAS TO BE LEFT UNDISTURBED

A. General
    1. When working within canopy spread of trees and in immediate vicinity of shrubs, use care not to damage roots and their soil environment.
    2. Relocate work to avoid damage if so directed by Engineer.
    3. Perform work using manual methods unless Engineer approves each specific piece of mechanical equipment being proposed for use.

B. Grubbing
    1. Strip grass and herbaceous plants by scalping top growth and thatch; then carefully till or scarify existing grade to depth of 1 inch, raking away loosened root crowns and debris.
    2. Neatly cut out and remove root crowns of woody undergrowth with hand tools using care not to disturb intervening soil area. Promptly fill holes with topsoil.
C. Stripping Topsoil: Remove only along approved, staked out corridors and edges in careful, neat manner so as to minimize damage to adjacent, undisturbed areas.
D. Excavating and Trenching:
    1. Limit excavating and trenching to only that required by Engineer.
    2. Tunnel under and around major roots by hand digging. Do not cut main lateral roots and tap roots. Cut only smaller roots which interfere with installation of new work with sharp pruning instruments. Do not break and chop roots.
E. Cutting and Filling:
    1. Where grade cuts expose major roots and massive root systems, promptly spread 6" protective covering of topsoil over the tops and ends of the exposed roots and water in. Protect roots from further hazards and construction operations.
    2. When existing grade at edge of canopy spread of trees and shrubs is higher than adjacent proposed subgrade, cut gently, sloping transition outward from edge and down to proposed subgrade.
    3. When existing grade at edge of canopy spread of trees and shrubs is lower than adjacent proposed subgrade, place fill to form gently sloping transition outward from edge of canopy spread and upward to proposed subgrade. In cases where transitional slopes would exceed 3:1, retain the side slope as directed by the Engineer.
F. Top soiling:
    1. When installing topsoil in stripped areas adjacent to canopy edges and vegetated areas to remain undisturbed, do not cover adjacent edges with soil unless otherwise indicated on Drawings, approved by Engineer and except as follows:
        a. In order to eliminate sharp grade breaks in proposed finish grades up and down, feather depth of topsoil out over short distance into vegetated area and area beneath canopy blending surfaces together smoothly.
    2. Where it is required to raise grades within canopy and vegetated areas, use topsoil placed by hand without compaction and overfill to compensate for natural settlement as follows:
        a. Minor fills over 4" or less: Fill with topsoil placed in single layer and fine grade.
    3. Moderate fills of 4" - 12": Place layer of approved drainage fill material to 6" below finish grade and cover with approved drainage fabric. Fill with topsoil placed in single layer and fine grade.

3.4 MAINTENANCE

A. Routinely inspect protective barriers, trees, shrubs and vegetated areas for damage and conditions which are causing damage and may cause damage and submit reports as specified. Following Engineer's review and authorization, repair, treat and take corrective action without delay, at no additional cost to the Owner.
    1. Inspect immediately after rains and during periods of runoff for ponding and silting caused by drainage from construction areas. Promptly drain and remove mud and silt back to natural grade.
    2. Inspect and remove boulders, rocks, soil, stumps, limbs, vegetative matter, debris, rubbish and waste that has accumulated.
    3. Water trees and plants to remain, as required, to maintain their health throughout construction period.

3.5 CLEANING

A. Remove protection materials at end of construction period when directed by Engineer and dispose off site.

END OF SECTION 32 91 14

SECTION 32 91 19 - LANDSCAPE GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Final grade topsoil for finish landscaping.

1.2 RELATED SECTIONS

A. Section 312213 - Rough Grading.
B. Section 312317 - Trenching.
C. Section 312323 - Fill.
D. Section 321216 - Asphalt Paving.

1.3 REFERENCES

A. ASTM C 602 - Specification For Agricultural Liming Materials.
B. FS O-F-241 - Fertilizers, Mixed Commercial.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Imported Topsoil, friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (pH) of 5.5 of 7.5; containing a minimum of four percent and a maximum of 25 percent organic matter, maximum soluble salt content of 500 ppm, maximum of five percent by volume of extraneous material exceeding 2 inches in diameter.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site and trench backfilling has been inspected.
B. Verify substrate base has been contoured and compacted.

3.2 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.
B. Remove debris, roots, branches, stones, in excess of ½ inch in size. Remove subsoil contaminated with petroleum products.
C. Scarify subgrade to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment is used for hauling and spreading topsoil and has compacted subsoil.

3.3 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding, and/or planting is scheduled. Place topsoil during dry weather.
B. Fine grade topsoil eliminating rough or low areas. Maintain profiles and contour of
C. subgrade.
D. Remove roots, weeds, rocks and foreign material while spreading.
E. Manually spread topsoil close to trees, plants, building, and structures to prevent damage.

F. Roll placed topsoil.
G. Remove surplus subsoil and topsoil from site. (unless otherwise directed by Engineer)
H. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 SOIL CONDITIONERS

A. Dolomitic Limestone: ASTM C 602.
B. Aluminum Sulphate: Standard commercial grade.
C. Peat: FS Q-P-166, Type I, Class B.
D. Perlite: Standard horticultural grade.
E. Manure: Rotted a minimum of 6 months.
F. Sawdust: Rotted a minimum of 24 months.
G. Pesticides: As recommended by Department of Agriculture/Pesticide Control Board.
H. Fertilizer:
    1. FS O-F-241, Type I, Grade B
    2. Available nutrients, percent by weight.
        a. 10 N
        b. 6 P_2O_5
        c. 4 K_2O
I. Water: Harmless to plant growth.

3.5 TOLERANCES

B. Top of Topsoil: Plus or minus ½ inch.

3.6 PROTECTION

A. Protect landscaping and other features remaining as final work.
B. Protect existing structures, fences, sidewalks, utilities, paving and curbs.

3.7 SCHEDULES

A. Compacted topsoil thickness at the following areas:
    1. Lawn Areas: 6 inches.

END OF SECTION 32 91 19

SECTION 32 92 19 - SEEDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fertilizing.
B. Seeding.
C. Hydroseeding.
D. Seed Protection.
E. Maintenance.

1.2 RELATED WORK

A. Section 329119 - Landscape Grading.

1.3 QUALITY ASSURANCE

A. Comply with all local, state and federal regulations concerning seeding.

1.4 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO):
    1. M 145-74, Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
B. American Society for Testing and Materials (ASTM):
    1. C 602, Agricultural Liming Materials.
    2. D 2487, Classification of Soils for Engineering Purposes.
    3. D 977, Emulsified Asphalt.
C. Federal Specifications:
    1. O-F-241, Fertilizer, Mixed, Commercial.
    2. O-P-166E, Peat Moss, Peat Humus, Peat, Reed-Sedge
D. Maine Department of Transportation (MDOT):
    1. Standard Specifications - Highways and Bridges.

1.5 SUBMITTALS

A. Test Reports
    1. Provide analysis of topsoil fill.
        a. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble
        i. salt content, organic matter content, and pH value.
    2. Results of seed purity and germination tests.
    3. Results of fertilizer analysis.
    4. Results of peat moss analysis.
B. Certificates
    1. Soil conditions and fertilizers.
    2. Grass seed.

3. Quarantine restrictions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Tag seed, with botanical and common names.
B. Store and protect seed from excessive heat, cold, sun, rain, wind, and other deleterious environmental conditions.
C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.7 JOB CONDITIONS

A. Place no frozen soils or extremely wet or dry soils.
B. The seeding process shall meet the following conditions.
    1. Not on or in frozen or extremely wet or dry soils.
    2. Not between June 15 and August 15 or October 1 and April 15.
    3. No seeding when wind exceeds 15 mph.

1.8 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush
B. Grass, Mustard, Lamsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgras
C. Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut
D. Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome
E. Grass.

1.9 GUARANTEE

A. Guarantee seed through one full growing season after planting. Replace if necessary.

1.10 MAINTENANCE DATA

A. Submit maintenance data for continuing Owner maintenance under provisions of Section 017823.
B. Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

PART 2 - PRODUCTS

2.1 SUBSOIL

A. See Section 319119 - Landscape Grading: Products.

2.2 TOPSOIL

A. See Section 319119 - Landscape Grading: Products.

2.3 SOIL CONDITIONERS

A. See Section 319119 - Landscape Grading: Soil Conditioners.

2.4 SEED

A. Lawn Areas: MDOT 717.03, Method Number 1: Park Mixture.
B. Other Areas: MDOT 717.03, Method Number 2: Roadside Mixture.

2.5 MULCH

A. Clean hay, wood fiber, jute netting, cheese cloth, burlap, or asphalt emulsion (ASTM
   A. D977, Grade SS-1) as appropriate

2.6 ACCESSORIES

A. Herbicide: Approved chemical registered in State of Maine for stump or basal bark treatment.
B. Stakes: Softwood lumber, chisel pointed.
C. String: Inorganic fiber.
D. Edging: Galvanized steel.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that prepared topsoil is ready to receive the work of this Section.
B. Beginning of installation means acceptance of existing site conditions.

3.2 FERTILIZING

A. Apply fertilizer at a rate of 25 pounds per 1000 square feet.
B. Apply after smooth raking of topsoil and prior to roller compaction.
C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
D. Mix thoroughly into upper 2 inches with an appropriate method.
E. Lightly water to aid the dissipation of fertilizer.
F. Water dry topsoil to a depth of 4 inches, 48 hours prior to seeding to obtain a loose, friable seed bed.

3.3 SEEDING

A. Apply seed at a rate of 3 lbs. per 1000 sq. ft. evenly in two intersecting directions. Rake in lightly to a depth of 3/8 inch. Do not seed area in excess of that which can be mulched on same day.
B. Planting Season: April 15 to June 15 or August 15 to September 15.
C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
D. Roll seeded area with roller weighing a maximum of 150 lbs./foot of width.
E. Immediately following seeding and rolling, apply mulch to a thickness of 1/8 inches.
A. Maintain clear of shrubs and trees.
F. Apply water with a fine spray immediately after each area has been mulched. Saturated to 4 inches of soil.

3.4 HYDROSEEDING

A. Apply seeded slurry at a rate of 3 lbs. per 1,000 sq. ft. evenly in two intersecting directions, with a hydraulic seeder. Do not hydroseed area in excess of that which can be mulched on same day.
B. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
C. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.5 SEED PROTECTION

A. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
B. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlay of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.
C. Secure outside edges and overlaps at 36 inch intervals with stakes.
D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
E. Erect warning signs and barriers to protect seeded areas.

3.6 MAINTENANCE

A. Mow grass at regular intervals to maintain at a maximum height of 2½ inches. Do not cut more than 1/3 of grass blade at any one mowing.
B. Neatly trim edges and hand clip where necessary.
C. Immediately remove clippings after mowing and trimming.
D. Water to prevent grass and soil from drying out.
E. Roll surface to remove minor depressions or irregularities.
F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
G. Immediately reseed areas which show bare spots.
H. Protect seeded areas with warning signs during maintenance period.

END OF SECTION 32 92 19

SECTION 33 05 23 – TRENCHLESS UTILITY INSTALLATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavation and backfill for approach trenches and pits.
   2. Excavation for Casing pipe.
   3. Carrier pipe.
   4. Disposal of excess materials.

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete.
   2. Section 31 23 17 - Trenching: Excavating and backfilling access pits.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. 1. AASHTO M133 - Standard Specification for Preservatives and Pressure
   2. Treatment Processes for Timber.

B. ASTM International:
   1. ASTM A36 - Standard Specification for Carbon Structural Steel.
   2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   3. ASTM A139 - Standard Specification for Electric fusion (Arc) Welded steel Pipe(NPS 4-inch and over).
   4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   5. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
   6. ASTM A1011- Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

C. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.

D. National Utility Contractors Association:
   1. NUCA - Pipe Jacking & Microtunneling Design Guide.
   2. NUCA - Trenchless Excavation Construction Equipment & Methods Manual.

E. MEDOT Standard Specifications:
   1. Standard Specifications for Highway Construction, 2007, published by the Maine Department of Transportation.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Prepare scaled shop Drawings to supplement Drawings, signed and sealed by Professional Engineer.
   1. Include details of casing, jacking head, sheeting, and other falsework for trenches and pits and support for adjacent facilities, field sketches, and other details to complete the Work.

2. Show relation of proposed installation to adjacent facilities and natural features over installation, angle of installation, right-of-way lines, and general layout of built facilities.
3. Show cross-section or sections from field survey showing installation in relation to actual profile of ground.

C. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.
D. Installation Plan: Submit description of proposed construction plan, dewatering plan, and plan to establish and maintain vertical and horizontal alignment.
E. Submit emergency response procedures to handle situations when conduit is compromised and jeopardizes integrity of installation or safety.
F. Submit written report results of visual check prior to installation of carrier pipe of entire length of casing or liner, to verify there are no voids or defective joints.
G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
B. Project Record Documents: Record actual locations of casing or tunnel liner, carrier pipe, and invert elevations.
C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with MEDOT Standard Specifications, NUCA Trenchless Excavation Construction Equipment and Methods Manual, NUCA Pipe Jacking & Microtunneling Design Guide.
B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum five years documented experience.
    1. Work Experience: Include projects of similar magnitude and conditions.
    2. Furnish list of references upon request.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
B. Convene minimum one week prior to commencing work of this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
C. Protect piping and jacking systems from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
D. Accept system components on site in manufacturer’s original containers or configuration.
E. Inspect for damage.

F. Use wooden shipping braces between layers of stacked pipe. Stack piping lengths no more than three layers high.
G. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.
H. Support casing and carrier pipes with nylon slings during handling.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
B. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.10 FIELD MEASUREMENTS

A. Verify invert elevations of existing work prior to excavation and installation of casing or tunnel.

PART 2 PRODUCTS

2.1 CASING AND JACKING PIPE MATERIALS

A. Steel Casing Pipe: ASTM A53 or ASTM A139, 35,000 psi minimum yield strength, full circumference welded joints in accordance with AWS D1.1 to withstand excavation forces, minimum wall thickness and diameter as shown on the plans or otherwise shown below

2.2 CARRIER PIPE MATERIALS

A. Gas Distribution System Piping: As specified in Section 33 50 00

2.3 GROUT AND COVER MATERIALS

A. Soil Backfill for Trench Approaches and Pits to Finish Grade: As specified in Section 33 23 17.
B. Fill and Seal Grout at Pipe Ends: Mortar conforming to Division 700 of MEDOT Standard
B. Specifications proportioned as described below. Do not add more water than is necessary to make a workable mixture.
    1. Mix No. 1: 1 part Portland cement, 1/4 part hydrated lime, 3-3/4 parts mortar sand (maximum).
    2. Mix No. 2: 1 part Portland cement, 1 part masonry cement, 6 parts mortar sand (maximum).
C. Pressure Grout Mix: One part Portland cement and six parts mortar sand mixed with water to consistency applicable for pressure grouting.

2.4 ACCESSORIES

A. Supports and Insulators

PART 3 EXECUTION

3.1 EXISTING WORK

A. Maintain access to existing facilities and other remaining active installations requiring access. Modify installation as necessary to maintain access.

3.2 PITS OR APPROACH TRENCHES

A. Excavate approach trenches or pits in accordance with shop drawings and as site conditions require.
B. Ensure casing entrance face as near perpendicular to alignment as conditions permit.
C. Establish vertical entrance face at least 1 foot above top of casing.
D. Install dewatering measures and excavation supports as specified in Section 31 23 17.

3.3 CASING PIPE INSTALLATION

A. Boring:
    1. Push pipe into ground with boring auger rotating within pipe to remove spoil. Do not advance cutting head ahead of casing pipe except for distance necessary to permit cutting teeth to cut clearance for pipe. Arrange machine bore and cutting head to be removable from within pipe. Arrange face of cutting head to provide barrier to free flow of soft material.
    2. When unstable soil is encountered during boring retract cutting head into casing to permit balance between pushing pressure and ratio of pipe advancement to quantity of soil.
    3. When voids develop greater than outside diameter of pipe by approximately one inch, grout to fill voids.
    4. When boring is obstructed, abandon boring, relocate jack or tunnel as directed by Engineer.
B. Jacking
    1. Construct adequate thrust wall normal to proposed line of thrust.
    2. Impart thrust load to pipe through suitable thrust ring sufficiently rigid to ensure uniform distribution of thrust load on full pipe circumference.
C. Drilling and Jacking
    1. Use oil field type rock roller bit or plate bit made up of individual roller cutter units solidly welded to pipe which is turned and pushed for its entire length by drilling machine to give bit necessary cutting action.
    2. Inject high density slurry (oil field drilling mud) to head as cutter lubricant. Inject slurry at rear of cutter units to prevent jetting action ahead of pipe.
D. Mining and Jacking: Utilize manual hand-mining excavation from within casing pipe as casing is advanced with jacks, allowing minimum ground standup time ahead of casing pipe.

3.4 PRESSURE GROUTING

A. Pressure grout annular space between casing pipe and surrounding earth.

3.5 CARRIER PIPE INSTALLATION

A. Clean, inspect, and handle pipe in accordance with applicable Section for carrier pipe.
B. Exercise care to prevent damage to pipe joints when carrier pipe is placed in casing.
C. Support pipeline within casing so no external loads are transmitted to carrier pipe. Attach supports to barrel of carrier pipe; do not rest carrier pipe on bells.
    1. Use minimum 2 supports per joint of carrier pipe.
D. Grout ends of casing to seal.

3.6 TOLERANCES

A. Do not over cut excavation by more than 1 inch greater than outside diameter of casing pipe.

B. Install casing pipe to vertical and horizontal alignment on Drawings within plus or minus 3 inches prior to installation of carrier pipe.
C. Install pipe bells with minimum 1/2 inch clearance to casing.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
B. Compaction Testing: As specified in Section 31 23 17.
C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.8 REMOVAL OF FACILITIES AND CONTROLS

A. Remove temporary facilities for casing installation and jacking operations in accordance with Section 01 50 00 - Temporary Facilities and Controls.

END OF SECTION 33 05 23

SECTION 33 50 00 – NATURAL GAS DISTRIBUTION SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Includes installation of 8", 6", 4" and 2" natural gas mains, 1" and 2" natural gas services, tracer wire, polyethylene valves and boxes, polyethylene fittings, excess flow valves, anode boxes, and all related equipment and fittings in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK

A. Division 31 – All Sections
B. Section 23 11 23 Facility Gas Piping
C. Section 33 05 23 Trenchless Utility Installation

1.03 QUALIFICATION OF NATURAL GAS DISTRIBUTION SYSTEM CONTRACTOR

A. The Contractor performing the installation of the natural gas distribution system shall have a drug testing program, employee certification, supervisor certification, and equipment certification in place per MPUC and CFR 192 Guidelines.

PART 2 -- MATERIALS

2.01 NATURAL GAS DISTRIBUTION SYSTEM MATERIALS

A. POLYETHYLENE PIPE
    1. All polyethylene pipe supplied under this Specification shall conform with the latest edition of ASTM D-2513, polyethylene fittings supplied under this Specification shall conform with the latest edition of ASTM D-2513 and ASTM D-3261 (Standard Specification for Thermoplastic Gas Pressure Systems) listed in Section I Appendix B of the latest edition of the Office of Pipeline Safety, Part 192, Title 49, Code of Federal Regulations and with the specifications stated herein.
    2. All pipe shall be high density PE ASTM D 2513 polyethylene
    3. All pipe shall be made of virgin quality material. Clean rework material of the same type and grade, generated from the manufacturer's own pipe and fitting production may be used by the same manufacturer as long as the pipe produced meets all the requirements of this Specification. Rework material shall not be used for manufacturing ½” and 1" CTS tubing sizes.
    4. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, blisters, dents, and other injurious defects. The pipe shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.
    5. 1" CTS and 2" IPS pipe shall be supplied in coils. The coils shall be furnished in either 500 or 1000 foot lengths specified at the time of order. The coil shall consist of a single length of pipe. Intermediate joints will not be permitted. 4", 6", and 8” IPS pipe shall be supplied in 40 foot or longer straight lengths. Straight lengths shall consist of a single length of pipe without couplings or any intermediate joints.
    6. Pipe markings shall be in a color that contrasts with that of the pipe and spaced at intervals not exceeding 2 feet. All required markings shall be legible and so applied as to remain legible under normal handling and installation practices. These markings shall consist of the word GAS, the designation ASTM D2513, the manufacturer's name or trademark, the nominal pipe or tubing size (including the sizing system used, such as, IPS, CTS or OD), the type of material, SDR number, the month and year of manufacture,

and identification of resin supplier (if other than pipe manufacturer), P for Performance Pipe, or S for Solvay.

7. Polyethylene pipe shall be no older than 6 months from the date of manufacture to the date of shipment to the project. All pipe shall be packaged in standard commercial coils or bundles that provide protection from shipping injuries. Supplied pipe shall be uniform in color.
8. Pipe dimensions and tolerances: per manufacturer recommendation.

B. POLYETHELYNE FITTINGS
   1. All fittings shall be same material HDPE polyethylene.
   2. All fittings shall be made of virgin quality material. Clean rework material of the same type and grade, generated from the manufacturer's own pipe and fitting production may be used by the same manufacturer as long as the fittings produced meet all the requirements of this Specification. Rework material shall not be used for tubing size, ie. 1"CTS.
   3. Fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, blisters, dents, and other injurious defects. The fittings shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.
   4. All polyethylene fittings 1" - 8" shall have butt end outlets.
   5. Fittings shall be no older than 1 year from the date of manufacture to the date of shipment to the project, provided they are stored indoors in suitable containers, otherwise they shall be no older than 6 months from date of manufacture to date of shipment to the project. All fittings shall same color as piping.
   6. Dimensions and tolerances:

C. Butt Fusion Fittings shall conform to the dimensions given in Table 2.
   1. Fittings shall be marked with the following: ASTM D3261 (Butt type); manufacturer's name or trademark; material designation); date of manufacture or manufacturing code; size (including the sizing system used, such as, IPS, CTS or OD). Where the fitting size does not allow complete marking, marking may be omitted in the following sequence: size, date of manufacture, material designation, manufacturer's name or trademark.

D. Electro Fusion Tapping Tees and Couplings
   1. Electro fusion type polyethylene fittings shall conform with the latest edition of ASTM F1055 (Standard Specification for Electro fusion Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing) and be manufactured in accordance with the latest listed edition of ASTM D-2513 by Trouvay & Cauvin under the trade name of Innogaz II Electro fusion System or by Friatec Gas Water Inc., under the trade name Frialen Safety Fittings. All electro fusion couplings shall have socket outlets. All electro fusion tapping tees will be 2" x 1", 4" x 1", 6" x 1", and 8" x 1" (IPS x CTS) and 4" x 2", 6" x 2", and 8" x 2" (IPS x IPS) - main size x outlet size. Electro fusion couplings will be used on the tapping tee outlets to connect with the 1" CTS and 2" IPS service lines.

E. Polyethylene Gas Valves
   1. Polyethylene gas valves shall be manufactured by either Nordstrom Valve Inc., Friatec Gas Water, Inc., or Kerotest Manufacturing Corp or approved equal. The gas valves shall be manufactured within 6 months of date of sale to the City and in compliance with the requirements of ANSI/AMSE B16.40 "Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems", ASTM 1996 Section 8 "Plastics", Volume 08.04 "Plastic Pipe and Building Products" D-2513, and DOT Part 192.145 "Valves". The valves shall be assembled so to operate smoothly and provide gas tight seal. Each valve's stem shall be equipped with the weather seal(s) protecting inner parts from ground water

and foreign debris intrusion. All polyethylene valves shall be supplied with the Butt End outlets. The polyethylene portion of the valve shall be one piece molded High densitypolyethylene manufactured from Performance Pipe Company Marlex TR-418 Resin, Rigidex PC 2040Y, or FINATHENE 3802Y or approved equal.

PE valves shall conform to the dimensions given in Table 3.

Table 3: Dimensional Standards for Polyethylene Valves

VALVE SIZE	SDR	MIN. PORT DIA. *	MIN. STUB LENGTH *
2"	11	1.80"	2.00"
4"	13.5	3.60"	3.00"
6"	13.5	4.80"	3.50"
8"	13.5	6.30"	3.50"

F. Valve Boxes
   1. Valve boxes for 2" and 4" valves shall be the telescoping type with a pop-up type metal traffic lid marked "GAS" manufactured by C. P. Test Services, Inc. model #668RPV6, Gingham & Taylor, and Handley Industries Inc. or Christy GS Traffic Valve Box with G5C Lid marked “GAS” (shall not be a twist lock type), or APPROVED equal. Corrugated 10" pipe shall be used for 6" and 8" valves.
   2. Valve supports shall be supplied for 2" valve sizes only .

G. Tracer Wire
   1. All tracer wire shall be 10 AWG solid copper wire coated with .45 mils Type HMW - PE yellow insulation. The wire shall meet all requirements of the latest version of ASTM D1351 and ASTM B8. Tracer wire shall be UL listed as direct burial wire at temperatures between -40o C and 75o C for circuits not exceeding 600 volts. The surface of the insulation shall be durably marked, at intervals not exceeding 24 inches, with only the following information: maximum working voltage "600 VOLTS", wire type, manufacturer's name or trademark, AWG size or circular mil area, UL required markings, and at the Contractor's option "CAUTION CPA GAS LINE”

H. Casing Insulators
   1. Commercial available casing insulators with a minimum of 4 plastic runners, each runner a minimum of 1/4" high, shall be installed at 5 feet maximum intervals on the steel gas main prior to insertion. Insulators shall be sized to center the gas main in the casing.

I. Cable Protectors
   1. When inserting the pipe into the casing, the Contractor shall use a suitable cable protector on the casing end to protect the pipe coating from damage. Cable protectors shall be left in place after pipe insertion is completed.

J. Casing End Seals
   1. End seals shall be Link SealTM or approved equal capable of forming a watertight seal at the ends of the casing.

K. Excess Flow Valves (EFV)

1. GENERAL: Polyethylene natural gas excess flow valves (EFV) shall be manufactured by either UMAC Inc. or Powell Co. The excess flow valves shall be manufactured within 6 months of date of sale to the City and be in compliance with CFR Title 49 DOT Part 192.381 and MSS SP-115: Excess Flow Valves. All EFVs shall be tested in accordance with ASTM F 1802-97: Standard Test Method for Performance Testing of Excess Flow Valves.
2. The design of excess flow valves shall incorporate a bypass to allow the valve to automatically reset and resume normal operation after repairs are made to the severed gas line. Each valve shall be fixed or anchored to the interior of the fitting to preclude movement of the valve.
3. Each valve shall have an affixed tag, identifying the EFV's capacity range and flow direction, and be individually packaged and supplied with the operating instructions. An additional stainless steel tag shall be included in the package indicating the flow capacity of the valve, which will be attached to the gas riser.
4. MATERIAL: The polyethylene portion of EFV shall be one piece molded High density
5. PE- polyethylene manufactured from Performance Pipe Company Marlex TR-418 Resin or Solvay Fortiflex® K38-20-160 Resin. Work materials supplied by the Contractor shall include but not be limited to:
    a. All polyethylene pipe, electro fusion tapping tees, excess flow valves, valves, valve boxes, valve extensions, valve supports, anode boxes, 1" x 1/2" Metfit couplings, ½" Metfit end caps, 1" Metfit end caps, 2" Metfit end caps, 2" through 8" PVC end caps, tracer wire, Nicotap # 3519J single type, electrical tape, risers, insulated meter valves, end plugs, electro fusion couplings, aquaseal, molded PE fittings, casing insulators, casing end seals and weld rod, meter and regulator vaults.
    b. Expendable Concrete Materials: Materials required to install and finish portland cement concrete, such as form lumber, tie-wire, nails, etc.
    c. Concrete: All portland cement concrete including reinforcing steel, wire mesh, etc.
    d. Temporary and Permanent Fencing including traffic barricades required to provide a barrier between vehicular/pedestrian movements and excavations.
    e. Trench Backfill Sand: All backfill sand shall be clean imported sand, rock and salt free. Bay/beach sand shall not be accepted.
    f. Paving Material: All materials required for temporary and permanent street repairs including base materials.
    g. Landscaping Materials: All landscaping materials, plants and surface improvements that are damaged due to this Work.

2.04 MANUFACTURER'S TESTING

A. Minimum Burst Pressure Tests, conducted in accordance with the latest edition of ASTM D1599 (Standard Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings), shall be performed by the manufacturer to determine the short term rupture strength of the pipe and fittings furnished. The minimum short term burst pressure shall be that required to develop a minimum hoop stress value for HDPE pipe. This test shall be performed on each lot of pipe ordered. A lot shall mean all material covered by a single item on a CPA order. Fittings shall be tested at the frequency specified in the latest edition of ASTM D2513, Annex A2., Section A2.3, Fittings Tests. Manufacturer shall provide test data for each lot of pipe as requested.

B. Sustained Pressure Tests shall be performed to ensure that the pipe and fittings supplied have passed the sustained pressure test outlined in the latest edition of ASTM D1598 (Standard Test Method for Time-To-Failure of Plastic Pipe Under Constant Internal Pressure). The minimum sustained pressure shall be that required to produce a minimum hoop stress value required for HDPE. Testing frequency shall meet or exceed that called for in the latest edition of ASTM D2513, Annex A2. Manufacturer shall provide test data for each lot of pipe as requested by the CPA.

2.05 SUBMITTALS AND QUALITY CONTROL

A. The Manufacturer shall submit a written quality control procedure conforming to the latest edition of ASTM D2513, Annex A2., which shall be subject to approval.

B. The Manufacturer shall certify that the plastic pipe and or fittings supplied meet all the requirements of this Specification. When requested by the owner the Manufacturer shall supply certification for all items ordered, failure to do so shall be cause for order rejection.

2.06 INSPECTION

A. The owner or owner's representative reserves the right to inspect each order upon delivery and, at the option of the owner, reject any items not meeting this Specification.

PART 3 -- EXECUTION

NON-QUALIFIED CONTRACTOR EMPLOYEES SHALL NOT BE ALLOWED TO PERFORM POLYETHYLENE JOINING

3.01 EQUIPMENT

A. All gas joining equipment to be used shall be certified by the State of Maine to be in good working condition and suitable for the intended purpose prior to being brought on site. Any equipment without a State issued certification tag shall be removed from the site.

B. The Contractor shall have all equipment necessary to install the pipe and appurtenances referred to in the Plans and Specifications, including but not limited to:

1. Pipe Trailer : Contractor shall provide a trailer capable of transporting 40' or longer lengths of polyethylene pipe without damaging pipe.
2. Pipe Spool: Contractor shall provide a reel type spooling device capable of dispensing 500' long 2" polyethylene pipe coils. Spool can be trailer mounted or suspended from a truck or backhoe (SpeedReel).
3. Pipe Support Stands: Pipe support stands shall be utilized to support pipe during fusion joining, directional boring pull in, and while lowering of the pipe into the trench. Pipe support stands shall not be spaced greater than 15' apart for directional boring pull in. Pipe shall be supported with stands at all time it is placed on pavement to avoid scratching the pipe surface.
4. Large Diameter Butt Fusion Machine: Contractor shall provide a McElroy No. 28 AutoMac butt fusion machine (must be used on 6" and 8") or TDW Polyfuse TD - 86 Butt - Fusion Unit or approved automated equal, capable of fusing 2" - 8" polyethylene pipe with the following features:
    a. Butt Fusion Machine: Butt fusion machine with freely moving pipe clamps, dirt and rust free aligned guide rods, and clamp inserts for 8", 6", 4", and 2" PE pipe.
    b. Facer: Pipe facer that attaches to the butt fusion machine. Facer shall have sharp properly aligned blades.

c. Heating Iron: Electrically powered heating iron with unscratched clean teflon coated faces. Heating iron shall have a thermometer and temperature set screw for calibration.
d. Micro Processor Controller: A preprogrammed microprocessor, capable of controlling all time temperature and pressure parameters required to insure proper joining, shall be utilized. Controller's memory shall be able to store a minimum of 100 fusions.
e. Small Diameter Butt Fusion Machine (2" and 4"):
f. Contractor shall provide a butt fusion machine capable of fusing 2" – 4" IPS polyethylenepipe, similar to a McElroy No. 14, with the following features:
    i. Butt Fusion Machine. Butt fusion machine with freely moving pipe clamps, dirt and rust free aligned guide rods, and clamp inserts for 2" IPS pipe.
    ii. Facer. Pipe facer that attaches to the butt fusion machine. Facer shall have sharp properly aligned blades.
    iii. Heating Iron. Electrically powered heating iron with unscratched clean teflon coated faces. Heating iron must have a thermometer and temperature set screw for calibration.

5. Electro Fusion Machine: The Contractor shall provide either an Innogaz or Friatec universal electro fusion control box, capable of storing a minimum of 100 fusion records, pipe alignment clamp, tapping tee alignment clamp, tapping wrench, pipe scraper, and all other tooling specified by the Electro Fusion machine manufacturer in their respective installation procedures or approved equal.
6. Electric Generator: Contractor shall provide the necessary power supply to meet the power requirements as specified by the manufacturer of the fusion equipment.
7. Pyronometer : The Contractor shall provide a pyronometer capable of testing the temperature of the heating iron, while at fusion temperature, to an accuracy of 0.5% (±3°F). The fusion temperature of the heating iron shall be verified each morning in the presence of the University. More frequent testing may be required at the discretion of University.
8. Note: All equipment must be in good working order and properly maintained during project installation. The owner will inspect the preceding items and reject those not in compliance. The owner shall have the right to reject any or all equipment judged inadequate to properly fuse Polyethylene Pipe and its Fittings.

3.02 POLYETHYLENE PIPE INSTALLATION - MAINS

A. Minimum Cover: Gas mains shall be installed with a minimum cover of 36", as measured vertically from the top of pipe to the top of pavement.
B. Underground Clearance: Unless otherwise specified a minimum of 12 inches vertically and 24 inches horizontally shall be maintained between the pipe surface and other utility lines or adjacent foreign structures. In the event that it is not possible to maintain required vertical clearance from other structures, the Contractor shall case the gas main in steel pipe or concrete at the discretion of the owner representative.
C. Gas Pipe Bedding: Trench shall be free of debris, sharp rocks, etc. before adding the sand bed for the new gas main. Sand bed shall have a minimum thickness of 4" below and 12" above the gas main.
D. Handling of Polyethylene Pipe: Extreme care must be exercised when moving plastic pipe, support stands and rollers shall be used when fusing and lowering pipe into the trench or bore

hole. POLYETHYLENE PIPE SHALL NOT BE DRAGGED ON THE GROUND OR ON PAVED SURFACES. Support/Stands must be used at all time that pipe is placed on paved surfaces.

E. Pipe Scratches or Cuts: Pipe that has scratches, notches, cuts or any other abrasions that exceed 10% of the pipe wall thickness shall be disposed of. The Contractor shall use pipe stands, rollers, spooling devices, or other means to avoid damaging the pipe during installation. Observe pipe during installation for scratches, gouges or other defects. If defects are present, remove and discard defective section of pipe. The University must be notified of all defects and subsequent repairs.

F. Minimum Bending Radius: The minimum bend radius for polyethylene pipe is twenty five times the outer pipe diameter, if fusions are present in the bend the minimum bend radius shall be fifty times the outer pipe diameter. The Contractor shall not bend polyethylene pipe any tighter than twenty five times the outer diameter of the pipe where no fusions are present and fifty times where fusions are present. Fittings are not allowed in pipe bends.

G. Snaking Pipe: Polyethylene pipe shall be installed in the trench by "snaking" method and additional pipe length shall be allowed for the possible thermal contraction of the pipe.

H. Butt Fusions
    1. All butt fusions must be performed by the person(s) qualified by the State of Maine to butt fuse Contractor's supervisor shall be present during all pipe fusions to insure that all required procedures are adhered to and to witness the quality of each joint.
    2. Pipe fusion shall be conducted in accordance with the State of Maine.
    3. Ambient temperature shall be between 55° F and 85° F prior to pipe fusion; otherwise pipe shall be protected from direct sunlight and cooled down until the ambient temperature falls within the above temperature range.
    4. Fusion joints shall be allowed to cool for the times specified in Appendix A, Table 1 prior to movement of the pipe/joint.

I. Tracer Wire Connections
    1. As required by code and per direction of the owner.

J. Valves
    1. Valves shall be installed at the marked locations. Valve supports are required for 2" valves. Valves shall be installed with the operating nut on top, facing vertically up. The owner will not accept valves that are cocked or oriented in any direction except up.

K. Valve Boxes
    1. Telescoping valve box shall be installed at each 2" or 4" valve location.

L. Anode Boxes
    1. Anode boxes shall be installed at locations shown on plans or as directed by the project inspector. Anode boxes shall be installed in the same manner as valve boxes.

M. Pressure Test
    1. The Contractor will conduct air pressure tests Per NFPA 54 2013 section 8.1 required inspection, testing and purging, on all piping installations a minimum time of 24 hours. The pressure shall not decrease during the test period. Tests shall be performed on each section of main installed after service installation is completed.

N. Inspection
    1. The owner may have a qualified Inspector at the job site. The Inspector has the right to reject any fusions not meeting State requirements. The Contractor shall replace all fusions not meeting specified requirements at its own expense.
    2. The Contractor shall also designate a polyethylene qualified supervisor who will be present on site at all times to observe pipe fuser(s).

3. At the City's discretion the Contractor will remove fusion(s) and supply it to the testing agency for testing to insure quality control.
4. Records of all electro fusions and 8" and 6" butt fusions shall be downloaded and provided to the owner on a weekly basis in both electronic and paper format.
5. Any failure recorded by the fusion equipment must be immediately brought to the attention of owner's Inspector to avoid requiring the contractor to remove fusions to the last recorded acceptable fusion.
6. The fusion number corresponding to each joint shall be written on the pipe at the fusion location with an undeletable marker.
7. Fusion number shall also be noted on the Contractor's record drawing at the exact location of the fusion.
8. The owners Inspector will non-destructively test plastic fusions and reject all connections that are deficient. The contractor will replace all fusions failing non-destructive testing at his expense.
9. All welded joints on steel gas carrier pipe will be 100% x-ray tested and any joints failing to pass said test will be cut out and rewelded at the Contractor's expense.

O. Boring
1. All underground utilities shall be located and potholed prior to the start of boring. One tracer wire shall be attached to all pipe prior to insertion in the borehole. All pipe ends shall be sealed with a butt fusion end cap or similar fitting prior to pulling into a borehole.

P. Sealing Installed Piping
1. Contractor shall seal open piping with butt fusion end caps at the end of each workday. No open pipe ends will be allowed at the end of the day.

3.05 INSTALLATION

A. Tapping Tee Installation NOTE: TAPPING TEES SHALL ONLY BE INSTALLED ON THE TOP OF THE GAS MAIN.
1. The main shall be tapped after the tapping tee outlet coupling has cooled for the time period specified in Appendix A and the service line has been soaped and pressure tested. The manufacturer supplied tapping wrench or fitting shall be the only tool used for turning the tapping tee cutter to avoid tapping the backside of the main or loss of the cutter into the main, allen wrenches shall not be used.

B. Minimum Cover: Gas services shall be installed with 24" minimum cover, as measured vertically from top of pipe to top of pavement or below existing grade.

C. Maximum Cover: Gas services shall not be installed any deeper than 30" below existing grade unless directed by Engineer.

D. Service Leak Testing: Prior to tapping the main, the contractor will conduct air pressure tests at manufacturer recommended pressure on service lines for a minimum time of 15 minutes. The pressure shall not decrease during the test period. Air pressure shall be held until after soap testing. Soap test the service connection by brushing a liquid soap and water solution around the tapping tee base at the main, both ends of the outlet coupling.

E. Surface Restoration: The Contractor shall restore the owner's surface improvements to the preconstruction condition.

F. Inspection:
1. The Contractor shall replace all fusions not meeting quality requirements at his own expense.

2. The Contractor shall also designate a polyethylene qualified supervisor who will be present on site at all times to observe pipe fuser(s).
3. The owners Inspector will employ non-destructive testing methods on polyethylene fusions and reject all deficient fusions.

3.07 SYSTEM PRESSURE TEST

A. As a punch list item or prior to final payment after all gas mains and services are installed, the Contractor will conduct an air pressure test at manufacturer recommended pressure on all lines, including services and mains, for a minimum time of 24 hours. The pressure shall not decrease during the test period.

3.08 POLYETHYLENE PIPE FUSION QUALIFICATION REQUIREMENTS

A. General Conditions: The Contractor shall have qualified persons perform the polyethylene pipe joining as per PIPELINE SAFETY REGULATIONS PART 192 Subpart F.
B. Qualification Testing: The person(s) intending to fuse polyethylene pipe Shall be qualified for the purpose of To fuse HDPE gas piping in the State of Maine. Said person(s) will be deemed the Qualified Fuser(s) and shall be the only person(s) performing fusions on the job site. Qualification testing is required for all Contractor employees that will be performing polyethylene pipe fusions.
C. Inspection: The Contractor shall provide a supervisor that will be responsible for inspecting all fusions performed. Said supervisor must be present on job site at all times fusions are being preformed to inspect, guide, advise, and correct their own Qualified Fusers on site.

3.09 DESIGN STANDARDS

A. LOCATION
    1. Gas mains shall be located as specified on the Project Drawings. Gas mains shall be twenty-four (24) inches minimum from any parallel utility line or as determined by the owner. Gas mains and services shall have a minimum one (1) foot vertical clear space from any crossing utility lines or other underground facilities.
    2. Gas services shall come perpendicular from the gas main in the shortest straight line to the gas meter.
    3. Above ground gas meters shall be installed on the meter location and installation shall be as specified in the project documents.
B. DEPTH OF PIPE: Minimum depths are to be provided to the finished street surfaces, unless otherwise specified on the Drawings, are as follows:
    1. Gas mains shall be installed with a minimum cover of thirtysix (36) inches, as measured vertically from the top of pipe to the top of pavement.
    2. The depth of new gas services shall be a minimum of twenty-four (24) inches unless the gas service serves more than one gas meter; then the minimum depth shall be thirty (30) inches.
    3. Unless otherwise specified a minimum of 12 inches shall be maintained between the pipe surface and other utility lines or adjacent foreign structures. In the event that it is not possible to maintain 12 inches clearance from other structures, the Contractor shall case the gas main in steel pipe or concrete at the discretion of the City's representative.
C. MINIMUM SIZE OF NEW MAINS AND SERVICES
    1. Provide as indicated
D. VALVES
    1. Provide as specified

E. Additional specification information reference NFPA Guidelines 2013 for Gas piping and accessories installation and connection. Where there is a conflict between specification and code, the more stringent of the conflict is to be provided, constructed or installed. This rule incorporates by reference the National Fire Protection Association Standard # 54,National Fuel Gas Code,. All rights reserved by the National Fire Protection Association. Copies of NFPA Standards are available through the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269

3.06 Piping Underground.

A. Clearances. Underground gas piping shall be installed with sufficient clearance from any other underground structure to avoid contact therewith, to allow maintenance, and to protect against damage from proximity to other structures. In addition, underground plastic piping shall be installed with sufficient clearance or shall be insulated from any source of heat so as to prevent the heat from impairing the serviceability of the pipe.

B. Protection against damage. Means shall be provided to prevent excessive stressing of the pipe where there is heavy vehicular traffic or soil conditions are unstable and settling of piping or foundation walls could occur. Piping shall be buried or covered in a manner so as to protect the piping from physical damage. Piping shall be protected from physical damage where it passes though flower beds, and other such cultivated areas where such damage is reasonably expected.

C. Cover requirements. Underground piping systems shall be installed with a minimum of 24 in. (service) or 36 in.(mains)
    1. Where the minimum cover cannot be provided, the pipe shall be installed in conduit or bridged (shielded).

D. Trenches. The trench shall be graded so that the pipe has a firm, substantially continuous bearing on the bottom of the trench.

E. Backfilling. While placing and consolidating backfill around piping exercise care to ensure no damage to piping by equipment or methods, as well as maintaining depth and alignment of piping.

F. Protection against freezing. Where the formation of hydrates or ice is known to occur, piping shall be protected against freezing.

G. Piping through foundation wall. Underground piping where installed through the outer foundation or basement wall of a building shall be encased in a protective sleeve or protected by an approved device or method. The space between the gas piping and the sleeve, and between the sleeve and the building wall shall be sealed to prevent entry of gas or water.

H. Piping underground beneath buildings. Where the installation of gas piping underneath buildings is unavoidable, the piping shall be either of the following:
    1. encased in an approved conduit designed to withstand the imposed loads and installed in accordance with the following;
        a. If the conduit is with one end terminating outdoors, the conduit shall extend into an accessible portion of the building and, at the point where the conduit terminates in the building, the piping shall be sealed as in 7.1.5. Where the end sealing is of a type that will retain the full pressure of the pipe, the conduit shall be designed for the same pressure as the pipe. The conduit shall extend at least 4 in. outside the building, be vented outdoors above grade and be installed so as to prevent entrance of water and insects. OR
        b. If the conduit is with both ends terminating indoors, where the conduit originates and terminates within the same building, the conduit shall originate

and terminate in an accessible portion of the building and shall not be sealed.
OR

c. a piping /encasement system listed for installation beneath buildings.

3.07 Plastic Pipe

A. Connection of plastic piping. Plastic pipe shall be installed outdoors, underground only.
   1. Exception1: plastic pipe shall be permitted to terminate above ground where an anodeless riser is used.
   2. Exception 2: Plastic pipe shall be permitted to terminate with a wall head adapter above ground in buildings, including basements where the plastic pipe is inserted in a piping material permitted for use in buildings.

B. Connections between metallic and plastic piping. Connections made outdoors and underground between metallic and plastic piping shall be made with fittings conforming to either of the following:
   1. ASTM D 2513, Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings, Category I transition fittings
   2. ASTM F 1973, Standard Specification for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide 11(PA11) Fuel Gas Distribution Systems.
   3. ASTM F 2509 standard specifications for field-assembled anodeless riser kits for use on outside diameter controlled polyethylene gas distribution pipe and tubing.

C. Tracer wire. An electronically continuous corrosion resistant tracer wire (minimum AWG 14) or tape shall be buried with the plastic pipe to facilitate locating. One end shall be brought aboveground at a building wall or riser.

3.08 Installation of Piping.

A. Piping installed aboveground shall be securely supported and located where it will be protected from physical damage (see also 7.1.4). Where passing through an exterior wall, the piping shall also be protected against corrosion by coating or wrapping with an inert material approved for such applications. The piping shall be sealed around its circumference at the point of the exterior penetration to prevent the entry of water, insects and rodents. Where piping is encased in a protective pipe sleeve, the annular space between the gas piping and the sleeve shall be sealed at the wall.

3.09 Building Structure.

A. The installation of gas piping shall not cause the structural stresses within the building components that exceed the allowable design limits.
B. Approval shall be obtained before any beams or joists are cut or notched.

3.10 Prohibited Locations.

A. Gas piping inside any building shall not be installed in or through a clothes chute, chimney, or gas vent, dumbwaiter, elevator shaft, or air duct, other than combustion air ducts.

3.11 Hangers, Supports, Anchors and Identification.

A. Piping shall be supported with metal pipe hooks, metal pipe straps, metal bands, metal brackets, or metal hangers or building structural components suitable for the size of piping of adequate strength and quality, and located at intervals so as to prevent or damp out excessive vibration. Piping shall be anchored to prevent undue strains on connected appliances, and equipment, and

shall not be supported by other piping. Pipe hangers and supports shall conform to the requirements of ANSI/MSS SP-58. Pipe Hangers and Supports-Materials, Design and Manufacture.

B. Spacing of Supports in gas piping installations shall not be greater than as shown in Table 7.2.5.2. Spacing of supports of CSST shall be in accordance with the CSST manufacturer's instructions.

Table 3.11.a Support of Piping

Steel Pipe, Nominal Size of Pipe (in.)	Spacing of Supports (ft)	Nominal Size of Tubing Smooth-Wall (in. O.D.)	Spacing of Supports (ft)
½	6	½	4
¾ or 1	8	5/8 or ¾	6
1 ¼ or larger	10	7/8 or 1	8
(Horizontal)		(Horizontal)	
1 ¼ or larger	Every Floor Level	1 or larger	Every Floor Level
(Vertical)		(Vertical)	

C. Supports, hangers, and anchors shall be installed so as not to interfere with the free expansion and contraction of the piping between anchors. All parts of the supporting system shall be designed and installed so they will not be disengaged by movement of the supporting piping

D. Removal of Pipe: Where piping containing gas is to be removed, the line shall be first disconnected from all sources of gas and then thoroughly purged with air, water, or inert gas before any cutting or welding is done. (See Section 8.3 of NFPA 54)

E. All exposed interior gas piping shall be painted Safety Yellow and be labeled "Natural Gas"

3.12 Concealed piping in buildings

A. General. Gas piping in concealed locations shall be installed in accordance with this section. Fittings in concealed locations shall be limited to the following types:
   1. threaded elbows, tees, and couplings
   2. Brazed fittings,
   3. Welded fittings
   4. Fittings listed to ANSI LC 1/CSA 6.26, Fuel Gas Piping Systems using corrugated stainless steel tubing CSST, or ANSI LC 4, Press-connect and copper alloy fittings for use in Fuel Gas Distribution Systems

3.13Piping in Floors

A. Industrial Occupancies: In industrial occupancies, gas piping in solid floors such as concrete shall be laid in channels in the floor and covered to permit access to the piping with minimum of damage to the building. Where piping in floor channels could be exposed to excessive moisture or corrosive substances, the piping shall be protected in an approved manner.

B. Other Occupancies: In other than industrial occupancies and where approved by the authority having jurisdiction, gas piping embedded in concrete floor slabs constructed with Portland cement shall be surrounded with a minimum of 1 ½ in. of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. All piping, fittings, and risers shall be protected against corrosion in accordance with 5.6.6 NFPA-54. Piping shall not be embedded in concrete slabs containing quickset additives or cinder aggregate.

C. Gas Pipe Turns: Changes in direction of gas pipe shall be made by use of fittings, factory bends, or field bends.
D. Metallic Pipe: Metallic Pipe bends shall comply with the following:
    1. Bends shall be made only with bending toolsand procedures for that purpose.
    2. All bends shall be smooth and free from buckling, cracks, or other evidence of mechanical damage.
    3. The longitudinal weld of the pipe shall be near the neutral axis of the bend.
    4. Pipe shall not be bent through an arc of more than 90 degrees.
    5. The inside radius of a bend shall be not less than 6 times the outside diameter of the pipe.

3.16 Plastic Pipe

A. Plastic pipe bends shall comply with the following:
    1. The pipe shall not be damaged , and the internal diameter of the pipe shall not be effectively reduced.
    2. Joints shall not be located in pipe bends.
    3. The radius of the inner curve of such bends shall not be less than 25 times the inside diameter of the pipe.
    4. Where the piping manufacturer specifies the use of special bending tools or procedures, such tools or procedures shall be used.
    5. Sediment Traps. (See 9.6.7. NFPA 54)

3.14 Outlets Location and Installation

A. The outlet fittings or piping shall be securely fastened in place.
B. Outlets shall not be located behind doors
C. Outlets shall be located far enough from floors, walls, patios, slabs, and ceilings to permit the use of wrenches without straining, bending, or damaging the piping.
D. The unthreaded portion of gas piping outlets shall extend not less than 1 in. thought finished ceilings or outdoor patios or slabs.
E. The unthreaded portion of gas piping outlets shall not extend less than 2 in. above the surface of floors or outdoor patios or slabs.
F. Cap All Outlets
G. Each outlet, including valve, shall be closed gastight with a threaded plug or cap immediately after installation, and shall be left closed until the appliance or equipment is connected thereto.

END OF SECTION 33 50 00

Part IV – Boiler Information and Fuel Consumption History

Location	Boiler Manufacturer	Series	Year	Sections	Model	Max fire oil (GPH)	Max fire gas (MBH)	Nozzle	Burner	Distibution
Emerson Hall	Weil-Mclain	88	2013	12	1288	26	3773	5,5,12	Carlin 1150FFD-W	steam
	HB Smith	350 Mill	2003	12	3500ASW 12	26.5	3836	15.5 BPS	Power flame C3-0hbs12	steam
Folsom Hall	Smith	28 A	2008	9	28A-sw-09	19.6	2836	9,5,5	Carlin 1050FFD-20	hot water
	KOB Viessmann	Wood-fired	2011		KRT 300			1024 MBH		hot water
Gentile Hall	Smith	28 A	2005	9	28a-sw-09	19.6	2836	9,4,4	Carlin 1050FFD-20	hot water
	Smith	28 A	2005	9	28a-sw-09	19.6	2836	9,4,4	Carlin 1050FFD-20	hot water
Kelley Commons	Weil-Mclain	92	1968	8	892	?	?	5.5, 5.5	Carlin 801CRD	steam
	Weil-Mclain	92	1968	8	892	?	?	5.5, 5.5	Carlin 801CRD	steam
	Burnham	V905A	2004	5	V905A	5.6	808	4.5	Carlin 301CRD	hot water
Marriman Hall	Weil-Mclain	80	2013	8	880	7.5	1082	4.5	Carlin	steam
	Weil-Mclain	80	2013	8	880	7.5	1082	4.5	Carlin	sream
Normal Hall	Weil-Mclain	88	2011	10	1088	21.5	3082	9, 7	Carlin 801CRD	steam
Preble Hall	Smith	28A	2005	8	28A-sw-08	17.4	2499	7.5, 6.5	Carlin 801CRD	steam
President's House	Weil-Mclain							1.5		hot water
South Hall	Weil-Mclain	94	1971	10	1094	22.5 ?	3247 ?	9, 7	Carlin 801CRD	steam
Support	Smith	28A	1989	4	28A-sw-04	8	1154	3.25, 2.25	Carlin 701CRD	hot water
Wieden Hall	Smith	28 A	2010	11	28A-sw-11	24.5	3508	12, 6, 6	Carlin 1150FFD	steam
	HB Smith	450 MILLS	1978	16	450 MILLS	35.5	5088	20 BPS	Power flame C3-0hbs12	steam
	HB Smith									hot water

		July	August	September	October	November	December	January	February	March	April	May	June	Total Gallons	Critical Gallons
Gentile Hall															
	2011	0	2599	0	0	5537	2532	5475	2030	4852	4629	0	1702	29356	25055
	2012	0	0	0	5310	3721	3027	5060	4056	3026	5544	1612		31356	24434
	2013	0	3565	0	3008	3019	3541	7590	2526	2630				25879	19306
Normal Hall															
	2011	0	0	0	0	5235	2539	3794	4260	0	2524	0	3503	21855	18352
	2012	0	0	0	0	4421	0	5368	3542	2530	3528			19389	19389
	2013	0	0	0	2011	2329	3343	4848	0	4147				16678	14667
South Hall															
	2011	0	0	0	501	0	2020	2735	0	1627	656	0	1503	9042	7038
	2012	0	0	0	0	1407	0	2222	1519	0	1516			6664	6664
	2013	0	1307	0	0	0	1515	2132	0	1519				6473	5166
Wieden Hall															
	2011	0	0	0	5023	8081	10035	5683	5754	6348	0	0	0	40924	35901
	2012	0	0	0	4213	5331	4430	3338	7694	4451	7055	1310		37822	32299
	2013	0	1991	0	4112	3622	8109	9204	5152	4045				36235	30132
Kelley Commons															
	2011	0	1000	0	0	3012	5960	3915	1625	5054	3124	0	2605	26295	22690
	2012	0	0	0	1798	3220	1514	5653	3542	2117	3729			21573	19775
	2013	0	1692	0	1806	2005	3742	4259	2020	1499				17023	13525
Merriman Hall															
	2011	0	0	0	0	2865	2633	2336	0	2335	3521	0	704	14394	13690
	2012	0	0	0	1598	3617	1309	1619	3037	1214	2013			14407	12809
	2013	0	1692	0	2007	810	3643	2126	0	1517				11795	8096
Emerson Hall															
	2011	0	2500	0	0	11171	4573	7197	6089	5750	8211	0	2805	48296	42991
	2012	0	0	0	6191	7235	3927	5859	6173	4537	6851	2014		42787	34582
	2013	0	5919	0	0	3019	8106	7690	3031	4046				31811	25892

Critical Gallons total 2011	165717
Critical Gallons total 2012	149952
Critical Gallons total 2013	116784
Year total 2011	190162
Year total 2012	173998
Year total 2013	145894

Part V – Insurance Requirements

Suppliers Liability Insurance

During the term of this agreement, the Supplier shall maintain the following insurance:

Insurance Type	Coverage Limit
1. Commercial General Liability	$5,000,000 per occurrence or more
(Written on an Occurrence-based form)	(Bodily Injury and Property Damage, including completed operations)
2. Vehicle Liability	$1,000,000 per occurrence or more
(Including Hired & Non-Owned)	(Bodily Injury and Property Damage)
3. Workers Compensation	Required for all personnel
(In Compliance with Applicable State Law)	

The University of Maine System shall be named as Additional Insured on the Commercial General Liability insurance.

Certificates of Insurance for all of the above insurance shall be filed with:

Office of Strategic Procurement

University of Maine System

16 Central Street

Bangor, Maine 04401

Certificates shall be filed prior to the date of performance under this Agreement. Said certificates, in addition to proof of coverage, shall contain the standard statement pertaining to written notification in the event of cancellation, with a thirty (30) day notification period.

As additional insured and certificate holder, the University should be included as follows:

University of Maine System

16 Central Street

Bangor, Maine 04401

Part VI – Sample CNG Purchase and Sales Agreement

Contract for Purchase and Sale of Compressed Natural Gas Fuel between The University of Maine System and [Seller]

This Contract for Purchase and Sale of Compressed Natural Gas Fuel (hereinafter referred to as "Agreement") is made effective as of the __ day of _____ 20__, by and between The University of Maine System, a body politic and corporate and an instrumentality and agency of the State of Maine with a mailing address of _____ (hereinafter referred to as "Purchaser"), and the [Seller], a _____ with a mailing address of _____ (hereinafter referred to as "Seller").

RECITALS:

Whereas, Purchaser wishes to purchase from Seller compressed natural gas fuel requirements for certain of its facilities; and

Whereas, Seller wishes to sell to Purchaser compressed natural gas fuel to meet Purchaser's requirements at Purchaser's facilities, in accordance with the terms of this Agreement.

Now, Therefore, in consideration of these presents. Purchaser and Seller agree as follows:

1. **Purchase Obligations.** Seller agrees to sell to Purchaser and Purchaser agrees to purchase from Seller all of Purchaser's compressed natural gas fuel ("CNG") requirements for those certain facilities listed in Table 1 – List of Facilities and Adders, as provided in Appendix A attached to this Agreement (hereinafter referred to as the "Facilities", or individually as the "Facility"). Notwithstanding and provision in this Agreement, Purchaser may, in its sole discretion, reduce or discontinue purchase of CNG requirements at any Facility or Facilities by switching to fuel(s) other than CNG to meet its energy needs during the Term of this Agreement.

2. Price. The price for CNG covered by this Agreement shall be the sum of the cost of CNG plus the Infrastructure Costs as set forth herein:

A. The CNG price shall be determined on a price-per-mmbtu basis from time-to-time by the price index described below, adjusted annually. The price index shall be the Tennessee Zone 6 200 Leg Spot Price at closing as reported by Bloomberg. An amount per mmbtu shall be added to this Index Price equal to the price per mmbtu attributable to transportation, delivery and overhead and other items as described in RFP 38-11 ("Adder"). The Adder detail for each Facility is specified in Table 1. Annually, in June, Seller may adjust the Adder by the cumulative change in the Producer Price Index for All Commodities (Index WPU00000000) published by the U.S. Department of Labor, Bureau of Labor Statistics for the previous 12 months.

B. The Infrastructure Cost shall be the amount shown per month in Table 2 – List of Facilities and Infrastructure Costs as provided in Attachment A, hereto.

3. Payment Terms. Seller shall invoice Purchaser weekly for all CNG delivered to Purchaser during the prior week priced in accordance with Paragraph 2 of this Agreement. Payment terms shall be net thirty (30) days. A late charge of ____ per month shall accrue upon all invoices unpaid for thirty (30) days or more, until paid in full.

4. **Delivery/Title.** Title to CNG covered by this Agreement shall pass from Seller to Purchaser upon delivery to Purchaser's Facilities at Purchaser's meter(s). Transportation of CNG to Purchaser's Facilities shall be the responsibility of Seller in accordance with all applicable State and Federal requirements. Actual delivery of CNG shall be in accordance with applicable State and Federal rules, and when reasonably requested, Purchaser shall comply with all applicable State and Federal rules regarding the use and storage of CNG. Seller shall not be responsible for unanticipated use or waste of CNG by Purchaser or in circumstances outside of Seller's control. Purchaser shall provide Seller with no less than thirty (30) days advance written notice of requested delivery schedule changes for any of Purchaser's facilities which may result in greater CNG needs and a greater frequency of CNG deliveries.

5. **Taxes.** Seller and Purchaser agree that any duty, tax, fee or other charges which Seller may be required to collect or pay under any municipal, state, federal or other law now in effect or hereafter enacted with respect to the sale, delivery or use of CNG fuel covered by this Agreement shall be added to the prices to be paid by Purchaser for the CNG purchased hereunder, provided, however, that in no event shall Purchaser be responsible to pay any taxes on Seller's income, Sellers legal existence or status, or Seller's property or payroll taxes.

6. **Force Majeure.**

A. The parties shall not be liable for any non-performance or delay in performance caused by or resulting from war, or war-like operations; fire, earthquake, explosion, flood, perils of the sea, act of God, or accidental interruption by governmental action or otherwise of supply; or any other cause whatsoever beyond the reasonable control of the non-performing party (herein called "force majeure"). Purchaser acknowledges that Seller is not a producer of the CNG sold under this Agreement.

B. If force majeure shall occur, Seller shall notify Purchaser within forty-eight (48) hours after Seller has notice thereof. If Seller estimates that force majeure shall continue for more than thirty (30) days, Seller shall so notify Purchaser, and Purchaser may, upon fifteen (15) days written notice to Seller, terminate this Agreement without liability of any kind/or purchase replacement CNG from another source. In the event of a force majeure, Purchaser may also, without penalty, purchase replacement CNG from another source in the event that, in the determination of Purchaser, Seller cannot deliver CNG within a sufficient time to prevent depletion of existing CNG supplies at any of its Facilities subject to this Agreement.

C. If, by reason of force majeure, supplies of CNG from Seller's then existing sources of supply are curtailed or cut off, Seller may allocate in such a manner as shall, in Seller's judgment, fairly prorate among its existing or prospective Agreement or non-Agreement customers, such quantities as may then be in Seller's storage and such quantities as may be received by Seller in the ordinary course of business from existing or other sources of supply for Seller's business. Notwithstanding the foregoing, Purchaser may, without penalty, purchase replacement CNG from another source so long as, in the determination of Purchaser, Seller cannot deliver sufficient CNG to meet requirements of Purchaser's Facilities.

7. **Determination of Quantity and Quality**. The quantity and quality of CNG sold hereunder shall be for all purposes conclusively deemed to be the quantity and quality set forth in Seller's document of delivery unless within thirty (30) days of the date of delivery Purchaser delivers to Seller written notice of any claimed shortage in quantity or claimed deviation in quality. Time is of the essence in complying with this provision. Quantity will be measured in mmbtu, using a conversion heat content of 1,034 btu/cubic foot, unless Seller can demonstrate a different heat content.

8. **Express Warranties.** Seller warrants that it will convey good title to the CNG supplied hereunder, free of all liens and subject to the remedies available to either party under the Maine Uniform Commercial Code. The foregoing warranty of title is exclusive and is in lieu of all other warranties, whether written, oral or implied. The warranty of merchantability, in other respects than expressly set forth herein, and warranty of fitness for a particular purpose, in other respects than expressly set forth herein, are expressly excluded and disclaimed.

9. **Storage and Delivery Equipment.** All storage tanks, regulators, meters and vaporizers supplied by Seller and kept at Purchaser's Facilities for the purpose of storing and delivering CNG to Purchaser shall be the property of Seller, unless otherwise specified in an exhibit to this Agreement. Seller shall have access thereto at any and all times for the purpose of inspection, maintenance, repair or removal. Except as otherwise expressly provided for herein, all storage tanks, regulators, meters and vaporizers shall be provided by Seller to Purchaser at the Infrastructure Cost in Table 2, so long as this Agreement is in effect. Further, it is understood that Purchaser owns all underground lines – and meters along this line - and will be responsible for taking all reasonable steps to insure adequate protection of Seller's equipment, to include protective barriers, guardrails and or bollards, etc. Should Purchaser determine that any existing installation does not meet code requirements, Seller will bring any and all installations up to code at its own expense.

10. **Insurance.** Seller shall at its own expense secure and maintain, and shall require its Subcontractors to secure and maintain, throughout the Term of t his Agreement, the following insurance with companies demonstrating an AM Best rating of no less than A-. Certificates evidencing such insurance shall be produced prior to commencing work under this Agreement. Said certificates shall contain evidence that the policy or policies shall not be canceled or altered without at least thirty (30) calendar days prior written notice to Purchaser. The insurance coverages and limits required to be maintained by Seller shall be primary and shall not contribute with any insurance coverage by Purchaser. To the maximum extent permitted by applicable law, all insurance policies maintained by Seller in accordance with this provision and any other insurance maintained applicable to Seller's performance hereunder shall provide a waiver of subrogation in favor of Purchaser.

(A) Worker's Compensation Insurance which shall fully comply with the statutory requirements of all applicable state and federal laws and Employers' Liability Insurance which limit shall be $1,000,000 per accident for Bodily Injury and $1,000,000 per employee/aggregate for disease.

(B) Commercial General Liability Insurance with a minimum combined single limit of liability of $1,000,000 per occurrence. This shall include products/completed operations coverage and shall also include Broad Form Contractual coverage specifically for this Agreement. Purchaser (including its parent, subsidiary, affiliated and

managed entities) its directors, officers and employees, agents and assigns shall be named as additional insureds.

(C) Business Automobile Liability Insurance covering all owned, hired and non-owned vehicles and equipment used by Seller with a minimum combined single limit of liability of $1,000,000 for injury and/or death and/or property damage. Purchaser (including its parent, subsidiary, affiliated and managed entities) its directors, officers and employees, agents and assigns shall be named as additional insureds.

(D) Excess coverage with respect to (B) and (C) above with a minimum combined single limit of $5,000,000.

11. **Laws.**

A. Purchaser recognizes that Seller is storing and delivering a hazardous substance and agrees that in receiving and utilizing CNG purchased from Seller, Purchaser will in all respects exercise the strictest care required by law and that it will comply with all applicable federal, state and local laws and ordinances, as exist now or hereinafter come into force relating to the use, maintenance and labeling of storage tanks, the prevention of spills, leaks, venting or other improper escape from product containers or storage tanks, and the method of cleanup for disposal of product which has leaked, spilled, vented or otherwise improperly escaped from containers or storage tanks.

B. Purchaser shall at all times during the terms of this Agreement maintain all necessary licenses, permits and authorities to undertake its business and maintain its store, storage and administrative facilities served under this Agreement.

12. **Compliance with Laws.** Both parties expressly agree that it is not the intention of either party to violate statutory or common law and that if any section, sentence, paragraph, clause or combination of same within this Agreement is in violation of any law, such provisions shall be inoperative and the remainder of this Agreement shall remain binding upon the parties hereto unless, in the judgment of either party, the remaining portions hereof are inadequate to properly define the rights and obligation of the parties, in which event such party shall have the

right, upon making such determination, to thereafter terminate this Agreement upon written notice to the other.

13. **Performance Terms and Conditions**.

(A) Compliance: The Seller's performance under this Agreement shall comply with all Federal, State, and local laws, rules, and regulations, including but not limited to those laws, rules, and regulations stated herein or otherwise incorporated in this Agreement. The Seller shall obtain an excavation permit from Purchaser for any and all excavation activities on Purchaser property. The Seller shall comply with applicable Purchaser policies. Purchaser policies shall include but are not limited to parking policies, the tobacco-free campus policy, and the vehicle idling policy. Purchaser policies may include those pertaining to environmental and workplace safety, at the discretion of the Purchaser.

The Purchaser must comply with the "Workplace Smoking Act of 1985" and M.R.S.A. title 22, §1541 et. seq. "Smoking Prohibited in Public Places." In compliance with this law, the Purchaser has prohibited smoking in all Purchaser buildings except in designated smoking areas. This rule must also apply to all Sellers and workers in existing Purchaser buildings. The Seller shall be responsible for the implementation and enforcement of this requirement within existing buildings.

B. Employees: The Seller shall employ only competent and satisfactory personnel and shall provide a sufficient number of employees to perform the required services efficiently and in a manner satisfactory to the Purchaser. If the Purchaser notifies the Seller in writing that any person employed on this Agreement is incompetent, disorderly, or otherwise unsatisfactory, such person shall not again be employed in the execution of this Agreement without the prior written consent of the Purchaser.

C. Condition and Care of Site and Protection of the Work: The Seller shall continuously maintain adequate protection of all work covered by the Agreement from damage or loss and shall protect persons and property from injury or loss arising in connection with this Agreement, and shall make good any such damage, injury or loss. The Seller shall adequately protect adjacent property as provided by law and the Agreement.

D. Workplace Safety and Environmental Safety Plans. Seller shall submit a copy of its written plan(s) pertaining to occupational and workplace safety, and environmental safety of all Seller activities that may be performed under this Agreement. The submittal shall include a written copy of the "Spill Prevention Control and Countermeasures Plan," which shall include, but is not necessarily limited to, the equipment, procedures and assistance they will provide in the event of a fuel spill (major or minor) as well as what assistance and procedures they will provide in the event of a leaking fuel tank or other system component. All Plans shall be filed prior to the date of performance under this Agreement.

E. Spills/Releases. Seller shall be responsible for complete and immediate clean-up of any spills/releases internal or external, caused by their negligence, equipment, or employees in accordance with all applicable regulations and statutes. Seller must notify the Purchaser's designated employee in writing within twenty-four (24) hours of any incident whether such spill or release has resulted in any type of contamination, such as soil or groundwater. "Clean up" means that there will be no remaining trace of contamination.

14. **Equal Opportunity.** In the execution of the Agreement the Seller and all subcontractors agree, consistent with Purchaser of Maine System policy, not to discriminate on the grounds of race, color, religion, sex, sexual orientation, transgender status or gender expression, national origin or citizenship status, age, disability or veteran's status and to provide reasonable accommodations to qualified individuals with disabilities upon request.

15. **Sexual Harassment.** The Purchaser is committed to providing a positive environment for all students and staff. Sexual harassment, whether intentional or not, undermines the quality of this educational and working climate. The Purchaser thus has a legal and ethical responsibility to ensure that all students and employees can learn and work in an environment free of sexual harassment. Consistent with the state and federal law, this right to freedom from sexual harassment was defined as Purchaser policy by the Board of Trustees. Failure to comply with this policy could result in termination of this Agreement without advance notice. Further information regarding this policy is available from the University of Maine System, Office of Equal Opportunity by calling (207) 973-3201.

16. **Indemnification.** Seller shall indemnify, defend and hold Purchaser harmless with respect to all damages, claims or liability, excepting those covered by Purchaser's workers compensation, (including expenses and reasonable attorney's fees) against Seller or Purchaser

arising from Seller's handling or delivering of CNG to Purchaser's Facilities or from the installation, repair, maintenance, removal or other use of the equipment caused by Seller, its employees, agents or independent Sellers or from any breach of this Agreement. Upon receipt by Purchaser of notice of any such claim, Purchaser shall afford immediate notice thereof to Seller, and Seller shall undertake defense of all claims for and on behalf of itself and Purchaser, including the selection and payment of defense counsel. Purchaser may retain counsel of its own in any such matter, at its own expense.

Purchaser shall indemnify, defend and hold Seller harmless with respect to all damages, claims or liability, excepting those covered by Purchaser's workers compensation, (including expenses and reasonable attorney's fees) against Seller or Purchaser arising from Purchaser's handling, repair, maintenance, removal or other use of the equipment caused by Purchaser or from any breach of this Agreement; PROVIDED that any liability of the Purchaser under this Agreement shall be limited by the provisions and limitations of the Maine Tort Claims Act, 14 MRSA § 8101, et. seq. Upon receipt by Seller of notice of any such claim, Seller shall afford immediate notice thereof to Purchaser, and Purchaser shall undertake defense of all claims for and on behalf of itself and Seller, including the selection and payment of defense counsel. Seller may retain counsel of its own in any such matter, at its own expense.

Delay by either party in providing notice of a claim under this section shall not be considered to be a default of that party's material obligations under this Agreement. In the event that a delay in providing notice under this section by either party results in the other party incurring additional costs, the party causing the delay in notice shall be responsible for those additional costs, provided that the party incurring additional costs can reasonably establish that those additional costs were the direct result of not receiving immediate notice of a claim by the other party.

17. **Damages.** No claim shall be made under this Agreement for special, consequential or punitive damages, except as expressly provided otherwise herein.

18. **Term; Termination.**

A. This agreement shall be in effect for the period commencing _____ and ending _____.

B. This Agreement may be immediately terminated: (i) upon assignment of the Agreement contrary to the provisions of this Agreement; (ii) if either party becomes insolvent (generally unable to pay its debts as they become due) or the subject of a bankruptcy, conservatorship, receivership, or similar proceeding, or makes a general assignment for the benefit of its creditors; or (iii) if either party defaults in any of its material obligations under this Agreement and does not act to cure the default within thirty (30) days following written notice by the other party.

C. Termination of this Agreement by either party for any reason shall not relieve the parties of any obligation heretofore accrued under this Agreement.

19. **Independent Seller.** Whether the Seller is a corporation, partnership, other legal entity, or an individual, the Seller is an independent Seller. The manner in which the services are performed shall be controlled by the Seller; however, the nature of the services and the results to be achieved shall be specified by the Purchaser. The Seller is not to be deemed an employee or agent of the Purchaser and has no authority to make any binding commitments or obligations on behalf of the Purchaser except as expressly provided herein.

20. **Entire Agreement.** This Agreement is intended by the parties to be a final, complete and exclusive statement of their agreement about the matters covered herein. There are no oral understandings, representations or warranties affecting the Agreement. No amendment or alteration to this Agreement shall have any effect unless made in writing and signed by an authorized representative of Seller and by Purchaser.

21. **Prior Agreements.** This Agreement cancels and supersedes any prior communications, representations or agreements between the parties hereto whether verbal, written or electronic, covering the purchase and sale of CNG now covered by this Agreement.

22. **Assignment.** Purchaser may assign this Agreement without Seller's consent to a campus of The University of Maine System. Purchaser may assign this Agreement otherwise only with the prior written consent of Seller, which shall not be unreasonably withheld, delayed or conditioned. Seller may assign this Agreement only with the prior written consent of Purchaser, which shall not be unreasonably withheld, delayed or conditioned.

23. **Waiver.** No waiver by either party of any breach of any of the covenants or conditions herein contained to be performed by the other party shall be construed as a waiver of any succeeding breach of the same or any other covenant or condition.

24. **Notices.** All written notices required or permitted to be given by this Agreement shall be deemed to be duly given if delivered personally or sent by certified mail to Seller or to Purchaser, as the case may be, at the address set forth below or such other address as may be furnished by either party to the other in writing in accordance with the provisions of this paragraph. The date of personal delivery or the third (3rd) business day after mailing shall be deemed the date of giving such notice except for notice of change of address, which must be received to be effective.

Seller	Purchaser
[Seller]	The University of Maine System

25. **Binding Effect.** This Agreement shall inure to and be binding upon the successors and permitted assigns of the parties hereto.

26. **Governing Law; Venue.** This Agreement shall be governed by, and construed and enforced in accordance with, the internal substantive laws of the State of Maine, as from time to time constituted and without regard to the conflicts of laws principles thereof. The parties agree that any action brought in connection with this Agreement shall be maintained only in a court of competent subject matter jurisdiction located in the State of Maine or in any court to which appeal therefrom may be taken. The parties hereto consent to the exclusive personal jurisdiction of such courts for all such purposes.

27. **Counterparts; Fax Signatures**. This Agreement may be executed in any number of counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Any facsimile reproduction of the signature of any party to this Agreement shall be admissible as evidence of the original signature itself in any judicial or administrative proceeding, whether or not the original is in existence.

[Rest of page left blank intentionally]

IN WITNESS WHEREOF the parties hereto have set their hands and seals as of the day of the _____ day of _____ , 20__.

THE UNIVERSITY OF MAINE SYSTEM

By: _____

Name: _____

Title: _____

Date: _____

[SELLER]

By: _____

Name: _____

Title: _____

Date: _____

APPENDIX A

Table 1 List of Facilities and Adders

Name of Facility	Address	City	State	Zip	Adder 1	Adder 2	Total Adder

[Adder is in Dollars per Gallon]

Table 2 List of Facilities and Infrastructure Costs

Name of Facility	Address	City	State	Zip	Infrastructure Costs

[Infrastructure Costs are in dollars per Calendar Month]

Part VII – Sample Land Lease Use Agreement

LEASE AGREEMENT

This Lease Agreement, is made and entered into this day of ____ , 20__ , by and between the University of Maine System, acting by and through the University of Maine Presque Isle, (hereinafter the "Lessor")
and _____ (hereinafter the "Lessee").

For good and valuable consideration, the receipt of which is hereby acknowledged, the parties agree as follows:

1. Premises. Lessor hereby leases to Lessee, and Lessee rents and takes from Lessor, the following described premises (the "Premises) _____ , further described in Attachment A (which shall include a floor plan, if applicable, of the Premises) which is appended to and, by this reference, incorporated into this Lease.

2. Term. The term of this Lease shall be from _____ , 20___ until _____, 20__ . At the expiration of the base term of this Lease, the term may be extended by mutual written agreement of the parties for _____ additional term(s) of ___years, on the same terms and conditions of this Lease, except as to rent, which shall be negotiated by the parties.

3. Rent. The Lessee agrees to pay to the Lessor $ as rent for the Premises, which rent shall be paid in installments of $_____ each, and which shall be paid to the Lessor as follows: Rent for any partial months shall be prorated at a daily rate.

4. Use of Premises. Lessee shall use and occupy the Premises for the following purpose(s) only: . Lessee shall not use the Premises for any other purpose without the prior written consent of the Lessor. The Lessee shall not conduct, permit or agree to any unlawful, improper or offensive use of the Premises or any use thereof contrary to any law, regulation or ordinance now or hereafter made, or which shall be injurious to any person or property, or which shall endanger or affect any insurance on the said Premises or to increase the premium thereof.

5. Insurance. During the term of this lease, the Lessee shall maintain in force a policy of commercial general liability insurance with a limit of not less than $1,000,000 per occurrence, covering bodily injury, personal injury, and property damage. The insurance shall be issued by companies acceptable to the Lessor, and the insurance policy shall name Lessor as an Additional Insured and stipulate that the policy will not be cancelled without thirty (30) days prior written notice to the Lessor. A certificate of insurance evidencing insurance coverage shall be provided to the Lessor prior to the commencement of this Lease.

> As additional insured and certificate holder, the Lessor shall be included as follows:
> The University of Maine System
> 16 Central Street
> Bangor, ME 04401

If deemed by the Lessor to be relevant to this lease, Lessee shall also maintain vehicle liability insurance with a limit of not less than $1,000,000 per occurrence and workers' compensation insurance in compliance with applicable state law. Proof of such insurance shall be provided by

Lessee upon request.

Lessee is responsible for insuring or self-insuring Lessee's own contents and betterments and improvements. Lessor is not responsible for loss or damage of contents, including betterments and improvements, or personal effects of Lessee and Lessee's employees, agents or guests, unless caused by the negligent acts or omissions of the Lessor.

6. Liability. Lessee shall indemnify and hold the Lessor harmless from and against any and all expenses, claims, lawsuits, judgments and costs, including reasonable attorney's fees, that the Lessor may become liable to pay or defend due to claims of bodily injury or property damage caused by the negligent acts or omissions of the Lessee, its officers, employees or agents, arising out of or in connection with the leasing of the Premises by the Lessee pursuant to this Lease.

7. Applicable Law. This Lease shall be interpreted and governed according to the laws of the State of Maine, without regard to its choice of law provisions. Maine shall be the forum for any lawsuits or claims arising under this Lease.

8. Termination. The Lessor shall have the right to terminate this Lease by giving at least days written notice to the Lessee and setting forth in such notice the effective date of termination.

9. Assignment. This Lease shall not be assigned, subleased, transferred or conveyed in whole or in part by the Lessee without the prior written consent of the Lessor or by the Lessor without written notice to the Lessee. The use of the Premises by any such sub-lessee or assignee shall be similar to the use described in section 4 hereof.

10. Non-discrimination. Lessee shall not discriminate and shall comply with applicable laws prohibiting discrimination on the basis of race, color, religion, sex, sexual orientation, including transgender status or gender expression, national origin or citizenship status, age, disability, or veteran status. The Lessor encourages the Lessee in the employment of individuals with disabilities.

11. Non-waiver. The failure of either party to exercise any of its rights under this Lease for a breach thereof shall not be deemed to be a waiver of such rights, and no waiver by either party, whether written or oral, express or implied, of any rights under or arising from this Lease shall be binding on any subsequent occasion; and no concession by either party shall be treated as an implied modification of the Lease unless specifically agreed to in writing.

12. Severability. In the event one or more clauses of this Lease are declared invalid, void, unenforceable or illegal, that shall not affect the validity of the remaining portions of this Lease.

13. Entire Agreement. This Lease sets forth the entire agreement of the parties on the subject, and replaces and supersedes any previous agreement between the parties on the subject, whether oral or written, express or implied. This Lease contains all of the agreements and conditions made between the parties concerning the Premises. There are no collateral agreements, stipulations, promises, understandings or undertakings whatsoever of the respective parties concerning the subject matter of this Lease. This Lease may be amended or modified only by a writing signed by both parties.

14. Destruction. If at any time during the term of this Lease, or any extension thereof, the Premises shall be totally or partially destroyed by fire, earthquake, or other calamity, then this Lease shall terminate as to the part so destroyed, and Lessee shall have the option within 30 days after assessing the amount of damage and amount of usable space, to either continue with the Lease, or choose to terminate the Lease without further obligation by lessee or Lessor. In case, however, Lessee chooses to remain in the Premises but Lessor elects not to rebuild or repair said Premises, Lessor shall so notify Lessee by written notice within the period of 30 days after the damaging event, and thereupon this Lease shall terminate without further obligation by Lessee or Lessor. In any event, Lessee's rent shall be abated to the extent its use is prevented or reduced by such destruction or failure.

15. Condemnation. In the event the Premises, or any part thereof, are taken, damaged consequentially or otherwise, or condemned by public authority, this Lease shall terminate as to the part so taken, and Lessee shall have the option within 30 days after assessing the amount taken or damaged and amount of usable space, to either continue with the Lease, or choose to terminate the Lease without further obligation by Lessee or Lessor. In any event, Lessee's rent shall be abated to the extent its use is prevented or reduced by such condemnation, damage or taking. Any damages and payments resulting from any public authority taking, damage or condemnation of the Premises shall accrue to and belong to Lessor, and Lessee shall have no right to any part thereof.

16. Holdover. If Lessee remains in possession of the Premises after expiration or termination of this Lease, such possession will be on a month to month basis. During this holdover period, all of the other provisions of this Lease shall be applicable.

17. Binding Effect. This Lease shall both benefit and bind the parties hereto and their respective successors, personal representatives and permitted assigns.

18. Taxes. The Lessee shall be solely responsible for any and all taxes assessed against the Lessee's personal property and for any and all taxes assessed against the Premises, including, but not limited to, real estate taxes, arising from the use and/or occupancy of the Premises by the Lessee.

19. Lessor's Right of Entry. Lessor shall have the right, upon reasonable notice, to enter upon the Premises to inspect the same and to make any and all improvements, alterations and additions of any kind upon the Premises.

20. Surrender. At the expiration or earlier termination of this Lease, Lessee will yield up the Premises to the Lessor in as good order and condition as when the same were entered upon by the Lessee, loss by fire or inevitable accident, damage by the elements, and reasonable use and wear excepted.

21. Notice. Any notice to either party under this Lease must be in writing signed by the party giving it, and shall be served either personally or by registered or certified mail addressed as follows:

To Lesser:

and University of Maine System
16 Central Street
Bangor, ME 04401

To Lessee:

or to such other address as may be hereafter designated by written notice provided in accordance with this section. All such notices shall be effective only when received by the addressee.

22. Alterations, Additions and Improvements. Lessee shall not make, or suffer or permit to be made, any alterations, additions or improvements in or about the Premises without first obtaining the written consent of Lessor therefore; provided, however, that such consent, if given, will be subject to the express condition that any and all alterations, additions and improvements shall be done at Lessee's own expense, and that no liens of mechanics, material men, laborers, architects, artisans, contractors, subcontractors, or any other lien of any kind shall be created against or imposed upon the Premises, or any part thereof.

23. Quiet Enjoyment. On payment of rent and performance of the covenants and agreements on the part of the Lessee to be paid and performed hereunder, the Lessee shall peaceably have and enjoy the Premises and all of the rights, privileges and appurtenances granted by this Lease free from any interference by Lessor or any other person.

24. Force Majeure. Neither party to this Lease shall be liable for non-performance of any obligation under this Lease if such non-performance is caused by a Force Majeure. "Force Majeure" means an unforeseeable cause beyond the control of and without the negligence of the party claiming Force Majeure, including, but not limited to, fire, flood, other severe weather, acts of God, labor strikes, interruption of utility services, war, acts of terrorism, and other unforeseeable accidents.

25. Utilities. Where a checkmark is placed on the line of the column under a party below, it is that party's responsibility to pay for those services to the Premises.

Lessor	Lessee	
_____	_____	Water
_____	_____	Sewer
_____	_____	Refuse Removal
_____	_____	Fuel
_____	_____	Electricity
_____	_____	Heating and Cooling Systems
_____	_____	Maintenance and Upkeep
_____	_____	Carpeting

_____	_____	Lighting Fixtures
_____	_____	Telephone Installation, Service, Billing and Long Distance Charges
_____	_____	Cable Television
_____	_____	Snow Removal

Lessee shall furnish and pay for any other services or supplies it desires for which responsibility is not designated above.

26. Default. Lessor shall have the right to terminate this Lease without further obligation in the event Lessee breaches any term or covenant of this Lease and Lessee fails to correct such breach within thirty (30) days after written notice to Lessee.

27. Lessor's Covenants. Lessor agrees to maintain the Premises in a condition fit for their intended use, make all necessary repairs of which Lessor is or becomes aware, including adequate heat and water and a sound physical structure.

28. Access. Lessee has the right of reasonable ingress and egress to the leased Premises.

29. Hazardous Waste Lessee hereby covenants and agrees that it shall not, during the term of this lease, including any extension or renewal hereof, permanently place, cause to be placed, deposit or discharge any hazardous waste upon the demised premises, and further expressly agrees that it shall indemnify Lessor from any and all costs, expense or liability, of whatever kind or nature, incurred by the Lessor in detecting, evaluating, removing, treating, disposing of or otherwise responding to any hazardous waste placed or deposited by Lessee in violation of this Article.

IN WITNESS WHEREOF, the authorized representatives of the parties have executed this Lease Agreementon this _____day of_____ , 20___ .

LESSOR:
By:
Signature
Printed Name
Title

LESSEE:
By:
Signature
Printed Name
Title

STATE OF MAINE

_____ss _____ , 20____

Then personally appeared before me the above-named _____, the duly authorized _____ of _____, and acknowledged the foregoing instrument to be his/her free act and deed in his/her said capacity, and the free act and deed of _____.

Before me,
Notary Public/Attorney-at-Law
Printed Name
My Commission Expires:

STATE OF MAINE

_____ss _____, 20___

Then personally appeared before me the above-named _____, the duly authorized _____ of the University of Maine System, and acknowledged the foregoing instrument to be his/her free act and deed in his/her said capacity, and the free act and deed of the University of Maine System.

Before me,
Notary Public/Attorney-at-Law
Printed Name
My Commission Expires