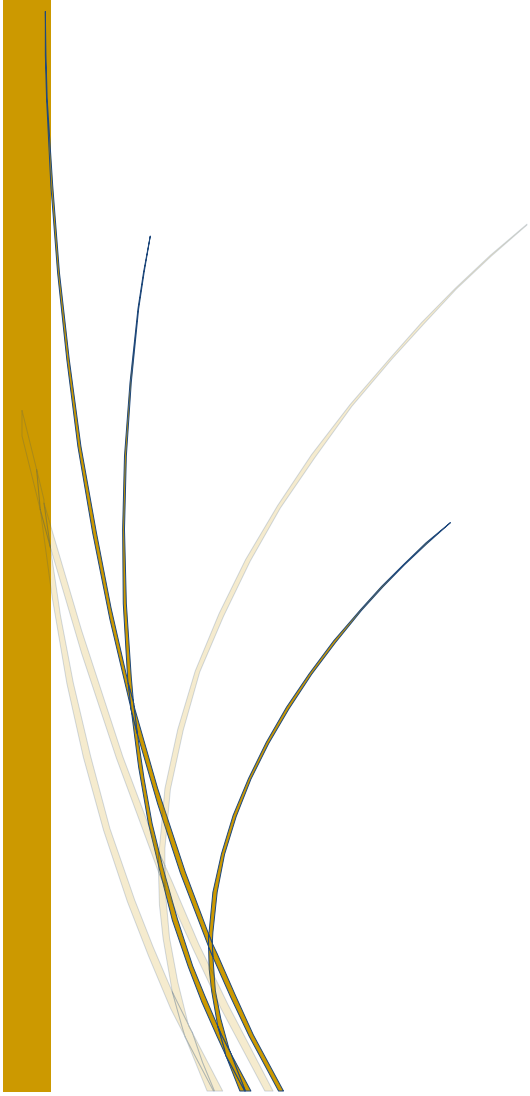
April 11, 2024

BID PACKAGE

LAKEVIEW ROAD @ ALDER BROOK



WENTWORTH PARTNERS & ASSOCIATES
A Gold Standard Company
31 Commercial Street
P.O. Box 2285
Skowhegan, ME 04976
Office: 207.858.8010

Project Information:

Alder Brook
Stream Crossing Replacement

Lakeview Road
Brownville, Maine 04414

Owner:

Town of Brownville
586 Main Road
Brownville, ME 04414

Agent:

The Nature Conservancy
14 Main Street
Suite 401
Brunswick, Maine 04011

Prepared by:

Wentworth Partners & Associates, Inc.
31 Commercial Street
P.O. Box 2285
Skowhegan, ME 04976

Project No. 103-23

Original: April 11, 2024

TABLE OF CONTENTS

SECTION A
INVITATION TO BID

Notice is hereby given that the Town of Brownville, Maine will receive sealed bids for the **Alder Brook Stream Crossing Replacement** until 12:00 PM local time on May 8, 2024 at the offices of Wentworth Partners & Associates, located at 31 Commercial Street, Skowhegan, Maine, at which time and place all bids will be publicly opened and read aloud. Bids received after this time will not be accepted.

Each Bidder must submit a single sealed envelope with three copies of the bid documents, the outside of which must be clearly marked **Alder Brook Stream Crossing Replacement.**

This project requires the complete removal of a multiple culvert stream crossing structure with a new open bottom bridge structure. This project will be completed in three Phases of work. For Phase I the on-Site construction process will include, but not be limited to, mobilization, installation of the sediment control barriers and buffers, installation of sheet piles, widening of the existing road, excavation for and installation of the Phase I abutments, removal of one-half of the existing metal culverts, Phase I reconstruction of the streambed, installation of the abutment armament installation of the Phase I bridge superstructure, regrading the road and shoulders, and then moving the traffic over the new structure and prepare for the next Phase. For Phase II the on-Site construction process will include, but not be limited to, excavation for and installation of the Phase II abutments, removal of the remaining metal culverts, Phase II reconstruction of the streambed, installation of the abutment armament, installation of the Phase II bridge superstructure, regrading the road and shoulders, and then moving the traffic over the new structure. Phase III will consist of removal of the sheet piles, finishing the road grades, reseeding all other areas, removal of the sediment control barriers and buffers, then cleanup and demobilization.

The Project Manual will be available digitally April 11, 2024. Copies of the Project Manual may be obtained upon payment of a non-refundable fee of $25.00 per set and will be mailed from the offices of Wentworth Partners & Associates, Skowhegan, Maine.

Permitting for this was applied for on January 11, 2024 with the State of Maine Department of Environmental Protection (Maine DEP) and the United States Army Corps of Engineers (USACE). All permits are anticipated to be in place by April 30, 2024. The project's in-stream work shall be completed between July 15, 2024 and September 30, 2024.

The Town of Brownville reserves the right to accept or reject any or all bids and to waive formalities. No proposal may be withdrawn for at least 30 days after receipt of proposals.

SECTION A

INSTRUCTION TO BIDDERS

1. The Town of Brownville is soliciting bid proposals for a complete culvert replacement project. The bid specifications are comprised of the following sections, all of which represent an integral part of the Town of Brownville's request for bid proposals.

A. Invitation to Bid/Instructions to Bidders
B. Bid Form
C. Bid Bond Form
D. Technical Specifications
   Latest edition of MDOT Standard Specifications for Highways and Bridges
E. Sample Contract
F. Payment and performance bond forms

The project drawings include:
Project Drawings for Lakeview Road @ Alder Brook, Sheets G-001 through G007, C001, C101 through C116, S001 through S002, and S101 through S107, issued as Revision 1"*Issued For Permitting*", dated March 19, 2024, by Wentworth Partners & Associates.

Prospective Bidders shall become completely familiar with the required work and shall rely on their own investigation. No consideration will be granted for any alleged misunderstanding of the material to be furnished, the work to be done, or for any defects in the final product that are the result of the absence of pre-inspection of a site. Any questions concerning these specifications shall be addressed to:

Steven C Govoni, P.E., M. ASCE
President
Wentworth Partners & Associates
A Gold Standard Company
31 Commercial Street
P.O. Box 2285
Skowhegan, ME 04976
Office: 207.858.8010
Mobile: 207.399.0900
Electronic: sgovoni@wpa-design.com

2. All bids must be submitted on the enclosed bid form supplied by the Town of Brownville and included herein. All bids must be signed and placed in a sealed envelope bearing the name and address of the Bidder and clearly marked "**Alder Brook Stream Crossing Replacement**". and addressed to:

Wentworth Partners & Associates
A Gold Standard Company
31 Commercial Street
P.O. Box 2285
Skowhegan, ME 04976

All bids must be accompanied by a duly signed and executed bid bond for the amount of 5% of the total bid.

3. Sealed bids are due to the Skowhegan, Maine office of Wentworth Partners & Associates by **12:00 PM (noon)**, **Wednesday, May 8, 2024.** No bid will be accepted after the time specified for bid closing**. Bids will be opened publicly at that time.**

4. The Contractor agrees to maintain liability insurance in the amount of $2,000,000 to protect it from personal injury, death or property damage claims which may arise from the road projects under this contract. The Town of Brownville and Wentworth Partners & Associates shall be named as an "additionally insured party" under this policy. The Contractor further agrees to indemnify, assume the defense of and save harmless, the Town of Brownville and Wentworth Partners & Associates and its agents and employees from liability, action, claims or damage suffered by any person or association, which results from the willful or negligent action or inaction of the Contractor in the performance of duties and the work performed under this contract. The Contractor shall also carry adequate insurance to cover the risk and requirements specified under the Worker's Compensation Laws of the State of Maine, if applicable. In lieu of Worker's Compensation insurance, the Contractor must provide Independent Contractor Certification from the Worker's Compensation Board. All certificates of insurance must be submitted to the Town of Brownville before any work begins.

5. Qualifications for Bidders: After the bid opening, The Town of Brownville may make such investigation as it deems necessary to determine the ability of the Bidders to perform the work. Bidders shall furnish to the Town of Brownville, all such information and data for this purpose as the Town of Brownville shall request. The Town of Brownville reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Town of Brownville that such Bidder is properly qualified to carry out the obligation of the Contract and to complete the work contemplated therein.

6. The Town of Brownville reserves the right to **ACCEPT OR REJECT** any or all bids in whole or in part.

7. All in-stream work shall be completed between July 15, 2024 and September 30, 2024. Other substantial associated work shall be completed by October 31, 2024.

8. A pre-bid site meeting shall take place at 10:00 am on Thursday, April 18, 2024 at the project location, approximately 695 Lakeville Road, Brownville, Maine.

SECTION B
BID FORMS

Project Identification: Alder Brook Stream Crossing Replacement
Brownville, Maine

This Bid is Submitted to: Town of Brownville
586 Main Road
Brownville, Maine 04414

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner to complete all work as specified, indicated, or implied in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.

2. BIDDER accepts all the terms and conditions of the Instructions to Bidders. BIDDER will sign an Agreement within five (5) days after the date of Owner's Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   a. BIDDER has examined copies of all the Contract Documents and of the following addenda:

Date:	Number:
_____	_____
_____	_____
_____	_____

   (Receipt of all of which is hereby acknowledged)

   b. BIDDER has examined the site and locality where the work is to be performed, the legal requirements (Federal, State and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the work and has made such independent investigations as BIDDER deems necessary.

   c. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false Bid; BIDDER has not solicited or induced any person, firm or a corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for themselves any advantage over any other BIDDER or over Owner.

4. BIDDER will complete the work for the Lump Sum prices set forth in the Bid Form. Bidder understands that depending on the total bid price, portions of the work may be eliminated to bring the project into budget. Bidder also agrees to complete extra work or delete portions of

the work on a unit price basis. The unit prices will be as listed in the Bid Schedule of Unit Prices.

5. BIDDER agrees that the long-lead fabrication work shall be ordered as soon as this contract is in place, and, that all in-stream work shall be completed between July 15, 2024 and September 30, 2024 with an in-stream work completion date of September 30, 2024. All other associated work shall be substantially complete by October 31, 2024. Any final work, limited to slope reseeding and road shoulder work, shall be completed by May 31, 2025.

BID FORM
April 11, 2024

Alder Brook
Stream Crossing Replacement
Brownville, Maine

Item No.	Description	Unit	Total Price (Words)	Total Price (Numbers)
Item 1	Alder Brook Stream Crossing Replacement	L.S.		
Total Bid				

IF BIDDER IS:

CORPORATION

By: _____
(Corporation Name)

_____

(State of Incorporation)

By: _____
(Name of Authorized Person/Title)

Attest _____
(Corporate Seal)

Business Address: _____

_____

Phone No.: (_____)_____Fax No.: (_____) _____

Federal Tax ID No. _____

SUBMITTED ON_____, 2024

IF BIDDER IS:

An Individual

Name (typed or printed)_____

By:_____
(Individual's Signature)

Doing Business As:_____

Business Address: _____

_____

Phone No.: (_____)_____Fax No. (_____) _____

E-Mail Address _____

Social Security No. _____

SUBMITTED ON_____, 2024

IF BIDDER IS:

A Partnership

Partnership Name:_____

By:_____
(Signature of general partner – attach evidence of authority to sign)

Name (typed or printed): _____

Business Address: _____

_____

Phone No.: (_____)_____Fax No.: (_____) _____

E-Mail Address: _____

Federal Tax ID No. _____

SUBMITTED ON_____, 2024

BID SCHEDULE OF UNIT PRICES

The following is a list of Unit Prices referenced in the Bid Form submitted

by: (Bidder): _____

_____

(Owner): Town of Brownville Dated: _____

_____and which is an integral part of the Bid Form.

Should additional work be requested by The Town of Brownville or portions of bid items be eliminated by the Town of Brownville, we agree to perform additional work at the unit prices listed below, and agree to credit the Town of Brownville for quantities of unit price items eliminated from the lump sum bid items. We understand that the unit prices listed include all the overhead, supervision, labor, equipment and material necessary to complete each work item, and are as measured in place and complete.

Item	**Unit Price**	**Unit**	**Item**	**Unit Price**	**Unit**
Common Excavation	_____	/cy	Erosion Control Blanket	_____	/sq yd
Ledge Removal	_____	/cy	Loam & Seed	_____	/sq ft
Common Borrow (in place)	_____	/cy	Riprap	_____	/cy
Type D Gravel – Aggregate Subbase (in place)	_____	/cy	Pavement	_____	/sqyd
Type A Gravel – Aggregate Base (in place)	_____	/cy	Guardrail	_____	/lf
Stream Bed Material	_____	/cy	Sediment Barrier	_____	/lf
Cast-In-Place Concrete	_____	/cy			

_____ _____

Contractor Name Date

_____ _____

Address Telephone

BID BOND

A singular reference to Bidder, Surety, Owner or other party shall be plural where applicable.

BIDDER *(Name and Address)*:

SURETY *(Name and Address of Principal Place of Business)*:

OWNER *(Name and Address)*:

BID

Bid Due Date:

Description *(Project Name and Include Location)*:

BOND

Bond Number:

Date *(Not earlier than Bid due date)*:

Penal sum _____ $_____

(Words) (Figures)

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

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
Print Name	Print Name
Title	Title
Attest: _____	Attest: _____
Signature	Signature
Title	Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venture's, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

   3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

   3.2 All Bids are rejected by Owner, or

   3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state and county in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail,

return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION C
SUMMARY OF WORK

Work under this contract shall be primarily located within the public right-of-way of Lakeview Road in the Town of Brownville, Maine. The project location is at the crossing of Lakeview Road over Alder Brook at is located at Latitude N 45.31221° Longitude W 68.96223°. The site is located at approximately 695 Lakeview Road.

WORK SUMMARY

This project requires the complete removal of a multiple culvert stream crossing structure and the installation of a multi-phased bridge structure. Lakeview Road is a critical travel way from Brownville center to the Village of Lakeview. There are no other passable routes. Additionally, the Village of Lakeview is primarily a summer community for the Village and the surrounding areas around Schoodic Lake. Hence, the Contractor shall be responsible to keep a single lane of traffic continuously open during the entire construction period. Therefore, this project is anticipated to require three continuous phases of work. The first phase of the on-Site construction process will include, but not be limited to, mobilization, installation of the sediment control barriers and buffers, installation of sheet piles, widening of the existing road, excavation for and installation of the Phase I abutments, removal of one-half of the existing metal culverts, Phase I reconstruction of the streambed, installation of the abutment armament, installation of the Phase I bridge superstructure, regrading the road and shoulders, and then moving the traffic over the new structure. The second phase of the on-Site construction process will include, but not be limited to, excavation for and installation of the Phase II abutments, removal of the remaining metal culverts, Phase II reconstruction of the streambed, installation of the abutment armament, installation of the Phase II bridge superstructure, regrading the road and shoulders, and then moving the traffic over the new structure. And finally, the third phase III will consist of removal of the sheet piles, finishing the road grades, reseeding all other areas, removal of the sediment control barriers and buffers, then cleanup and demobilization.

The contractor shall be responsible for installing and maintaining all specified in-stream and adjacent fish protection, turbidity control, and erosion and sediment control measures shown on the Plans. The contractor shall also install and maintain dewatering activities shown on the Plans as necessary to perform the work in “dry” conditions to the greatest extent possible.

SCHEDULE

All long lead and manufactured components shall be ordered once the signed contract is in place. Notifications for scheduling and sign postings of the upcoming work shall be posted immediately. On-site work may begin as soon as possible. However, any in-stream work will be restricted to the Maine DEP / US Army Corp in-stream window start date of July 15, 2024. All in-stream work will be completed on or before September 30, 2024 with other associated substantial work complete by October 31, 2024. Any reseeding and final

shoulder work can be pushed off until the next spring with a final project completion date no later than May 31, 2025.

COORDINATION

No work will begin prior to a two-week minimum notification to the Town of Brownville and the Village of Lakeview.

TRAFFIC CONTROL

Contractor shall be responsible for providing and maintaining all traffic control and detours including signage, flaggers and public notification. This project will require temporary traffic signal lights to be operational twenty-fours a day seven days a week (24/7).

WORK TO BE INCLUDED:

The work shall include but not be limited the following:

Culvert Installation – In-Stream Work (must be complete by September 30, 2024)

- Mark site and contact DigSafe
- Install block net, turbidity curtain, and other E&SC measures
- Build cofferdams
- Construct bypass drainage and dewatering
- Remove existing culvert and dispose offsite
- Stream bed excavation
- Place concrete footers
- Stream bed reconstruction
- Place Abutments
- Assemble wing walls
- Riprap placement for scour protection
- Removal of cofferdam and in-stream nets and curtains

Out-of-Stream Work

- Backfill and associated earthwork
- Sheet piling installation
- Increase road width
- Slope reinforcement and stabilization
- Fine grading
- Pavement reconstruction
- Guardrail installation
- Loaming, seeding and mulch
- Erosion and sedimentation control measures removal
- Site restoration

SECTION D
TECHNICAL SPECIFICATIONS

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 3 - CONCRETE

033000	Cast-In-Place Concrete
033546	Concrete Finishing, Curing and Repairs

DIVISION 31 - EARTHWORK

311000	Site Clearing
311413	Stripping and Stockpiling Topsoil
312000	Earth Work
312213	Rough Grading
312300	Excavation (Excavation and Fill)
312316	Rock Removal
312316.13	Trenching
312323	Structural Backfilling (Fill)
312333	Trench Backfilling, Compaction, Control & Testing
312500	Temporary Erosion Control
312500.13	Environmental Protection

DIVISION 32 - EXTERIOR IMPROVEMENTS

321116	Borrow and Bedding Material (Subbase Courses)
321123	Aggregate Base Course
321216	Asphalt Paving
	Concrete Curbing
	Pavement Markings
	Site Signage
	Precast Concrete Retaining Wall
329119	Landscape Grading
329219	Seeding

DIVISION 33 - UTILITIES

330526	Buried Utility Markings (Utility Line Signs, Markers and Flags)
334113	Polyvinyl Chloride (PVC) Storm Drainage Piping
334626	Filter Fabric (Geotextile Subsurface Drainage Filtration)
334913	Catch Basins, Grates and Frames (Storm Drainage Structures)

END OF SECTION

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork, shoring, bracing, and anchorage
B. Concrete reinforcement and accessories
C. Concrete

1.2 PRODUCTS INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

A.	Anchor bolts	Section 05120, Structural Steel

1.3 REFERENCES

A.	ACI 211.1-2022 -	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
B.	ACI 301-2016 -	Standard Specifications for Structural Concrete
C.	ACI 302.1R-2015 -	Guide for Concrete Floor and Slab Construction
D.	ACI 304.2R-2017 -	Placing Concrete by Pumping Methods
E.	ACI 305R-2020 -	Hot Weather Concreting
F.	ACI 306R-2016 -	Cold Weather Concreting
G.	ACI 308R-2016 -	Standard Practice for Curing Concrete
H.	ACI 309R-2005 -	Guide for Consolidation of Concrete
I.	ACI 318-2014 -	Building Code Requirements for Structural Concrete and Commentary
J.	ACI 347R-2021 -	Guide to Formwork for Concrete
K.	ACI 350R-2020 -	Environmental Engineering Concrete Structures
L.	ASTM A 82-2001 -	Specification for Steel Wire, Plain, for Concrete Reinforcement
M.	ASTM A185-2001 -	Specification for Steel Welded Wire Fabric, Plain for Concrete Reinforcement
N.	ASTM A615-2022 -	Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement
O.	ASTM A706-2022 -	Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
P.	ASTM A775-2022 -	Specification For Epoxy-Coated Reinforcing Steel Bars
Q.	ASTM C 33-2018 -	Specification for Concrete Aggregates
R.	ASTM C 94-2023 -	Specification for Ready Mixed Concrete
S.	ASTM C150-2007 -	Specification for Portland Cement
T.	ASTM C260-2010 -	Specification for Air Entraining Admixtures for Concrete
U.	ASTM C309-2019 -	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
V.	ASTM C494-2017 -	Specification for Chemical Admixtures for Concrete
W.	Concrete Reinforcing Steel Institute - Manual of Standard Practice	
X.	Concrete Reinforcing Steel Institute - Placing Reinforcing Bars	
Y.	AASHTO LRFD Bridge Design Specifications – 9th Edition (2022 Supplement)	

1.4 QUALITY ASSURANCE

A. Perform work in accordance with AASHTO LRFD Bridge Design Specifications – 9th Edition (2022 supplements) as modified here-in.

1.5 SUBMITTALS

A. Submit shop drawings for concrete reinforcement prior to fabrication, showing bar bends, details and placement.
B. Submit Concrete Mix designs including past field performance test results.
C. Submit sieve analysis and soundness tests for fine and coarse aggregates.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Plywood: APA, B-B Plyform Class I exterior.
B. Lumber: Southern pine, No. 2 grade or equal.
C. Steel: Minimum 16 ga. sheet, well matched, tight fitting, stiffened to resist loads without excess deflection.
D. Form Liner: Plywood conforming to PS-1, Grade B-B exterior (concrete form) not less than 1/4 inch thick.
E. Form Ties: Factory fabricated assembly providing at least 1.5 inch break back dimension with at least a 1 inch diameter conical wood or plastic cones to leave a uniform hole for patching. Single rod ties require a tightly fitted waterstop washer at the midpoint. Multi rod ties do not require washers.
F. Conform to ACI 301 and ACI 347

2.2 REINFORCING STEEL

A. Bars: ASTM A615 Grade 60; deformed new materials; ASTM A706 for bars to be welded.
B. Welded wire fabric: ASTM A185
C. Tie wire: ASTM A82, annealed, Epoxy coated for Epoxy-coated reinforcing.
E. Bolsters, chairs and supports: plastic coated, stainless steel, or epoxy coated.

2.3 FABRICATION OF REINFORCING STEEL

A. Conform to CRSI Code of Standard Practice-Fabrication.
B. Cold bend bars.
C. Bend bars around revolving collar of recommended size.

2.4 CONCRETE MATERIALS

A. Portland cement: ASTM C150; Type II. Tricalcium Aluminate (C_3A) content in cement less than 8%. Cement shall be furnished from one source during the project.
B. Aggregates:
   1. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specification C-33, and the following requirements:

Sieve	Percent Passing
No. 4	95 to 100
8	80 to 100

16	50 to 85
30	24 to 60
50	5 to 30
100	0 to 10

Fineness Modulus 2.6 to 3.0

2. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM Specification C-33.

C. Water: potable from municipal water supply or equal.

D. Admixtures: All from one common manufacturer.

2.5 ADMIXTURES

A. Low Range Water Reducer: Pozzolith 122-N by Master Builders; WRDA with HYCOL by Grace Construction Products Division; or equal meeting ASTM C494 Type A

B. High Range Water Reducer (superplasticiser): Rheobuild 1000 by Master Builders; Daracem 100 by W.R. Grace; or equal meeting ASTM C494 type F.

C. Air entraining agent: Micro-Air by Master Builders, DAREX 11 AEA by Grace Construction Products; or equal meeting ASTM C260.

D. Non-corrosive non-chloride accelerator: Pozzutec 20 by Master Builders; or equal meeting ASTM C494 type C or E.

E. Not permitted: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions.

2.6 ACCESSORIES

A. Joint filler and slab perimeters: J-Joint polyethylene foam with tear off strip for sealant or approved equal; joint filler to be slab thickness in depth less 0.5 inch for sealant.

B. Expansion joint filler: Self expanding cork by W.R. Meadows or W.R. Grace or equal size as indicated on the Drawings.

C. Epoxy adhesive: Water based epoxy resin/portland cement bonding agent: Armatec 110 by Sika corporation or equal.

D. Bond Breaker: Thompson's Water Seal or equal, or form oil.

2.7 CONCRETE CLASS

A. Reinforced concrete sections greater than 10" thick: Class P

B. Reinforced concrete sections equal to or less than 10" thick: Class P

C. Concrete fill: Class A

D. Topping for precast concrete plank: Class C

E. Mud slab: Class B

F. Sand/Cement Slurry: Class A without Coarse Aggregate

2.8 CONCRETE

A. Concrete proportioning shall conform to AASHTO, Chapter 5 except as modified below:

Class	Specified Strength (f'_c)	Coarse Aggregate Size	% Air +(1.5%)	Min.-Max. Slump	Min.-Max. Cem.Fac.	Max. W/C	High Range Water Reducer
A	5000 PSI	No. 57 (1")	6	1-3	564-620	0.42	Yes

B	4000 PSI	No. 67 (¾")	6	1-3	564-620	0.42	Yes
C	3000 PSI	No. 8 (3/8")	6	2-5	517-564	0.50	No
D	2500 PSI	No. 4 (1½")	4	2-5	470-517	0.55	No

B. The maximum slump as indicated in the above table will be as measured at the batch plant.
C. Pumped Concrete: Conform to Chapter 4 - ACI 304.2
D. High range water reducer shall be added on site to obtain 4" - 8" slump.
E. No water shall to be added on site.
F. Concrete shall be furnished from one source during the project.

2.9 SELECTION OF CONCRETE PROPORTIONS

A. The Concrete producer shall select the concrete mix proportions on the basis of past field performance or the use of trial mixes. The changes in materials, and proportions within the population of background tests shall not have been more closely restricted than they will be for the proposed work. The test record shall represent only a single record of consecutive tests that span a period of not less than 45 calendar days. The concrete mix proportions shall produce an average strength at least as great as the required average strength (f'_{cr}).

B. Field Experience

1. Concrete mix proportions shall be established on the basis of field test data with similar materials to be used for the project. Past field experience will be considered suitable if it consists of data from one group of at least 30 consecutive compressive strength tests. To be acceptable, the test data shall be based on similar mix proportions to those for the project.
2. The Standard Deviation (s) shall be computed from such test data and the required average strength (f'_{cr}) to be used for the selection of the concrete proportions shall exceed the specified strength (f'_c) in accordance with the following formulae:
   a. When the standard deviation (s) is less than 500 psi:
      $f'_{cr} = f'_c + 1.34s$
   b. When the standard deviation (s) is greater than or equal to 500 psi:
      $f'_{cr} = f'_c + 2.33s - 500$
3. When a Concrete producer does not have test data meeting the requirements listed in Section 2.11.B.1, but does have data based on a single group of 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and modification factor indicated below. To be acceptable, the test data shall be based on similar mix proportions to those for the project.

No. of tests	Modification factor for standard deviation
15	1.16
20	1.08
25	1.03
30 or more	1.00

4. When a Concrete producer does not have test data meeting the requirements listed in Section 2.11.B.3, but does have data based on a set of two groups of consecutive tests totaling at least 30. To be acceptable, none of the two groups shall consist of less than 10 tests with similar mix proportions to those for the project. The group containing 15 or more test results which have different mix proportions from those for the

project shall be within 1,000 psi of the specified strength. A standard deviation shall be established as the product of the calculated standard deviation based upon the group containing 15 or more test results and modification factor indicated above.

5. Document that the calculated average strength for the proposed concrete proportions, using past field performance data for the proposed concrete proportions consisting of at least 10 consecutive test records, is at least greater than or equal to the required average strength (f'_{cr}). If the past field performance data consists of two groups of strength tests for two different mixes, plot the average strength versus the water cement ratio of the two mixes. Interpolate between the corresponding mixture proportions to determine the mixture proportions for the required average strength (f'_{cr}).

C. Laboratory Trial Batches
   1. When an acceptable record of field test results is not available, concrete proportions established from trial mixtures meeting the following restrictions shall be permitted:
      a. Combination of materials shall be that for proposed work.
      b. The required average compressive strength (f'_{cr}) shall be 5,000 PSI.
      c. Trial mixtures having proportions and consistencies required for proposed work shall be made using at least three (3) different water-cementitious materials ratios which will be less than or equal to 0.42 and will produce a range of strengths encompassing the required average strength (f'_{cr}).
      d. The maximum cement factor as listed in Section 2.10.A shall not be exceeded.
      e. Trial mixtures shall be designed to produce a slump within + or - 0.75 in. of maximum permitted, and for air entrained concrete, within + or - 0.5 percent of maximum air content.
      f. For each water-cementitious materials ratio, at least three (3) test cylinders for each test age shall be made and cured in accordance with ASTM C 192. Cylinders shall be tested at 7, 21 and 28 days.
      g. Maximum water-cementitious materials ratio for concrete to be used in proposed work shall be selected by the curve to produce the average strength required (f'_{cr}).

D. Adjustments to Required Average Strength (f'_{cr}).
   1. Adjustments in the Required Average Strength (f'_{cr}) may be made during the progress of the work on the following basis:
      a. When a minimum of fifteen 28-day tests from this project are available, the average strength and standard deviation shall be computed. Should these determinations indicate an excessive compressive strength with a low standard deviation, the Engineer may allow modification of the concrete mix to achieve a lower average strength based upon a new standard deviation. In the event such determination should indicate a lower average strength or higher Standard Deviation than anticipated, the Engineer will require corrective measures to be taken immediately which may include one or more of the following but not limited to:
         (1) An increase in the cementitious material
         (2) Changes in mixture proportions
         (3) Reductions in or better control of levels of slump supplied

(4) A reduction in the delivery time
(5) Closer control of air content.
(6) Decrease in the water-cement ratio.
(7) An improvement in the quality of the testing, including strict compliance with standard test procedures.
(8) To test the fifth cylinder immediately or at 56 days.

2.10 STORAGE OF MATERIALS

A. Protect materials from ground and the elements.
B. Maintain cement in dry condition.
C. Store reinforcement on skids.
D. Remove defective materials from site. Do not store on site.

PART 3 - EXECUTION

3.1 FORMWORK

A. Conform to ACI 301 and ACI 347
B. Verify lines, levels and measurements before proceeding.
C. Erect plumb and straight. Maintain rigid. Brace sufficiently.
D. Allow no concrete leakage. Provide continuous, straight, smooth exposed surfaces.
E. Treat forms with form release agent. Protect reinforcing from contact with form release agent.
F. Earth forms not permitted.
G. Camber formwork as necessary.
H. Clean out inside of forms of all foreign materials prior to concrete placement.
I. Maintain forms and shores supporting the cast concrete for the time periods indicated:
   1. Walls and Vertical Surfaces
      (Non-water retaining) ***72 Hours**

      * These periods represent cumulative number of days or hours during which the temperature of the air surrounding the concrete is above 50°F and the concrete has been damp and no loss of moisture has occurred.
J. Reshore as required.
K. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form release agent as specified for new formwork.
L. All concrete formwork, including reinforcing steel and embedment items, shall have a temperature greater than or equal to 35°F at the time of concrete placement.

3.2 REINFORCEMENT

A. Conform to the CRSI Code of Standard Practice - Field Erection for surface condition, bending, spacing and placement tolerance.
B. Weld no reinforcement unless no exceptions are taken by Engineer in writing.
C. Splicing reinforcement: conform to AASHTO Chapter 5; welded wire fabric to be lapped 1½ courses or 12 inches; tie fabric at 24 inches on center maximum spacing.

D. Provide bar supports: on grade use concrete brick; elsewhere use manufactured wire supports.
E. Do not bend reinforcing partially embedded in the concrete.
F. Mechanical connections shall be installed in accordance with splice device manufacturer's recommendations.
G. Epoxy coating damaged shall be repaired with patching material conforming to ASTM A775.
H. All parts of mechanical connections on epoxy coated reinforcing bars, including steel splice sleeves, bolts and nuts shall be coated with the same material used for repair of epoxy coating damage.

3.3 EMBEDDED ITEMS

A. Coordinate installation of embedded items.
B. Place all items secure.
C. Pipes or Conduits for embedment within a slab, wall or beam, other than those merely passing through, shall satisfy the following:
   1. Shall not be larger in outside diameter than one-third (1/3) the thickness of the slab, wall or beam.
   2. Shall not be spaced closer than 3 diameters on center.
   3. Shall not impair significantly the strength of the concrete.

3.4 PLACING CONCRETE

A. Notify Independent Testing Laboratory 24 hours minimum prior to each placement.
B. Assure placement and proper location of all embedded items.
C. Place no concrete on frozen ground.
D. Place concrete from mixing truck to final location quickly and without segregation.
E. Place concrete within 90 minutes of batching.
F. Freefall: 4 feet maximum.
G. Place continuously and against plastic concrete only.
H. Do not place partially hardened concrete.
I. Consolidate concrete by vibrating. Penetrate preceding lift 4 inches to blend layers. Do not use vibrator to move fresh concrete laterally. Insert vibrator at approximately 18-inch intervals. Consolidate concrete without segregation. Conform to ACI 309.
J. Conform to ACI 306R for cold weather concreting when environmental conditions exist as defined in Section 03346, Part 1.5.
K. Conform to ACI 305R for Hot Weather Concreting when environmental conditions exist as defined in Section 03346 Part 1.5.
   1. Temperature of concrete placed shall not exceed 90°F.
L. Provide concrete Delivery Slip prepared at batch plant with each truck load of concrete showing ticket number, date, truck number, mix strength, maximum stone size, weight of coarse aggregate, weight of fine aggregate, cement weight, volume of concrete, gallons of water added at plant, time water added at plant, quantities of all admixtures used.
M. High Range Water Reducing admixtures shall be used for all concrete to be pumped or with a specified water/cement ratio below 0.50. Maximum slump 8 inches with admixture.
N. Use non-corrosive, non-chloride accelerator when placing concrete in air temperatures below 50°F.

O. Thoroughly moisten subgrade materials prior to placing slabs on grade.
P. Horizontal wall construction joints deeper than 8' from top of placement, place one inch of sand cement slurry prior to placing concrete.
Q. Thoroughly clean the surface of the concrete at construction and control joints and remove laitance prior to placing adjoining concrete. Do not place concrete against the hardened side of a joint for at least 48 hours.

3.5 JOINTS

A. Saw cut control joints for slabs on grade within 24 hours of placement.
B. Provide joints only where shown on the drawings or as otherwise approved after written request.

3.6 MODIFICATIONS OR REPAIRS TO EXISTING CONCRETE

A. Field measurements shall be taken at the required structures to determine the quantity of concrete to be removed and/or repair and the amount of patching to be done.
B. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work, and to prevent damage to the structures or contents by falling or flying debris.
C. Remove concrete to the depths shown or required. Roughen concrete surfaces by chipping, sandblasting or scarifying.
D. Surfaces must be clean and sound. Surfaces may be dry, damp, or wet, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials by mechanical abrasion methods such as sandblasting.
E. Exposed reinforcement shall be cleaned by wire brushing and where shown the reinforcement shall be cut or bent. Additional reinforcement shall be provided as shown on the Drawings.

3.7 DRILLING AND GROUT DOWELS

A. Use rotary drills and cores (non-percussive) and drill holes into concrete to the depth indicated. Hole size shall be one inch (1 in.) larger in diameter than the dowel diameter unless otherwise noted.
    1. Drill holes may be offset 2 inches plus or minus from set locations, but shall not be drilled within six inches (6 in.) of the free edge of concrete
B. Scour the dowel hole by thoroughly roughening the sides with a coarse, wire flue brush.
C. Clean hole of dust and debris with a power vacuum.
D. Fill hole with non-shrink grout; insert dowel with twisting motion; add grout as needed.
E. Maintain dowel stationary until grout cures.

3.8 TOLERANCES

A. Maximum allowable deviations from dimensions, elevations, slopes and positions as indicated.
    1. Variation from plumb:
        a. In the lines and surfaces of columns,

piers, walls, and in arises:
In any 10 ft. of length ..... 1/4 in.
Maximum for the entire length ..... 1 in.

b. For exposed corner of columns, control-joint grooves, and other conspicuous lines:
In any 20 ft. length ..... 1/4 in.
Maximum for the entire length ..... 1/2 in.

2. Top elevation of columns, piers, walls and arises ..... ±1/4 in.
3. Top elevation of slabs ..... ±1/4 in.
4. Footings*
   a. Variations in dimensions in plan:
      Minus ..... 1/2 in.
      Plus ..... 2 in.
   b. Misplacement or eccentricity:
      2 percent of the footing width in the direction of misplacement but not more than ..... 2 in.
   c. Thickness:
      Decrease in specified thickness ..... 5 percent
      Increase in specified thickness ..... No limit
   d. Elevation of top ..... ±1/4 in.

*Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.2

3.9 FAILURE TO MEET STRENGTH REQUIREMENTS

A. The strength of the concrete in place will be considered substandard if any one of the following results occur:
   1. The arithmetic average of 28-day cylinder tests for any three (3) consecutive test results are less than the specified strength (f'_c).
   2. More than 10 percent of the 28-day cylinder tests have strengths less than the specified strength (f'_c).
   3. An individual compressive strength test result falls below the specified strength (f'c) by more than 500 psi.

B. Concrete which fails to meet the strength requirements as outlined above will be reviewed by the Engineer. The Engineer will determine whether the substandard concrete will be accepted, rejected or additional tests performed.

C. When Substandard concrete as defined in Section 3.11 paragraphs A.1 and A.2 occurs, the Engineer will require corrective measures to be taken immediately, as listed in Section 2.11.D, in order to increase the average of subsequent strength tests.

D. When substandard concrete as defined in Section 3.11 paragraph A.3 occurs the Engineer may require cores drilled in the area of question in accordance with Specification 03305 paragraph 3.2.B. If the core tests are inconclusive or impractical to obtain, load tests may be required and their results evaluated in accordance with ACI 318 Chapter 20. If the average of the three cores is less than 85% of the specified 28-day strength or if one core is less than 75% of the specified 28-day strength, then that portion of the structure shall be strengthened by a method proposed by the Contractor and no exceptions taken by the Engineer or replaced by the Contractor at no additional cost to the Owner.

E. Concrete not requiring strengthening but still falling below the strength requirements as outlined in Section 3.11 paragraph A may be accepted by the Owner in accordance with Article 13 of the General Conditions, specifically the paragraph entitled "Acceptance of Defective Work".

3.10 DEFECTIVE CONCRETE

A. Defective concrete is defined as concrete in place, which does not conform to strength, shapes, alignments, appearances and/or elevation as shown on the drawings and/or presents faulty surface areas.
B. Reinforcing steel size, quantity, strength, position, or arrangement at variance with the Drawings will be considered defective.
C. Concrete which differs from the required dimensions or locations in such a manner as to reduce the strength will be considered defective.
D. Concrete surfaces not finished or cured in accordance with Section 03346 - Concrete Finishing, Curing, and Repairs shall be classified as defective concrete.
E. Formed surfaces larger or smaller than dimensional tolerances specified in this Division may be rejected. If the Engineer permits the Contractor to correct the error, such correction shall be as directed and in such a manner as to maintain the strength, function and appearance of the structure.
F. Concrete members cast in the wrong location may be rejected and shall be removed at no additional cost to the Owner if the strength, appearance or function of the structure is adversely affected.
G. Inaccurately formed surfaces exposed to view may be rejected and shall be repaired or removed and replaced at no additional cost to the Owner.
H. Concrete exposed to view with defects which adversely affect the appearance of the specified finish shall be repaired. If, in the opinion of the Engineer, the defects cannot be repaired, the concrete may be accepted or rejected in accordance with the decision of the Engineer.

3.11 PROTECTION FROM COLD

A. Concrete structures shall be covered, insulated and heated as required to prevent frost penetration beneath the structures until acceptance by the Owner.

END OF SECTION

DIVISION 033546 - CONCRETE FINISHING, CURING AND REPAIRS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Curing
B. Concrete Finishing
C. Concrete Repairs

1.2 RELATED SECTION

A. Section 01340 - Submittals
B. Section 03300 - Cast-in-Place Concrete
C. Section 03604 - Non-Shrink Grout
D. Section 07115 - Resealable Membrane Waterproofing
E. Section 07120 - Fluid Applied Waterproofing
F. Section 07150 - Dampproofing
G. Section 07900 - Joint Sealers
H. Section 09900 - Painting
I. Section 09965 - Abrasion Resistant Coatings

1.3 REFERENCES

A. ACI 301-96 - Standard Specifications for Structural Concrete
B. ACI 302.1R-89 - Guide for Concrete Floor and Slab Construction
C. ACI 305R-91 - Hot Weather Concreting
D. ACI 306R-88 - Cold Weather Concreting
E. ACI 308-92 - Standard Practice for Curing Concrete
F. ACI 350R-89 - Environmental Engineering Concrete Structures
G. ASTM C309-93 - Specification For Liquid Membrane - Forming Compounds for Curing Concrete

1.4 SUBMITTALS

A. None.

1.5 ENVIRONMENTAL CONDITIONS

A. Cold Weather and Hot Weather are defined when temperatures will fall below 40°F during the week following placement or will be above 90^{O}F, respectively.

PART 2 - PRODUCTS

2.1 FINISHING MATERIALS

A. Patching Mortar: 1 part of a mixture of white and grey Portland cement to 2.5 parts of damp loose sand. Cement type to match substrate.

2.2 REPAIR MATERIALS

A. Epoxy Adhesive: Armatec 110 by Sika Corporation or equivalent.

B. Repair Mortar: polymer improved, cementitious, 2 component, trowel grade mortar equal to Concrete Coat by Euclid Chemical; Sikatop 122 by Sika Corp. or equivalent.

PART 3 - EXECUTION

3.1 FINISHES

A. Repair all holes and defects and allow to set prior to finishing concrete.
B. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.
C. Finish concrete surfaces as scheduled.

3.2 FINISHING SLABS AND FLATWORK

A. Screed to bring concrete surface to proper contour and elevation.
B. Highway straightedge, bull float or Darby float the concrete surface immediately after screeding.
C. Allow bleed water to evaporate or remove.
D. (STF) Steel Troweled Finish (All Floors): Float the surface with magnesium or cast aluminum float or with a power-finishing machine. Steel trowel surface immediately after floating to produce smooth surface. Steel trowel again after concrete has hardened enough so that mortar does not adhere to trowel edge. Ringing sound should be apparent when performing second troweling due to tilted, compacting motion.
F. (LBF) Light Broom Finish for equipment pads): wood float finish as in E above; while plastic draw a soft-bristled broom, over the concrete in long even strokes with downward pressure.
H. Tolerances for trowel finished floors: ACI 302 class BX. 5/16 inch maximum deviation from 10 foot long straightedge placed anywhere on the surface.

3.3 FINISHING VERTICAL SURFACES

A. (RFF) Rough Form Finish: Repair structural defects only and patch tie holes as specified in paragraph 3.5 - STRUCTURAL DEFECTS. Fins exceeding 1/4 in. in height to be removed by grinding and/or rubbing.

3.4 CURING

A. Curing: Curing shall begin immediately following the initial set of concrete or after slab surface finishing has been completed and shall continue after form removal. All concrete shall be cured to attain strength and durability by one of the following methods for a minimum of seven days after placement regardless of the ambient air temperature:
   1. Ponding or continuous sprinkling. Intermittent wetting and drying is not an acceptable curing method.
   2. Application of absorptive mats of fabric kept continuously wet.
   3. Continuous application of steam or fog spray.
   4. Application of waterproof sheet materials.

B. Moisture loss from surfaces placed against wooden or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal, the concrete shall be cured by one of the methods described above, for the balance of time remaining as specified above.

C. Cold Weather:

1. Maintain concrete temperature between 50^{O}F and 70^{O}F for a minimum of seven days after placement, enclose and heat, insulate as required.
2. Protect concrete from damage due to concentrated heat sources.
3. Reapply curing compounds every two days during heating period.
4. The maximum allowable temperature drop of the concrete surfaces during the first 24 hours after the end of the curing period shall not exceed 5°F in any 1 hour.

D. Hot Weather: Concrete temperature shall not be greater than 90^{O}F. Protect from loss of slump, flash set, plastic cracking and rapid evaporation of water.

E. Place concrete quickly, shade from direct sun and protect from wind. Concrete shall be cured by one of the methods described in paragraph 3.4.A for seven days after placement.

3.5 SURFACE DEFECTS

A. As soon as the forms have been stripped and the concrete surfaces exposed, repair all surface defects. Surface defects include all form tie holes, honeycombed areas and surface blemishes including air voids and bug holes with a nominal diameter or depth greater than ¼ inch, visible construction joints, fins, burs and other defects. All concrete repair work shall result in a concrete surface of uniform color and texture, and shall be free of all irregularities. Honeycombed and/or rat holes larger than 50 cubic inches are considered a structural defect.

B. Cut out and remove honeycombed areas and rock pockets down to solid concrete, but in no case to a depth less than 1 inch, by means of hand chisels or pneumatic chipping hammers. Saw cut the edges perpendicular to the surface. No featheredges shall be allowed.

C. Remove all loose aggregate paste and debris and scrub clean; thoroughly wet area to be repaired; brush and scrub grout paint into the substrate of the area to be repaired.

D. Apply a stiff consistency of patching mortar to the area with a trowel; apply prior to the set of grout paint (but after it has cast its water sheen): leave patched surface slightly higher than surrounding surface; do not finish for 1 hour minimum. Cure in same manner as adjacent concrete.

E. Mix patching mortar using as little water as possible; allow to stand with frequent manipulation of trowel to achieve stiffest consistency; blend white and gray Portland cement to achieve color match with surrounding concrete.

F. Form Tie Holes: After cleaned and thoroughly dampened, apply grout paint and fill tie holes solid with patching mortar.

G. Finished Flatwork exceeding specified tolerances:
1. High areas shall be repaired by grinding after the concrete has cured 14 days.
2. Low areas shall be repaired by cutting out low areas and replaced with concrete. Finish repair area to match adjacent concrete.

3.6 STRUCTURAL DEFECTS

A. Remove and replace or repair all structural defects. Structural defects include honeycombed areas and/or rat holes greater than 50 cubic inches, areas which cracking, spalling or other signs of deterioration are present or develop during the initial curing or thereafter until accepted by the Owner. The Contractor shall propose a specific repair method, suitable for the situation, and the Engineer will review the method prior to the repair.

B. Cut out and remove defective concrete, honeycombed areas and rock pockets to sound concrete by means of hand chisels or pneumatic chipping hammers. Saw cut 1-inch minimum the edges perpendicular to the surfaces. If honeycomb exists around reinforcement, chip to provide a clear space at least 1 inch wide all around the reinforcement. Moisten surfaces and allow to dry until damp. Apply bonding agent. Apply a polymer-modified cement with 3/8-inch coarse aggregate. Cure as required by manufacturer.

C. Random Cracks:
   1. Random shrinkage or structural cracks shall be repaired utilizing a low viscosity, 100% solids, two (2) component epoxy resin system. Remove all dust, debris or disintegrated material from crack or void by use of oil-free compressed air or vacuuming.
   2. Crack or void must be dry at time of application. Cracks saturated with oil or grease must be chipped out to unsaturated concrete. "Vee" out cracks in horizontal surfaces slightly.
   3. Where cracks extend through members and are accessible, seal bottom of crack, which is to receive the epoxy. Apply epoxy in strict accordance with manufacturer's recommendations.
   4. Epoxy resin system shall be Sika chemical Corporation "Sikadur Hi-Mod LV", or equal.
   5. Patching of vertical wall or overhead cracks shall be accomplished in the same manner using a similar epoxy material of higher viscosity as recommended by the manufacturer.

D. Excessive Cracking:
   1. Floor slabs containing an excessive amount of cracks as defined herein, and which will remain exposed, shall receive an epoxy mortar topping after sealing of cracks in accordance with the above paragraph.
   2. Excessive cracking shall be defined as areas containing racks averaging 1/64th-inch wide or greater, and in excess of 15 linear feet of cracks per 100 square feet of slab. In the event that excessive cracking occurs in isolated areas of a given floor, topping will only be required in the area of the cracks bounded by construction, expansion, or control joints.
   3. Topping shall be Sika Chemical Corporation "Sikadur Lo-Mod LV Mortar" or equal.

E. Spalls:
   1. All weakened, damaged or disintegrated concrete shall be removed to sound concrete. For defective areas involving only the surface and/or the finish of the concrete, reference Section 03350, Concrete Finishes, for surface defects.
   2. For spalled areas involving depths generally less than three (3) inches, utilize epoxy mortar for repair, Sika Chemical Corporation "Sikadur Lo-Mod LV Mortar" or equal.
   3. For spalled areas involving depths generally in excess of three (3) inches, utilize an epoxy bonding compound and concrete grout. Bonding compound shall be Sika Chemical Corporation "Sikadur Hi Mod" bonding agent or equal.

3.7 PROTECTION

A. Protect concrete from high and low temperatures for seven days.

B. Protect against vibration until concrete has attained 33% of its 28-day strength.
C. Protect against premature loads until the 28-day strength has been attained.

END OF SECTION

DIVISION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Remove surface debris.
B. Clear site of plant life and grass.
C. Remove trees and shrubs.
D. Remove root system of trees and shrubs.
E. Topsoil excavation.

1.2 RELATED SECTIONS

A. Section 312213 - Rough Grading.
B. Section 312300 – Excavation (Excavation and Fill)
C. Section 312316.13 – Trenching
D. Section 312333 – Trench Backfilling, Compaction, Control & Testing

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable code for disposal of debris.
B. Coordinate clearing Work with existing utilities.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that existing plant life designated to remain is tagged or identified.

3.2 PROTECTION

A. Locate, identify, and protect utilities that remain, from damage.
B. Protect trees, plant growth, and features designated to remain, as final landscaping.
C. Protect bench marks and existing structures from damage or displacement.

3.3 CLEARING

A. Clear areas required for access to site and execution of Work.
B. Remove trees and shrubs as designated on the site plan. Remove stumps and root systems and chip on-site.
C. Clear undergrowth and deadwood, without disturbing subsoil.

3.4 REMOVAL

A. Remove debris, rock, and extracted plant life from site.
B. Do not burn any material to be removed unless the owner's representative grants permission and all required permits are secured.
C. Do not bury trees, stumps, or other material otherwise indicated as to be removed.

3.5 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded.
B. Remove from site.

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 311413 - STRIPPING AND STOCKPILING TOPSOIL

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work Included: segregate topsoil approved by the Engineer prior to excavation, trenching and grading operations and stockpile it for use in the work.

B. Related Work Specified Elsewhere (When Applicable): demolition, clearing, grading, embankment, excavation and landscaping are specified in the appropriate sections in this division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil shall consist of friable loam of at least two percent decayed organic matter (humus), free of subsoil, and reasonably free of clay lumps, brush, roots, weeds, and other objectionable vegetation, stones and similar objects larger than one (1) inch in any dimension, litter and other materials unsuitable or harmful to plant growth. It shall contain no toxic materials.

B. The quality of the topsoil material to be used shall be subject to approval by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Remove topsoil from the areas that are likely to be disturbed as a result of construction operations to a depth based on the soil profile, as approved by the Engineer. Remove topsoil from all designated areas prior to the performance of normal excavation.

3.2 STORAGE

A. Transport topsoil and deposit in storage piles convenient to the areas, which are subsequently to receive the application of topsoil.

B. Stockpile topsoil separate from other excavated materials in areas approved by the Engineer.

C. Take all necessary precautions to prevent other excavated material and objectionable material from becoming intermixed with the topsoil before, during and after stripping and stockpiling operations.

D. Neatly trim and grade stockpiles to provide drainage from surfaces and to prevent depressions where water may become impounded.

E. Construct temporary erosion control devices for all stockpiled material, subject to the Engineer's approval.

F. All loam stripped and stockpiled shall be seeded with 70% Annual/30% Perennial Rye Grass.

END OF DIVISION 311413

SECTION 312000 - EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Perform the following items of work, as shown on the Drawings and specified herein:
   1. Do all excavating and furnish all material necessary for embankment construction, as required to complete the work of this Contract, including the furnishing and compaction of additional material as needed.
   2. Completely remove from the site all excavated material which is not approved by the Engineer for use as embankment material. This provision does not apply to topsoil which will remain the property of the Owner.
   3. Establish subgrades as indicated on the Drawings and specified hereunder.
   4. Perform cutting and removal of existing pavements to the extent indicated on the Drawings and as required for the work under this Contract.
   5. Protect all trees, shrubs and plantings not designated on the Drawings to be removed, for the duration of the Contract.
   6. Protect all utilities on the site for the duration of the work.

B. Related Work Specified Elsewhere:
   1. Section 312000.13 – Earthwork – Contractor Testing

1.2 DEFINITIONS

A. The work involved includes removal, haul and disposal of materials to prepare for construction and the placing and compaction of material to construct embankments.
B. Excavation shall be designated as common, rock, unclassified or muck.
   1. Common excavation shall consist of removal of earth, of boulders, solid mortared stone masonry and concrete masonry when each is less than two cubic yard in volume and of rock which can be removed with ordinary excavating machinery. Grubbing shall be considered as common excavation.
   2. Rock excavation shall consist of removal of solid rock which cannot be excavated without the use of explosives or ripping equipment and of boulders, solid mortared stone masonry and concrete masonry having a volume of two cubic yard or more.
   3. Unclassified excavation shall consist of removal of materials without consideration to their composition.
   4. Muck excavation shall consist of excavation of soils and organic materials which are not suitable for use in embankment.
C. Embankment construction shall consist of constructing roadway embankments, including preparation of the areas upon which they are to be placed; site grading around buildings and structures; the construction of parking areas, lawns, berms, and dikes; the placing and compacting of approved material within areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits and other depressions within the roadway area or construction site limits.
D. Related Work Specified Elsewhere: (When Applicable)

1. Stripping and Stockpiling of Topsoil; Trench Excavation-Earth; Trench Excavation-Ledge; Borrow and Bedding Material; Trench Backfilling, Compaction, Control and Testing; Temporary Erosion Control and Dewatering are specified elsewhere in this division.

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. All work shall be performed and completed in accordance with all local, state or federal regulations.
   2. The General Contractor shall secure all necessary permits from, and furnish proof of acceptance by, the local and state departments having jurisdiction and shall pay for all such permits, except as specifically stated elsewhere in the Contract Documents.

B. Grade and Elevations:
   1. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain same to properly perform the contract installation.

C. Compaction:
   1. The Contractor shall compact all embankment materials in accordance with this specification.
   2. Density testing shall be performed by an Independent Testing Laboratory retained by the Owner and acceptable to the Engineer and Contractor.
   3. Independent Testing Laboratory shall determine in place densities in accordance with ASTM D1556 or other methods approved by the Engineer.
   4. Independent Testing Laboratory shall submit one (1) copy of the following reports to each of the following: Engineer, Resident Project Representative, Contractor;
      a. Test reports on material
      b. Field density test reports
      c. One moisture density curve for each type of soil encountered

   5. Location of Tests:
      a. One test per 300 feet of completed roadway subgrade just prior to placement of subbase gravels and additional tests at depths as required by the Engineer.
      b. Two tests on finished subgrade in parking area just prior to placing the subbase gravels and additional tests at depths as required by the Engineer.
      c. One test per 300 feet of completed railroad subgrade after fine grading and just prior to placement of the loam and additional tests at depths as required by the Engineer.
      d. Tests on lagoon embankments shall be taken on every 1,000 c.y. of dike material. Also, in order to determine optimum water content, maximum allowable lift and number of equipment passes required, one test section shall be constructed, and thoroughly tested. To avoid conflicts the Contractor shall allow a minimum of one working day for testing to be conducted on the test section. The test section may be part of the lagoon embankment.

6. If the test results fail to meet the requirements of these specifications, the Contractor shall correct the situation and obtain a passing test. The cost of reworking the material to obtain a passing test shall be borne by the Contractor and no allowance will be made for delays in the performance of the work. All testing and retesting shall be conducted by the Independent Testing laboratory. Costs of retesting will be paid by Owner. The cost of retesting will be determined by Engineer and Owner will invoice Contractor for this cost. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price.

1.4 JOB CONDITIONS

A. Disposition of Utilities:

1. The locations of utilities shown on the plans are approximate as determined from physical evidence on or above the surface of the ground and from information supplied by the utilities. The Engineer in no way warranties that these locations are correct. It shall be the responsibility of the Contractor to determine the actual locations of any utilities within the project area.
2. Rules and regulations governing the respective utilities shall be observed in executing all work in this section. Active utilities shall be adequately protected from damage, and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped. Report in writing to the Engineer, the locations of such abandoned utilities. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable. If, in the progress of excavation, any utility should become damaged and result in any damage to public or private property, the General Contractor shall restore to the original condition, at no additional cost to the Owner, anything which has been damaged or disturbed.

PART 2 - PRODUCTS

2.1 DEFINITIONS OF GRAVEL, SAND AND SILT CLAY

A. The terms "gravel", "coarse sand," "fine sand" and "silt-clay," as determinable from the minimum test data required in this classification arrangement and as used in subsequent word descriptions, are defined as follows:

1. Gravel - Material passing sieve with 75 mm (3-inch) square openings and retained on the 2.00 mm (No. 10) sieve.
2. Coarse Sand - Material passing the 2.00 mm (No. 10) sieve and retained on the 0.425 mm (No. 40) sieve.
3. Fine Sand - Material passing the 0.425 mm (No. 40) sieve and retained on the 0.075 mm (No. 200) sieve.
4. Silt-Clay (Combined silt and clay) - Material passing the 0.075 mm (No. 200) sieve.
5. Boulders (retained on 77 mm (3-inch) sieve) should be excluded from the portion of the sample to which the classification is applied, but the percentage of such material, if any, in the sample should be recorded.
6. The term "silty" is applied to fine material having plasticity index of 10 or less and the term "clayey" is applied to fine material having plasticity index of 11 or greater.

2.2 SOIL MATERIALS

A. Use of Excavated Material:

1. To the extent they are needed, all suitable materials from the specified excavation may be used in the construction of required embankment and slope protective devices (riprap).
2. Surplus excavated materials suitable for filling operations shall not be wasted, but will be stockpiled for future use as directed by the Engineer within the Town's property. This specific location will be determined at the start of construction.
3. Unsuitable material shall consist of grubbings or other materials which contain rock of size exceeding specifications, organic materials, or other materials of a deleterious nature as deemed by the Engineer. Silts, clays and granular materials with more than 8% passing the number 200 sieve shall be considered unsuitable for embankment in the Frost Penetration Zone under paved areas when sufficient water supply is available to cause heaving.

B. Common borrow shall consist of approved material required for the construction of embankments or for other portions of the work as designated and shall be obtained from a source off-site, except as otherwise noted. Common borrow shall be free from frozen material, clay, perishable rubbish, peat, organic and other deleterious materials.

C. Gravel borrow shall be free of rocks with a maximum dimension over six inches, frozen material and other unsuitable material. That portion passing a three-inch square mesh sieve shall contain not more than 70% passing a 1/4 inch mesh sieve and not more than 10% passing a number 200 mesh sieve.

D. Rock fill shall consist of rock for use in embankments which consists of hard durable particles broken to various sizes that will form a compact embankment with a minimum of voids. It shall contain no particles or fragments with a maximum dimension in excess of the compacted thickness of the layer being placed.

E. Embankment material shall consist of suitable approved common excavation and/or common, or gravel borrow. Rock excavation may be used as embankment material if it is thoroughly mixed with common excavation and/or common borrow to eliminate voids.

PART 3 - EXECUTION

3.1 CUTTING AND REMOVAL OF EXISTING PAVEMENT

A. Refer to the Drawings for extent of cutting and removal required of existing pavements.
B. Perform all cutting in a straight and neat manner, using mechanical equipment for such purpose. Pavement cuts shall be vertical. Completely remove all cut surfacing materials from the site.
C. In addition to areas specifically designated on the Drawings, perform cutting wherever existing surfacing will be disturbed by the work of this Contract.

3.2 SAFETY

A. Comply with applicable local, state or federal safety regulations or in the absence thereof, with he provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc.

B. Provide shoring, sheeting and/or bracing at excavations as required to prevent cave-ins of excavation, and to assure complete safety of existing structures, utilities and pavements that are to remain in place.
C. Remove sheeting and shoring and bracing, as backfilling operations progress, taking all necessary precautions to prevent failure of excavation sides. Where sheeting is to be left in place, it shall not be within 2 feet of subgrade.

3.3 COMMON EXCAVATION

A. The Contractor shall excavate material encountered to establish required grade elevations.
   1. Unauthorized Excavation:
      a.. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.
      b. The Contractor shall backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by the Engineer.
   2. Additional Excavation:
      a. When excavation has reached required subgrade elevations, notify the Engineer who will make an inspection of conditions.
      b. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.
      c. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.

B. Common excavation areas shall be maintained in such condition that the excavation will be well drained.

C. Roadway excavation, in general, shall proceed in a direction upgrade. Subgrades shall be promptly rolled to prevent absorption of water.

3.4 EXCAVATION FOR UTILITY SERVICES

A. Water, telephone, fire alarm, storm drainage, electric services, utility structures, sanitary sewer piping, manholes, and catch basins will be installed under the work of the respective Sections.

3.5 MINIMUM LIMITS FOR EARTH EXCAVATION

A. Earth excavation must be carried to the following limits, unless otherwise indicated herein or on the drawings or authorized by the Engineer:
   1. Subgrades for site work shall be as follows:
      a. Areas to receive topsoil - Four (4) inches below finish grades.
      b. Utility structures - Bottom of structure or as shown on the site details and eighteen (18) inches outside wall extremities.

c. On-site bituminous concrete paved surfaces, as noted on the Drawings.
d. Off-site paved areas, as noted on the Drawings.
e. Unspecified site improvements - To bottom elevation of item plus ample working space on all sides.

2. In non-specified areas - To the lines indicated on the Drawings plus proper side clearance for construction.

3.6 ROCK EXCAVATION

A. In open excavations material will be classified as rock only when the following conditions prevail:
   1. When the natural compound, natural mixture, and/or chemical element cannot be broken and removed from its existing position and state by a 3/4-yard backhoe or D8 dozer and requires the use of drills, or the use of explosives.
   2. Boulders or old concrete foundations in excess of 2 cubic yards.
   3. Anything other is "earth" insofar as removal of the material to be excavated is concerned.
   4. NOTE: When during the process of excavation, rock is encountered such material shall be uncovered and exposed, and the Engineer shall be notified by the Contractor, before proceeding further. The areas in question shall then be measured as stipulated in paragraph B, following. The Contractor shall not proceed with excavation of material claimed as rock until the material has been classified by the Engineer. Should the Contractor proceed with the excavation without notifying the Engineer, or prior to the survey, he shall forfeit his right to extra payment in the subject area.

B. The Contractor will provide qualified personnel, acceptable to both the Owner and the Engineer, to take cross-sections of rock before removal of same, and to provide computations of cross-sections within the pay limits.

C. Excavate rock, encountered in grading areas within the contract, to depths as follows:

   1. Under pavements and surfaced areas - To six inches below the required subgrade for such areas.
   2. Under lawn areas - To two feet below finished grade, unless approved otherwise by the Engineer.

D. Blasting - Obtain written permission and approval of method from the local authorities before proceeding with rock excavation. Explosives shall be stored, handled, and employed in accordance with the provisions of the "Manual of Accident Prevention in Construction: of the Associated General Contractors of America, Inc.

3.7 COLD WEATHER PROTECTION

A. Protect excavations against freezing when atmospheric temperature is less than 35°F.

3.8 COMPACTION

A. General: Control soil compaction during construction to the satisfaction of the Engineer and/or Resident Project Representative by providing compaction to at least the minimum percentage of maximum density as specified for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship (determined in accordance with ASTM D1557) and to not less than the following percentages of relative dry density (determined in accordance with ASTM D2049) for soils which do not exhibit a well- defined moisture density relationship.

1. Lawn or Unpaved Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum dry density as determined by AASHTO T-180, Method C or D.
2. Pavements: Compact top 12 inches of excavation subgrade and each layer of fill material to 95 percent maximum dry density as determined by AASHTO T-180, Method C or D.

C. Moisture Control: Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material at a rate such that free water does not appear on surface during or subsequent to compaction operations.

D. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

E. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry.

3.9 EMBANKMENT

A. Compaction Equipment:
1. Provide sufficient equipment units of suitable types to spread, level and compact fills promptly upon delivery of materials.
2. The Contractor may use any compaction equipment or device which he finds convenient or economical, but the Engineer retains the right to disapprove equipment which, in his opinion, is of inadequate capacity or unsuited to character of material being compacted.
3. The Contractor shall be responsible for the proper placement and compaction of backfill material. Any settlement that occurs shall be repaired by the Contractor at his own cost and expense. If pipeline and/or structures are damaged or displaced, they shall be repaired at the Contractor's expense.

B. Areas to be filled or backfilled shall be free of construction debris, refuse, compressible or decayable materials and standing water.

C. Notify the Engineer when excavations are ready for inspection. Filling and backfilling shall not be started until conditions have been approved by the Engineer.

D. Place acceptable soil materials in layers to required subgrade elevations, for each area classification listed below.
   1. In excavations; use satisfactory excavated or borrow material.
   2. Under grassed areas; use satisfactory excavated or borrow material.
   3. Under pavements; use satisfactory excavated or borrow material or combination of both.

E. Grub areas a depth of 12" where fills are to be less than five feet in depth as shown on the Drawings.

F. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

G. Placement and Compaction: Place fill materials in layers no thicker than 10 inches.

H. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.

I. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

J. Place backfill and fill materials evenly to required elevations adjacent to structures. Take care to prevent wedging action of fill against structures by carrying the material uniformly around structure to approximately the same elevation in each lift.

K. When water and sewer piping is laid in filled areas, place the fill before any pipe is placed, and compact as specified to a depth or not more than two feet above the proposed top of the pipe. A trench shall then be excavated to the required grade, and of sufficient width to permit thorough tamping of the fill under the bells and around the pipe.

L. At the end of each day's work the embankment shall be shaped and rolled to minimize infiltration of water.

3.10 GRADING

A. General: Uniformly grade areas within limits of construction. Smooth finished surface within specified tolerances.
   1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 feet above or below the required subgrade elevations.
   2. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2 inch above or below the required subgrade elevation.

3.11 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances in settled, eroded or rutted areas.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, reshape, and compact to required density prior to further construction.

3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, debris and dispose of it off the Owner's property. This provision does not apply to stockpiled topsoil which shall remain on site unless written authorization for its removal is provided by the Engineer.

END OF DIVISION 312000

SECTION 312213 - 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 312300 – Excavation (Excavation and Fill)

B. Section 312316.13 – Trenching

C. Section 312333 – Trench Backfilling, Compaction, Control & Testing

1.3 REFERENCES

A. 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.

B. ASTM D922 - Test Method for Density of Soil and Soil Aggregate in Place by the Nuclear Methods. (Shallow Depth)

C. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Excavated material, graded, free of roots, rocks larger than 1 inch, subsoil, debris, and large weeds.

B. Subsoil: Excavated material, graded, free of lumps larger than 6 inches, rocks larger than 3, and debris.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

B. Verify that survey benchmark 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 locations.

C. Protect above and below grade utilities which are to remain.

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

E. Protect bench marks and existing structures from excavation equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Remove from site.

3.4 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Remove from site or use in approved locations.

C. When excavation through roots is necessary, perform work by hand and cut roots with sharp axe.

3.5 FILLING

A. Fill areas to contours and elevations with unfrozen materials.

B. Common Borrow MDOT 703.18: Place and compact materials in continuous layers not exceeding 8 inches of 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.

3.6 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot.

END OF DIVISION 312213

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 312300 - EXCAVATION (EXCAVATION AND FILL)

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation for foundations.
B. Excavation for slabs-on-grade.
C. Excavation for site structures.

1.2 RELATED SECTIONS

A. Section 312213 - Rough Grading
B. Section 312333 – Trench Backfilling, Compaction, Control & Testing
C. Section 312316.13 - Trenching

1.3 FIELD MEASUREMENTS

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

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum.
B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.
C. Protect above and below grade utilities which are to remain.
D. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
E. Protect benchmarks, existing structures, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

3.2 EXCAVATION

A. Excavate subsoil required to accommodate building foundations and slabs-on-grade.
B. Grade top perimeter of excavation to prevent surface water from draining into excavation.
C. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
D. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
E. Correct unauthorized excavation at no extra cost to Owner.
F. Remove excess material not being reused from site.

3.3 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces.

3.4 PROTECTION

A. Protect excavations by methods required preventing 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 DIVISION 312300

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 312316 - ROCK REMOVAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

Furnish the labor, materials and equipment necessary to identify and remove bedrock within the proposed excavation limits in accordance with the requirements of this Section, including the following:

A. Rock Removal - All rock blasting and rock removal using drill and blast techniques, including blasting for roadways, parking areas, building foundations, and trench blasting for utilities. The blasting shall be performed in accordance with the requirements of this Section. The Contractor shall employ controlled blasting procedures in order to maintain ground vibrations and airblast overpressures below the maximum levels specified in this Section and to minimize stressing and fracturing of the rock beyond the limits of the excavations, footing elevation subgrades, and utility trenches shown on the Drawings. The Contractor's proposed blasting methods, procedures, sequence and data to show compliance with these specifications shall be described in a blasting plan submitted prior to blasting operations and meeting the requirements of subsection 3.02.
   1. Condition Surveys - The Contractor shall perform pre-blast condition surveys of all structures and improvements of adjoining properties within at least 600 feet of any blast as described in subsection 3.01.A. If a complaint of alleged blasting related damage is made by a nearby property owner during construction, the Contractor shall perform additional condition surveys as described in subsection 3.01.B.
   2. Test Blasts - Prior to commencement of production blasting, the Contractor shall, using small charges and the required monitoring instruments, establish a site specific relationship between charge weight, distance and response in accordance with the requirements of subsection 3.04.F.2.
   3. Blast Monitoring - A monitoring program of blasting vibrations shall be performed by the Contractor during construction in accordance with the requirements of subsections 1.06.C.3 and 3.07.
   4. Blasting Records - A blasting log summarizing the details of the round as shot, weather conditions, blast proximity to nearby structures, location of monitoring instruments and measured vibration data shall be maintained and reported in accordance with the requirements of subsections 1.06.C.2 and 3.06.

B. Disposal of blasted rock and cleaning of exposed bedrock surfaces.

1.2 RELATED SECTIONS AND INFORMATION

A. Section 312213 - Rough Grading
B. Section 312000 - Earthwork
C. Section 312333 – Trench Backfilling, Compaction, Control & Testing: Backfill materials.
D. Section 312316.13 - Trenching: Trenching and backfilling for utilities.

1.3 PRICES

A. Rock Quantity: Rock removal, including open ledge and trench ledge will be priced on a unit price basis.

1.4 COMPLIANCE WITH STANDARDS

A. Comply with the provisions of all applicable safety codes including without limitation the following Codes and Standards:
B. National Fire Protection Association (NFPA): 495 Code for the Manufacture, Transportation, Storage and Use of Explosive Materials.
C. "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc.
D. "Construction Safety Rules and Regulations" as adopted by the State Board of Construction Safety, Augusta, Maine.
E. Section 107.12 (Use of Explosives) of the "Standard Specifications" prepared by the Maine Department of Transportation.
F. Occupational Safety and Health Act of 1970 (Public Law 91-596 of the United States, 29 USC Section 651 et. seq.)
G. Applicable provisions of laws, rules, ordinances, and regulations of Federal, State and the Town of Farmingdale governing the transportation, storage, handling and use of explosives.
I. In case of conflict between regulations or between regulations and the requirements of this Specification, the Contractor shall comply with the strictest applicable codes, regulations or Specifications.

1.5 DEFINITIONS

A. Site Rock: Solid mineral material with a volume in excess of 1/3 cu yd. loose rock removable by hammer or over excavation shall not be designated as site rock.
B. Trench Rock: Solid mineral material with a volume in excess of 1/4 cu yd or solid material that cannot be removed with a backhoe without drilling or blasting. Rock removable by hammer shall not be designated as trench rock.
C. Peak Particle Velocity: Peak Particle Velocity shall mean the greatest of three peak velocity components (inches per second units) measured at any point, with the three components being measured in the vertical and mutually perpendicular horizontal directions.

1.6 SUBMITTALS AND NOTIFICATIONS

A. Submit under provisions of section 01300.
B. Advance Submittals and Notifications
   1. Qualifications: Qualifications in accordance with the provisions of Section 1.07 shall be submitted for the blasting contractor conducting blasting operations and for the independent seismologist or blasting consultant performing pre-blast surveys and vibration monitoring.
      a. Blasting Contractor - At least two weeks prior to commencing drilling and blasting operations written evidence of the licensing, experience, and qualifications of the blaster who shall be responsible for the loading and firing of

each shot shall be submitted to the Engineer. If different, the name and qualifications of the person responsible for designing and directing the blasting operation shall also be submitted to the Engineer.

b. Seismologist or Blasting Consultant - At least two weeks prior to the performance of pre-blast surveys the name and resume of qualifications of the independent seismologist or blasting consultant proposed for use in conducting pre-blast condition surveys and monitoring blast vibrations shall be submitted to the Engineer. In the event a different seismologist or blasting consultant is proposed for use in monitoring blast vibrations only, the name and resume of qualifications of this individual shall be submitted to the Engineer at least two weeks prior to commencing any drilling and blasting operations. A sample of a previous vibration analysis or report shall be included with the qualifications.

2. Notification of Pre-Blast Surveys and Blasting Schedule: Prior to commencement of any pre-blast surveys, the Contractor shall provide documentation to the Engineer and the Town listing building owners within 600 ft. of the anticipated blasting areas (from Tax Map records), that the subject building owners were notified of the pre-blast survey work and the blasting schedule, and the offer to conduct a pre-blast survey was either accepted or rejected by each building owner.
3. Pre-Blast Condition Surveys: Written verification that all pre-blast condition surveys and related reports were completed in accordance with the requirements of Section 3.01 shall be submitted to the Engineer at least two weeks prior to commencing any drilling and blasting operations.
4. Blasting Plan: At least two weeks prior to commencing drilling and blasting operations the Contractor shall submit to the Engineer for review a blasting plan providing complete details of his proposed blasting and construction operations in accordance with the blasting plan requirements described in Section 3.02.
5. Blasting Schedule: The blasting contractor shall prepare and submit a blasting schedule in accordance with the requirements of Section 3.03 to the Engineer and the Town (fire, police, emergency agencies and Codes Enforcement personnel) at least one week prior to commencing blasting operations.

6. Certificate of Insurance: Prior to commencing any drilling and blasting operations, the Contractor shall submit a Certificate of Insurance in accordance with the requirements of Section 1.10.

C. Submittals and Notifications During Blasting Operations

1. Notification of Individual Blasts: During construction the blasting contractor shall coordinate the blasting schedule with the Engineer and the Town (fire, police, emergency agencies and Code Enforcement personnel) when requested. A minimum of 24 hours in advance, the blasting contractor will notify the Engineer and the Town by telephone of the start of blasting in any new area. At least 24 hours prior to any blast, the blasting contractor shall inform by telephone all property owners who have requested to be so informed, of the impending blast.
2. Blasting Log: A blasting log summarizing details of the round as shot, weather conditions, proximity of the blast location to nearest structures, exact locations of

monitoring instruments, and the results of blast monitoring at each instrument location shall be maintained daily for every blast. Specific information to be included on the log are described in Section 3.06. The blasting log shall be available for inspection on-site, shall be submitted in writing to the Engineer within 24 hours following each blast, and shall be submitted to the Town on a weekly basis.

3. Blast Monitoring Reports: Blast monitoring data obtained by the independent seismologist or blasting consultant shall be available for inspection on-site, shall be submitted in writing to the Engineer (as part of the blasting log) within 24 hours following each blast, and shall be submitted to the Town on a weekly basis. In the event a ground vibration or airblast limit is exceeded, the blasting contractor shall notify the Engineer by telephone immediately following the blast.

4. Condition Surveys: If a nearby property owner submits a complaint regarding alleged blasting related damages during construction, the independent seismologist or blasting consultant shall conduct a second survey of the property within 48 hours of receiving the complaint to identify any changes in the property conditions. A condition report summary shall be submitted to the Engineer within two weeks after the second survey is conducted.

5. Noise Minimization: The contractor shall take precautions, such as the use of water, vacuums, and mufflers, to minimize noise and dust from air track operations, and shall keep noise and airborne dust levels at off site residences below regulatory limits.

1.7 QUALIFICATIONS

A. The Blasting Contractor shall be a company specializing in explosives for disintegration of rock, with at least five years documented experience in controlled blasting techniques.

B. Seismologist or Blasting Consultant: The Contractor will be required to retain an independent seismologist or blasting consultant to perform condition surveys prior to and during blasting operations, and to monitor, record, analyze, and report the seismic vibrations and airblast pressures being caused by blasting activities.
The seismologist or blasting consultant shall have at least five years of documented experience conducting condition surveys for blasting operations, and shall be experienced in the subject of vibrations emanating from construction activities. The seismologist or blasting consultant shall not be an employee of the Contractor, subcontractor, explosives manufacturer, or explosives distributor.

C. The seismologist or blasting consultant shall be present at the site of the blasting during all blasts. The seismologist or blasting consultant shall provide and use all necessary equipment to observe and record vibrations to ascertain that acceptable levels of vibrations are not exceeded. The seismologist or blasting consultant shall monitor, report findings, and submit recommendations to the Engineer in accordance with the requirements of this Specification.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for explosive disintegration of rock and to NFPA 495 for handling explosive materials.

B. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

1.9 SAFETY PRECAUTIONS AND WARNING SIGNALS

A. During the blasting operation the blasting contractor shall be responsible for control of access in and around the general blast area.
B. All persons within 600 ft. of the blasting area will be notified of "warning" and "all-clear" signals through notices left in mailboxes and signs posted in the area.
C. Equipment and traffic shall be stopped far enough away to ensure work area safety and shall not be released until the blasting foreman issues the "all-clear" signal.
D. A series of air horn warnings shall be issued to warn of an imminent blast as follows: 3 horn signals at 5 minutes prior to blast; 2 horn signals at 1 minute prior to blast: 1 horn signal after the blast to signal "all-clear" conditions once the shot has been checked for any misfires.
E. Explosives shall be stored, handled and employed in accordance with federal, state and local regulations and in accordance with NFPA 495, except where stricter requirements are contained elsewhere herein such requirements shall govern.
F. No explosives, caps, detonators, and fuses shall be stored on the site during non-working hours. The Contractor shall notify each public utility company having structures in the proximity to the work site, of the impending use of explosives and give sufficient advance notice to enable the companies to take such steps as they deem necessary to protect their property from injury.

1.10 RESPONSIBILITY FOR BLASTING OPERATIONS

A. A review of the Contractor's blasting submittals by the Engineer or the Town will not relieve the Contractor of its responsibility for the accuracy, adequacy, and safety of the blasting; for exercising proper supervision and field judgment; for preventing damage to structures; and for producing results in accordance with this Specification and the regulations and ordinances of the Town of Farmingdale. The Contractor shall be solely and completely responsible for the safety of all persons and property during the performance of its work. The Contractor shall take whatever measures it deems necessary, in addition to the requirements herein, to protect the safety of persons and property, both at the construction site and away from the site. The Contractor shall have full and complete responsibility for the handling, discharging, or settling of any and all damage or annoyance claims resulting from the blasting activities on the project. Any monitoring and/or review of the Contractor's procedures and performance conducted by the Engineer or the Town shall not relieve the Contractor of its responsibility for safety at and away from the site, or for preventing damage to adjacent structures or property. The Blasting Contractor shall carry liability insurance coverage (XCU) in an amount no less than $2,000,000. A certificate of insurance documenting the coverage and naming the owner, owner's representative, Engineer, and their consultants as additional insured shall be submitted prior to commencing any drilling and blasting operations.

1.11 INDEMNITY

A. The Contractor shall hold harmless the Owner, Owner's representative, Engineer and their consultants from any costs, liens, charges, claims or suits, including the costs of defense arising from any direct or indirect damage, real or alleged, from blasting.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
B. Delay Device: Type recommended by explosive firm.
C. Blast Mat Materials: Type recommended by explosives firm.

PART 3 - EXECUTION

3.1 CONDITION SURVEYS

A. Pre-Blast Condition Surveys: The pre-blast survey shall document the conditions of existing buildings within at least 600 ft. of the limit of blasting work. The pre-blast survey shall be completed by the independent seismologist or blasting consultant. The survey shall include documentation of interior subgrade and above grade accessible walls, ceilings, floors, roof, and visible exterior as viewed from the grade level. It shall detail the existing structural, cosmetic, plumbing, and electrical condition, and shall include all walls, and not be limited to areas in buildings showing existing damage. Where significant cracks or damage exist, or for defects too complicated to describe in words, photographs shall be taken.
A good quality videotape survey with appropriate audio description of locations, conditions, and defects can be used. Notes and sketches may be made to highlight or enhance the photographic documentation. The condition report shall present engineering notes and photographs or video records. The report shall also summarize the condition of each building and define areas of concern, including deteriorated structures or utilities, structures housing sensitive equipment, and/or manufacturing processes that are sensitive to vibrations.

B. Condition Surveys During Construction: If a nearby property owner submits a complaint regarding alleged blasting related damages during construction, the independent seismologist or blasting consultant shall conduct a second condition survey of the property within 48 hours of receiving the complaint to identify any changes in the property conditions. This survey shall be conducted with same level of detail, care and diligence as the pre-blast condition survey.

C. The contractor shall report to the Town in writing all blasting complaints received by the contractor within 24 hours of receipt. Each blast complaint report shall include the name and address of the complaintant, time received, date and time of blast complained about, and a written description of the circumstances, which led to the complaint. Upon receiving a written complaint from a resident alleging damage from blasting, the contractor's independent seismologist or blasting consultant and/or a representative of the Blaster's Insurance Company shall investigate the claim and a written report shall be issued to the homeowner, with a copy to the Town, of the results of the investigation and the response of the contractor. This written

report shall be received by the resident and the Town within 15 working days of receipt of the written complaint.

3.02 BLASTING PLAN

A. The blasting contractor shall be required to submit a drilling pattern and loading plan, referred herein as a blasting plan, in accordance with the schedule described in Section 1.06.B.4. The blasting plan shall be submitted to the Engineer for review, and shall contain details of the proposed rock excavation and blasting operations. No drilling or blasting shall take place until approval is received from the Engineer. The blasting plan shall include the following:
   1. The sequence and schedule of blasting rounds, including the general approach for developing each bedrock excavation area.
   2. A diagrammatic description of the typical blast pattern to be used, including presplitting pattern if pre-splitting is required.
   3. Diameter, spacing, burden, depth and orientation of each drill hole relative to the "free face", along with details of the delay pattern.
   4. A diagrammatic description of the loading plan for a typical production hole and, if presplitting is required on the project, for a typical presplit hole. This description shall include:
      a. Diameter, spacing, burden depth and orientation of each drill hole.
      b. Type and nomenclature of detonators and delay pattern.
      c. Type, nomenclature and weight per cartridge of explosives to be used, and weight and distribution of charge to be used within each hole, as well as total weight of explosive charge on each delay, and the total weight for the blast round.
      d. Type and distribution of stemming to be used in each hole
   5. Estimation of ground vibration levels at nearest adjacent structures.
   6. Methods of matting the blast area to prevent fly rock and excessive air blast pressure.
   7. Written evidence of the licensing, experience, and qualifications of the blaster who will be directly responsible for the loading and firing of each shot.
   8. A listing of instrumentation which the Contractor and/or the independent seismologist or blasting consultant proposes to use to monitor vibrations and, together with performance specifications and users manual supplied by the manufactures, and a recent calibration (within the previous six months).
   9. A description of the criteria to be used for locating vibration-monitoring instrumentation for each blast.
   10. A copy of the blasting permit obtained to conduct blasting on the site.

B. The blasting plan shall form the basis for all blasting operations on the project. If, in the judgment of either the Engineer or the Contractor, changes in the plan appear to be necessary, drilling or blasting operations shall be suspended and a revised plan shall be submitted to the Engineer reflecting the proposed changes.

3.3 BLASTING SCHEDULE

A. The blasting contractor shall prepare and submit a projected project-blasting schedule to the Engineer and the Town (fire, police, emergency agencies and Codes Enforcement personnel) at least one week prior to commencing blasting operations. The schedule shall, at a minimum, include the following:
   1. Name, address and phone number of blaster.
   2. Identification of specific basting areas.
   3. Projected dates and times of blasts.
   4. Methods to restrict access in the blast area and warning whistle announcements.

B. During construction the blasting contractor shall coordinate the actual blasting schedule with the Engineer and the Town (fire, police, emergency agencies and Codes Enforcement personnel) when requested. A minimum of 24 hours in advance, the blasting contractor shall notify by telephone the Engineer and, if requested, the Town, of the estimated time of blast. At least 24 hours prior to any blast, the blasting contractor shall inform by telephone all property owners who have requested to be so informed, of the impending blast.

3.4 EXCAVATION METHODS

A. General: Rock excavation shall be accomplished by blasting, cutting, wedging, barring, hammering, mechanical ripping, or a combination thereof. The Contractor shall select and be responsible for methods and procedures to be used, except as hereinafter provided.

B. Scaling and Final Rock Slope Stability: Rock scaling may be required on all or part of the exposed face following rock excavation. All loose and unstable material, all breakage, and all potentially unstable rock slides, even if located beyond the payment lines, shall be removed or stabilized to the Engineer's satisfaction during or upon completion of the excavation. Permanent rock cut slopes deviating from the design grades or exhibiting unexpected conditions shall be inspected by the Engineer, or their qualified geotechnical engineering sub-consultant, concerning the long-term stability of the slopes. The Engineer, or their sub-consultant shall prepare written documentation, and copied to the Town, regarding the long-term stability of the rock cut slopes, including, if appropriate, any remedial actions considered necessary to provide slopes with a suitable factor of
safety against post-construction movements.

C. Rock Excavation Limits and Overblast Mitigation: All necessary precautions shall be taken in blasting operations to preserve the rock outside the lines of excavation in the soundest possible condition. Blasting shall be done only to the lines and grades shown on the Drawings or approved by the Engineer. Where overblasting occurs at footing locations or other project structures, the overblasted rock shall be completely removed to the satisfaction of the Engineer, and the over-excavated area backfilled with 2500 psi concrete, crushed stone, or in accordance with backfilling and compaction requirements of Section 02223 as determined by the Engineer.

D. Excavations for Buried Utilities: In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Cleaning of Rock Surfaces: The Contractor shall, in areas designated by the Engineer, clean rock surfaces exposed during excavation to permit a thorough inspection and assessment of the rock by the Engineer. Cleaning of rock surfaces shall consist of the removal of all organic materials, soil, and loose rock. Cleaning may be done with high-pressure air jets, water jets, brooms or by any other method acceptable to the Engineer.

F. Blasting Procedures:
   1. Hours of Blasting: Blasting shall be limited to the hours of 9:00 AM and 4:00 PM, Monday through Friday.
   2. Test Blast(s): Prior to the commencement of production blasting, the Contractor shall, using small charges and the required monitoring instruments, establish a site specific relationship between charge weight, distance and response. The Contractor shall develop site specific scaled distance relationships from the test blast rounds to determine the allowable charge weight of explosives to be detonated per delay which will result in a minimum of overbreak, a minimum of shattering or loosening of rock beyond the excavation limits, and which will produce sound and reasonably uniform surfaces in the completed excavations.. The scaled distance (D_s) shall be the distance from the charge to the recording seismograph (D), divide by the square root of the explosive charge ($W^{0.5}$).
   3. Controlled Perimeter Blasting: When blasting near existing structures, production blasting shall start as far as possible from the existing structures so that blast vibrations and bedrock conditions can be evaluated as blasting approaches the structures. For blasting located within 65 ft. of existing structures, controlled perimeter blasting techniques may be required along the excavation perimeter to assist in obtaining a stable, undisturbed rock face and mitigate offsite impacts. Controlled blasting refers to the controlled use of explosives and blasting accessories in carefully spaced and aligned drill holes, to produce a smooth, free surface, or shear plane, in the rock along the specified backslope. Acceptable controlled blasting techniques include presplitting, cushion blasting, line drilling, and smooth-wall blasting. Smaller blast rounds may also be desirable as blasting approaches nearby structures to minimize explosive charge weights and mitigate impacts in the event normally sized charges do not produce expected results.
   4. Fly Rock Control: Before the firing of any blast, the rock to be blasted shall be covered with blasting mats, as approved by the Engineer. Mats shall be placed for every blast over the entire loaded area and shall restrict all fly rock from leaving the site. If blasted rock is permitted to escape the blasting mats, all blast-related activities shall be stopped. The Contractor shall prepare a report describing why rock was allowed to be ejected, and how such events will be prevented in the future. This report shall be submitted to the Engineer and, if requested, the Town. In order to proceed with any further blast related activity, written permission shall be obtained from the engineer. These provisions do not relieve the Contractor from all responsibility for the safety of his own personnel, the safety of the general public, as well as damage to structures.
   5. Overbreak Control at Perimeter Areas: When blasting at the perimeter of the excavations, care shall be taken at the excavation limits to minimize overbreak and fracturing of remaining rock. If necessary, presplitting or cushion blasting shall be utilized at such locations.
   6. No free-flowing, pourable, or pumpable explosives shall be used. All explosives shall be in cartridges or other semi-rigid containers.

3.5 VIBRATION AND AIRBLAST LIMITS

A. Ground Vibration: Ground vibration from all blasting operations shall be measured in terms peak particle velocity (inches per second), I any of the three mutually perpendicular components of particle velocity, and frequency (Hertz).

1. Residential Structures: The permissible maximum ground vibration at existing nearby aboveground residential structures shall not exceed the following limits:

Ground Vibration Limits for Residential Structures

Type of Structure	*Maximum PPV (in/s)*	
	Frequencies Below 40 HZ	*Frequencies 40Hz or Greater*
Modern Homes – Drywall Interiors	0.75	2.0
Older Homes – Plaster on Wood Lath for Interior Walls	0.50	2.0

2. Non-residential Structures: The maximum peak particle velocity (PPV) of ground vibrations for non-residential structures shall not exceed 2.0 in/s.
3. Underground Utilities: The maximum PPV of ground vibrations for underground utilities shall not exceed 2.0 in/s. Buried pipelines and other utilities owned by private utility companies are sometimes subject to lower limiting values imposed by the owner. The Contractor shall verify the maximum allowable PPV of ground vibrations allowed by the individual utilities.
4. Deteriorated structures or utilities, structures housing sensitive equipment, and/or manufacturing processes that are sensitive to vibrations may require lower PPV limits than those indicated above. If information obtained from the pre-blast surveys indicates lower limits are required at certain structures, the independent seismologist or blasting consultant
will identify the lower limits applicable to a specific structure, and the blasting contractor shall incorporate such provisions in the features of the blasting plan applicable to this site area.

B. Airblast Overpressure: The peak airblast overpressure at any inhabited building not owned or controlled by the developer will not be allowed to exceed 133 decibels (linear) when measured by an instrument with a high pass system and a lower frequency limit of 2 Hz. The equivalent maximum allowable airblast overpressure is 0.013 pounds per square inch (psi).

C. Vibration Reduction: In the event the blasting contractor's blasting round results in ground vibrations or airblast overpressures approaching the stated limits, the Engineer may require the blasting contractor to modify the blasting operations to reduce ground vibrations/overpressures. In the event the blasting contractor's blasting round results in ground vibrations or airblast

overpressures exceeding the stated limits at structures, the blasting contractor shall cease all blasting activities and submit a written report to the Engineer, and copied to the Town. This report shall discuss the corrective action to be taken on the next shot, and the next shot shall not be loaded until the Engineer acknowledges, in writing, that a design change is being attempted

3.6 BLASTING RECORDS

A. A blasting log summarizing details of every blast round as shot shall be maintained daily. The blasting log shall include detailed information concerning the specific drilling and loading for each blast as well as the results of blast monitoring by the independent seismologist or blasting consultant. Blast monitoring requirements are described in Section 3.07. The blasting log must be available for inspection on-site, shall be submitted in writing to the Engineer within 24 hours following each blast, and shall be submitted to the Town on a weekly basis. Specific information to be included on the log include:

1. Name of blasting company and blaster responsible for the blast.
2. Location, date and time of the blast.
3. Weather conditions including such factors as wind direction and cloud cover.
4. Number and spacing of drill holes and depth of burden or stemming.
5. Diameter and depth of drill holes.
6. Type of explosives used.
7. Total amount of explosives used.
8. Maximum amount of explosives used per delay period of 8 milliseconds or greater.
9. Maximum number of holes per delay period of 8 milliseconds or greater.
10. Method of firing and type of circuit.
11. Type of detonators used and delay periods used.
12. Height or length of stemming.
13. Distance and direction to nearest structure.
14. Scale distance to nearest structure.
15. The exact location and approximate elevation of each seismograph and the distance from each seismograph to the blast.
16. Vibration and airblast overpressure data from each seismograph, including a strip chart (or other permanent record of velocity/time waveform) with the calibration and monitoring record marked with the date, time and location of the blast, including: resultant PPV (in/s);
    longitudinal, vertical and transverse PPV (in/s); frequency (Hz); and peak airblast overpressure (dBL).
17. The name and signature of the person operating each seismograph.
18. The name of the person and firm analyzing the seismograph record.

3.7 BLAST MONITORING

A. Blast monitoring and analysis shall be conducted by the independent seismologist or blasting consultant. A minimum of three (3) seismograph instruments shall be used to monitor vibrations and airblast overpressures for each blast. Seismograph locations for each blast shall comply with the criteria described in the blasting plan.

B. All vibration-monitoring instruments used on the project shall comply with the following requirements:

1. Measure, display, and provide a permanent record on a strip chart of particle velocity components.

2. Measure the three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.

3. Have a velocity (seismic) frequency response of 2 Hz to 150 Hz, a sound frequency range of 1 Hz to 500 Hz, and be capable of measuring PPV's up to 10 in/s.

4. All seismographs used on the project shall display the date of the most recent calibration.

5. Calibration must have been performed within the last six (6) months and must be performed to a standard traceable to the National Institute of Standards and Technology.

C. Blast monitoring data obtained by the independent seismologist or blasting consultant shall be available for inspection on-site, shall be submitted in writing to the Engineer as part of the blasting log (Section 3.06) within 24 hours following each blast, and shall be submitted to the Town on a weekly basis. In the event a ground vibration or airblast limit is exceeded, the blasting contractor shall notify the Engineer by telephone immediately following the blast.

END OF DIVISION 312316

DIVISION 312316.13 - TRENCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavate trenches for piping.
B. Backfilling and compaction.

1.2 RELATED SECTIONS

A. Section 312333 – Trench Backfilling, Compaction, Control & Testing

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.
C. ASTM D922 - Test Method for Density of Soil and Soil Aggregate in Place by the Nuclear Methods. (Shallow Depth)
D. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

1.4 FIELD MEASUREMENTS

A. Verify that intended elevations for the Work are as shown on Drawings.

PART 2 - PRODUCTS

2.1 BED MATERIALS

A. Type 1 - 3/4 inch screened stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136.
B. Dead Sand.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be reused, is acceptable.

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, and other features remaining as a portion of final landscaping.

D. Protect benchmarks and existing structures 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 insitu compaction.

3.3 EXCAVATION

A. Cut trenches sufficiently wide to enable installation of drainage structures and allow inspection.
B. Hand trim excavation. Remove loose matter.
C. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
D. Correct unauthorized excavation at no cost to Owner.
E. Remove excavated material from site.

3.4 BEDDING

A. Support drainage structures during placement and compaction of bedding fill.

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. Employ a placement method that does not disturb or damage the pipe in trench.
D. Maintain optimum moisture content of backfill materials to attain required compaction density.
E. Remove surplus backfill materials from site.

3.6 TOLERANCES

A. Top Surface of Backfilling: Plus or minus 1/2 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ANSI/ASTM D1556, ANSI/ASTM D1557, and ANSI/ASTM D698.
B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.8 PROTECTION OF FINISHED WORK

A. Re-compact fills subjected to vehicular traffic.

END OF DIVISION 312316.13

SECTION 312323 - STRUCTURE BACKFILLING (FILL)

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Bridge perimeter construction, backfilling and site structure backfilling.
B. Fill under slabs-on-grade.
C. Consolidation and compaction.

1.2 RELATED SECTIONS

A. Section 312000 - Earthwork.
B. Section 03300 - Cast-in-Place Concrete: Concrete materials.

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.
C. ASTM D922 - Test Method for Density of Soil and Soil Aggregate in Place by the Nuclear Methods. (Shallow Depth)
D. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

PART 2 - PRODUCTS

2.1 FILL MATERIAL

A. Granular Borrow: MDOT 703.19: Place and compact materials in continuous layers not exceeding 8 inches of compacted depth, compacted to 95 percent of modified proctor density.
B. Reference Sheet C001 Construction Notes for Fill Material Specifications

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be reused are acceptable.
B. Verify foundation perimeter drainage installation has been inspected.

3.2 PREPARATION

A. Generally, compact subgrade to density requirements for subsequent backfill materials.
B. Cut out soft areas of subgrade not capable of insitu compaction. Fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.3 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.
B. Employ a placement method that does not disturb or damage foundation perimeter drainage, foundation damp proofing, and utilities in trenches.

3.4 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ANSI/ASTM D1556, ANSI/ASTM D1557, and ANSI/ASTM D698.
B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.5 PROTECTION OF FINISHED WORK

A. Recompact fills subjected to disturbance.

END OF DIVISION 312323

DIVISION 312333 - TRENCH BACKFILLING, COMPACTION, CONTROL & TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Backfilling work includes backfilling trenches below subgrade and/or backfilling around structures with suitable material removed in the course of excavating and other suitable material as shown on the Drawings and/or as specified herein.

B. Related Work Specified Elsewhere: (When Applicable)
   1. Traffic regulation is specified in Division l.
   2. Clearing, removal and replacement of paving, trench excavation-earth, trench excavation - ledge, structure excavation, dewatering, borrow and bedding material are specified in the appropriate sections in this division.
   3. Quality Control as specified in Division 1.

1.2 QUALITY ASSURANCE

A. When other than excavated backfill is required, and/or where shown on the Drawings, compact backfill material to an in-place density not less than 90 percent of the maximum density of the material in accordance with ASTM Dl557 Method "B".

B. Where backfilling with excavated material, compact to native field density.

C. Density testing shall be performed by an Independent Testing Laboratory retained by the Owner.

D. Determine in-place density in accordance with ASTM Dl556 or by other methods as approved by the Engineer.

E. Locations of Tests (when applicable):
   1. Average of one test between each manhole for sewers.
   2. Average of two tests around each pump station structure.
   3. Average of one test for each 300 linear feet of water line and of force main.
   4. Additional testing will be required by the Engineer if the Engineer is not satisfied with the apparent results of the contractor's compaction operation.
      a. If the additional test results fail to meet the requirements of these Specifications, the Contractor shall undertake whatever action is necessary, at no additional cost to the Owner, to obtain the required compaction. Owner will pay the cost of retesting. The Engineer will determine the cost of retesting and the Owner will invoice the Contractor for this cost. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price. No allowance will be considered for delays in the performance of the work. The Independent Testing Laboratory shall conduct all testing and retesting.
      b. If the test results pass and meet the requirements of these Specifications, the cost of the testing service will be borne by the Owner, but no allowance will be considered for delays in the performance of the work.

F. Requirements for compaction and the testing thereof establish guidelines for proper backfilling, but in no way relieve Contractor of correcting any settlement, which occurs thereafter.

PART 2 - PRODUCTS

2.1 FINAL BACKFILL MATERIALS

A. Suitable Excavated Material:
   1. Free from large clods, silt lumps or balls of clay.
   2. Free from stones and rock fragments over 50 pounds.
   3. Free from organics, peat, etc.

B. Frozen Materials:
   1. Do not backfill with, or on, frozen materials.
   2. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.

C. Wet Material:
   1. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet.
   2. Do not continue backfilling until the previously placed and new materials have dried sufficiently to permit proper compaction.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. General:
   1. Provide and place all necessary backfill material.
   2. Do not allow large masses of backfill material to be dropped into the excavation, as from a grab bucket, in such a manner that may endanger pipes and structures.
   3. Place material in a manner that will prevent stones and lumps from becoming nested.
   4. Completely fill all voids between stones with fine material.
   5. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
   6. Deposit backfill material evenly on all sides of structures to avoid unequal soil pressures.
   7. Keep stones or rock fragments with a dimension greater than two inches at least 6 inches away from the pipe or 18 inches from the structure during backfilling.

B. Sheeting:
   1. Leave sheeting in place when, in the opinion of the Engineer, damage is likely to result from its withdrawal.
   2. Completely fill with suitable material and thoroughly compact all voids left by the removal of sheeting.

C. Backfilling in Paved Areas:
   1. Backfill in such a manner as to permit the rolling and compaction of the backfilled trench with the adjoining material to provide the required subgrade bearing value for placing aggregate base and subbase materials and paving immediately after backfilling is completed.

2. Where required, place excavated material that is acceptable to the Engineer for surfacing or pavement subbase, at the top of the backfill to the depths as directed by the Engineer. Bring the surface to the required grade and rake out and remove stones.

D. Backfilling Trenches in Nonpaved Areas:
   1. Grade the ground to a reasonable uniformity.
   2. Leave the mounding over the trenches in a uniform and neat condition, satisfactory to the Engineer.

E. Bedding and Backfilling Pipelines:
   1. Install pipe bedding and initial backfill in accordance with the Borrow and Bedding Section in this division.
   2. Deposit and thoroughly compact the remainder of the backfill in twelve inch layers.

F. Placing and Compacting Backfill:
   1. The nature of the backfill materials will govern the methods best suited for their placement and compaction.
   2. No stone or rock fragment larger than twelve inches in dimension shall be placed in the backfill.
   3. No material shall be dropped from a height greater than five feet, unless a timber chute is used to break the fall.
   4. Rolling and tamping by mechanical or hand means shall be employed for compacting material in twelve-inch lifts.
   5. Other types of placing and compacting methods may be employed only when approved by the owner's representative.

G. Placing and Compacting Impervious Dam Material:
   1. The impervious dam material will be rolled and tamped by mechanical or hand means.
   2. Material shall be placed in lifts not greater than six inches.

H. Improper Backfill:
   1. When excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.
   2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
   3. Excavation, backfilling and compacting work performed to correct improper backfilling shall be performed at no additional cost to the Owner.
   4. Retesting shall be performed by the Contractor at his expense.

END OF DIVISION 312333

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 312500 - TEMPORARY EROSION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. The work under this section shall include provision of all labor, equipment, materials and maintenance of temporary erosion control devices as specified herein, as shown on the Drawings and as directed by the Engineer.
   2. Erosion control measures shall be provided as necessary to correct conditions that develop prior to the completion of permanent erosion control devices or as required to control erosion that occurs during normal construction operations.
   3. Construction operations shall comply with all federal, state and local regulations pertaining to erosion control.
   4. After awarded the Contract, prior to commencement of construction activities, meet with the Engineer to discuss erosion control requirements and develop a mutual understanding relative to details of erosion control.
B. Related Work Specified Elsewhere:
   1. Site work is specified in appropriate sections of this Division.
   2. Provisions stipulated in Environmental Protection.
C. Design Criteria:
   1. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
   2. Stabilize disturbed earth surfaces in the shortest time and employ such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved.

1.2 SUBMITTALS

A. The Contractor shall furnish the Engineer, in writing, his work plan giving proposed locations for storage of topsoil and excavated material before beginning construction. A schedule of work shall accompany the work plan. Acceptance of this plan will not relieve the Contractor of the responsibility of completion of the work as specified.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Baled Straw: At least 14" by 18" by 30" securely tied to form a firm bale, staked as necessary to hold the bale in place.
B. Sand Bags: Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.

C. Mulches:
   1. Loose hay, straw, peat moss, wood chips, bark mulch, crushed stone, wood excelsior, or wood fiber cellulose.
   2. Type and use shall be as specified by the "Maine Erosion and Sedimentation Control Handbook for Construction - Best Management Practices" prepared by the Maine DEP and the Soil and Water Conservation Commission herein after referred to as the BMP.

D. Mats and Nettings:
   1. Twisted Craft paper, yarn, jute, excelsior wood fiber mats, glass fiber and plastic film.
   2. Type and use shall be as specified in the BMP.

E. Permanent Seed: Conservation mix appropriate to the predominant soil conditions as specified in the BMP and subject to approval by the Engineer.

F. Temporary Seeding: Use species appropriate for soil conditions and season as specified in the BMP and subject to approval by the Engineer.

G. Water: The Contractor shall provide water and equipment to control dust, as directed by the Engineer.

H. Filter Fabrics: Filter fabric shall be of one of the commercially available brands such as Mirafi, Typar or equivalent. The Engineer prior to installation shall approve fabric types for particular applications.

2.2 CONSTRUCTION REQUIREMENTS

A. Temporary Erosion Checks:
   1. Temporary erosion checks shall be constructed in ditches and other locations as necessary. Stones shall be used for check dams as specified.
   2. Baled hay, sand bags or siltation fence may be used in an arrangement to fit local conditions.

B. Temporary Berms: Temporary barriers shall be constructed along the toe of embankments when necessary to prevent erosion and sedimentation.

C. Temporary Seeding: Areas to remain exposed for a time exceeding 3 weeks shall receive temporary seeding as indicated below:

Season	Seed	Rate
Summer (5/15 - 8/15)	Sudangrass	40 lbs/acre
Late Summer/Early Fall	Oats	80 lbs/acre
(8/15 - 9/15)	Annual Ryegrass	40 lbs/acre
Fall (9/15 - 10/1)	Winter Rye	112 lbs/acre
Winter (10/1 - 4/1)	Mulch w/Dormant Seed	80 lbs/acre*
Spring (4/1 - 7/1)	Oats	80 lbs/acre
	Annual Ryegrass	40 lbs/acre

* Seed rate only

D. Siltation fences shall consist of porous filter fabric with a wire mesh backing and shall be supported by posts as per manufacturer's recommendations. The Engineer shall approve fabric.

E. Mulch All Areas Receiving Seeding: use either wood cellulose fiber mulch (750 lbs/acre); or straw mulch with chemical tack (as per manufacturers specifications). Wetting for small areas may be permitted. Biodegradable netting is recommended in areas to be exposed to drainage flow.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Temporary Erosion Checks:
   1. Temporary erosion checks shall be constructed in ditches and at other locations designated by the Engineer. The Engineer may modify the Contractor's arrangement of silt fences, bales and bags to fit local conditions.
   2. Baled hay, silt fences, or sandbags, or some combination, may be used in other areas as necessary to inhibit soil erosion.
   3. Siltation fence, if called for in the plans, shall be located and installed as shown.

B. Maintenance:
   Erosion control features shall be installed prior to excavation wherever appropriate. Temporary erosion control features shall remain in place and shall be maintained until a satisfactory growth of grass is established. The Contractor shall be responsible for maintaining erosion control features throughout the life of the construction contract. Maintenance will include periodic inspections by the Owner or Engineer for effectiveness of location, installation and condition with corrective action taken by the Contractor as appropriate.

C. Removing and Disposing of Materials:
   1. When no longer needed, material and devices for temporary erosion control shall be removed and disposed of as approved by the Engineer.
   2. When removed, such devices may be reused in other locations provided they are in good condition and suitable to perform the erosion control for which they are intended.
   3. When dispersed over adjacent areas, the material shall be scattered to the extent that it causes no unsightly conditions nor creates future maintenance problems.

END OF DIVISION 312500

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 312500.13 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 DEFINITIONS OF CONTAMINANTS:

A. Sediment: Soil and other debris that has been eroded and transported by runoff water.
B. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from construction activity.
C. Chemical Wastes: Includes salts, acids, alkalis, herbicides, pesticides, and organic chemicals.
D. Sanitary Wastes: Wastes characterized as domestic sanitary sewage.

1.2 ENVIRONMENTAL PROTECTION REQUIREMENTS:

A. Provide and maintain during the life of the Contract, environmental protection as defined herein. Provide environmental protective measures as required to prevent or control pollution that develops during normal construction practice. Provide environmental protection measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with all federal, state, and local regulations pertaining to water, air, and noise pollution.

PART 2 - PRODUCTS

A. Temporary Erosion Control Blanket-Adhere to specifications in 717.061 in the MDOT Standard Specifications Highways and Bridges. Silt Fence-Terratex pre-assembled or equal.

PART 3 - EXECUTION

A. PROTECTION OF NATURAL RESOURCES:
The natural resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their existing condition or restored to an equivalent or improved condition upon completion of the work. Confine construction activities to areas defined by the work schedule, drawings, and specifications.
B. Land Resources: except in areas indicated to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without special approval of the owner's representative. Do not fasten or attach ropes, cables, or guys to any existing nearby trees for anchorages unless specifically authorized. Where such special emergency use is authorized, the Contractor shall be responsible for any resultant damage.
C. Protection: protect existing trees that are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operators. Remove displaced rocks from uncleared areas. Protect monuments and markers.
D. Repair and Restoration: repair or restore to their original condition all trees or other landscape features scarred or damaged by the equipment operations. Obtain approval of the repair or restoration from the Engineer prior to its initiation.
E. Temporary Construction: remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and all other vestiges of construction. Temporary roads, parking areas, and similar

temporary use areas shall be graded in conformance with surrounding areas and revegetated, seeded, or sodded as required by the plans.

F. Water Resources: perform all work in such a manner that any adverse environmental impact on water resources is avoided. Storage of hydraulic fluid is not permitted on-site. Quantities of bulk materials shall be reduced to a level acceptable to the owner's representative.

3.2 EROSION AND SEDIMENT CONTROL MEASURES:

A. Burn-off: Burn-off of ground cover is not permitted.
B. Protection of Erodible Soils: All earthwork brought to final grade shall be immediately finished as indicated or specified. Protect immediately side slopes and backslopes upon completion of rough grading. Plan and conduct all earthwork in such a manner as to minimize the duration of exposure of unprotected soils, and in no case shall exposure exceed 7 days. Consult weather forecasts prior to exposing large areas of soil. Check erosion control measures before forecasted major storm events.
C. Temporary Protection to Erodible Soils: Utilize the following methods to prevent erosion and control sedimentation.
    1. Vegetation and Mulch: Provide temporary protection on all side and back slopes as soon as rough grading is completed or sufficient soil is exposed to require protection to prevent erosion. Such protection shall be by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

3.3 CONTROL AND DISPOSAL OF SOLID, CHEMICAL AND SANITARY WASTES:

A. Pick up solid wastes and place in containers that are emptied on a regular schedule. The preparation, cooking and disposing of food is strictly prohibited on the project site. Conduct handling and disposal of wastes to prevent contamination of the site and other areas. On completion, leave areas clean and natural looking. Remove signs of temporary construction and activities incidental to construction of permanent work in place
B. Disposal of Rubbish, Garbage, and Debris: dispose of rubbish, garbage and debris in accordance with the requirements specified herein.
C. Sewage, Odor, and Pest Control: dispose of sewage through chemical toilets or comparable effective units and periodically empty wastes. Include provisions for pest control and elimination of odors.
D. Petroleum Products: conduct fueling and lubricating of equipment and motor vehicles in a manner that affords the maximum protection against spills and evaporation. Dispose of lubricants to be discarded and excess oil in accordance with approved procedures meeting federal, state and local regulations.

3.4 DUST CONTROL:

A. Keep dust down at all times, including nonworking hours, weekends, and holidays. Sprinkle or treat the soil at the site, haul roads, and other areas disturbed by operations with dust suppressers.

Petroleum products will not be used as suppressers. No dry power brooming is permitted. Instead use vacuuming, wet mopping, wet sweeping, or wet power brooming.

END OF DIVISION 312500.13

DIVISION 321116 - BORROW AND BEDDING MATERIAL (SUBBASE COURSES)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Provide, place and compact borrow and bedding material in authorized excavation(s) below normal depth and in other location(s) as shown on the Drawings and/or as specified herein.

B. Related Work Specified Elsewhere:
   1. Trench Excavation - Earth, Trench Excavation - Ledge, Trench Backfilling, Compaction, Control and Testing are specified in the appropriate sections in this division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Gravel Borrow:
   1. Well graded granular material having no rocks with a maximum dimension over 6-inches, except where it is used for pipe bedding in which case the maximum size shall be 2-inches.
   2. Free from frozen material and other unsuitable material.
   3. That portion passing a three inch square mesh sieve shall contain not more than 70 percent passing a l/4 inch mesh sieve and not more than l0 percent passing a number 200 mesh sieve when used as pipe bedding material and not more than 5 percent passing a number 200 mesh sieve when used as backfill around structures.

B. Screened Stone (Bedding Material):
   1. Shall be either screened stone or crushed stone and shall be well graded in size from 1/4 inch to 3/4 inch.
   2. Clean, hard, and durable particles or fragments.
   3. Free from dirt, vegetable, or other objectionable matter, and excess of soft, thin elongated, laminated or disintegrated pieces.
   4. Sieve Analysis:

Sieve Designation	% Passing by Weight Square Opening
1"	100
3/4"	90-100
3/8"	20-50

No. 4	0-10
No. 8	0-5

C. Sand:
1. Clean, hard and durable particles or fragments.
2. Sieve Analysis:

Sieve Designation	% Passing by Weight Square Opening
3/8"	100
No.4	95-100
No. 16	50-85
No. 50	10-30
No. 100	2-10

D. Underdrain Backfill Material:
1. Free from organic matter.
2. Gradations:

Type "B" Underdrain

Sieve Designation	% by Weight Passing Square Mesh Sieves
1 inch	95-100
½ inch	75-100
No. 4	50-100
No. 20	15-80
No. 50	0-15
No. 100	0-10

Type "C" Underdrain

Sieve Designation	% by Weight Passing Square Mesh Sieves
1 inch	100
3/4 inch	90-100
3/8 inch	0-75
No. 4	0-25
No. 10	0-5

Filter Fabric Lined Trench with 3"-6" coarse aggregate.
3. Shall conform to AASHTO T 27

E. French Drain Stone
1. Hard, durable rock.
2. Gradations:

Sieve Designation	% by Weight Passing Square Mesh Sieves
6 inch	90-100
1½ inch	0-40

No. 4	0-5

3. Shall conform to AASHTO T 27 except that the total material sampled shall be sieved and the minimum weight of the sample will be 120 pounds.

F. 3/4"-Crushed Stone: Crushed Stone shall be a uniform material, containing angular pieces, as are those which come from a mechanical crusher. Gradation requirements shall be as follows:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1"	98-100
3/4"	0-30
No. 200	0-3

G. Impervious Dam Material: The impervious dam material shall be uniform natural or selected cohesive soil with minimum of 30 percent of the material passing a No. 200 sieve. It shall not contain vegetation, masses of roots, individual roots larger than 12 in. long or 1/2 in. in diameter or other porous or organic matter.

H. Unsuitable Soil Materials: Shall be those defined in AASHTO M145, soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7; also, peat and other highly organic soils.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Place bedding material, initial backfill, impervious dam material and fill below pipe bedding in layers of uniform thickness not greater than six inches or as shown on the Drawings.

B. Thoroughly compact each layer by means of a suitable vibrator or mechanical tamper.

C. In excavations below normal depth or where unsuitable materials are excavated, gravel borrow shall be used unless ground water makes such usage not practical; if such is the case, then screened gravel shall be used.

D. No stone 2" in diameter or larger shall be allowed within 6" of the pipe.

E. Where soft silt and clay soils are encountered the trench shall be excavated 6 inches below the normal bedding and backfilled with 6-inches of compacted sand.

F. No stone or rock greater than 12 inches measured at any point shall be placed in the trench backfill.

G. The following schedule gives the minimum bedding requirements for various types of pipe. Dimensions refer to distance below bottom of pipe.

1.	PVC or ADS Pipe	6 inches min.
2.	P.E. Pipe	6 inches min.
3.	Culverts and Underdrain	6 inches min.

4.	Storm Drain Pipe	6 inches min.

H. The following schedule gives the minimum initial backfill requirements for various types of pipes.

1.	PVC or ADS Pipe	6 inches min. over the top of the pipe
2.	P.E. Pipe	6 inches min. over the top of the pipe
3.	Culverts and Underdrain	6 inches min. over the top of the pipe
4.	Storm Drain Pipe	6 inches min. over the top of the pipe.

END OF DIVISION 321116

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 321123 - AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 312333 – Trench Backfilling, Compaction, Control & Testing: Compacted fill under base course.

1.3 REFERENCES

A. AASHTO Ml47-65 - Materials for Aggregate and Soil-Aggregate.

B. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate for gravel base shall be screened or crushed gravel of hard durable particles 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 Designation	Percentage by Weight Passing Square Mesh Sieves	
	"MDOT" Type A Aggregate	"MDOT" Type D Aggregate
1/2 inch	45 - 70	35 - 80
1/4 inch	30 - 55	25 - 65
No. 40	0 - 20	0 - 30
No. 200	0 - 6.0	0 - 7

Type “A” aggregate for base shall not contain particles of rock, which will not pass the 2-inch square mesh sieve.
Type “D” aggregate for base shall not contain particles of rock, which will not pass the 6-inch square mesh sieve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify subbase has been inspected, gradients and elevations are correct, and are dry.

3.2 AGGREGATE BASE PLACEMENT

A. Spread Type D base course aggregate over the prepared backfill. Place Type D base course aggregate in 8-inch layers and compact.

B. Spread Type A base course aggregate over prepared Type D base course. Place Type A base course aggregate in a 3-inch layer and compact.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Compact placed aggregate materials to achieve compaction to 95 percent of its maximum dry density in accordance with ANSI/ASTM D698 and ANSI/ASTM D1557.

F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.3 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within 1/2 inch.

3.4 FIELD QUALITY CONTROL

A. Gradation of Aggregate: In accordance with ASTM C136.
B. Compaction testing will be performed in accordance with ANSI/ASTM D698 and ANSI/ASTM D1557.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
D. Frequency of Tests: Owners and Engineers discretion.

END OF DIVISION 321123

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Asphaltic concrete paving and surface sealer; wearing binder or base course.

1.2 RELATED SECTIONS

A. Section 312213 – Rough Grading: Preparation of site for paving and base.

B. Section 312333 – Trench Backfilling, Compaction, Control & Testing: Compacted subbase for paving.

C. 321123 - Aggregate Base Course

1.3 REFERENCES

A. MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types; The Asphalt Institute.

B. MS-3 - Asphalt Plant Manual - The Asphalt Institute (AI).

C. MS-8 - Asphalt Paving Manual - The Asphalt Institute (AI).

D. MS-19 - Basic Asphalt Emulsion Manual, The Asphalt Institute (AI).

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AI Manual MS-8.

B. Mixing Plant: Conform to AI Manual MS-3.

C. Obtain materials from same source throughout.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate for Binder Course Mix: MDOT 403.207

B. Aggregate for Wearing Course Mix: MDOT 403.208
C. Fine Aggregate: In accordance with MDOT standards.

2.2 ACCESSORIES

A. Tack Coat (if required): Homogeneous, medium curing, liquid asphalt in accordance with MDOT standards.

2.3 ASPHALT PAVING MIX

A. Binder Course: 4.5 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2 standards.

B. Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with AI MS-2 standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that compacted aggregate base course is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.2 BASE

A. Section 321123 - Aggregate Base Course forms the base construction for work of this Section.

3.3 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Thickness of binder course shall be in accordance with construction drawings.

B. Thickness of surface course shall be in accordance with construction drawings.

.

C. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas accessible to rolling equipment.

D. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.4 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within 1/2 inch.

3.5 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for 2 days.

END OF DIVISION 321216

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 329119 - LANDSCAPE GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Finish grade subsoil and proof roll.

B. Place, level, and compact topsoil.

1.02 RELATED WORK

A. Section 312213 - Rough Grading: Subsoil contouring.

B. Section 312333 – Trench Backfilling: Backfilling and compacting fill.

C. Section 312316.13 - Trenching: Excavation, backfill, and compacting fill in trenches.

D. Section 311216 – Bituminous Concrete Paving (Asphalt Paving)

E. Section 329300 - Trees, Plants, and Ground Cover: Topsoil fill for trees, plants, and ground cover.

1.03 SAMPLES

A. Submit samples under provisions of this contract.

B. Submit 10 lb sample of topsoil to testing laboratory, in airtight container.

1.04 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, roads, sidewalks, paving, and curbs.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil: Reused, free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter

B. Topsoil: Imported, friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range ph of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify site conditions and note irregularities affecting work of this Section.

B. Beginning work of this Section means acceptance of existing conditions.

3.02 SUBSOIL PREPARATION

A. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones in excess of 1/2 inch in size, and subsoil contaminated with petroleum products.

B. Scarify subgrade to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.03 PLACING TOPSOIL

A. Place topsoil in areas where sodding and planting is scheduled.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.

D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.

E. Manually spread topsoil around trees, plants and buildings to prevent damage.

F. Lightly compact or roll placed topsoil.

G. Remove surplus subsoil and topsoil from site.

H. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.04 TOLERANCES

A. Top of Topsoil: Plus or minus 1/2 inch.

3.05 SCHEDULE OF LOCATIONS

A. The following paragraphs identify compacted topsoil thicknesses for various locations.

B. Sod or loam and seed: 4 inches.

C. Shrub Beds: 18 inches.

END OF DIVISION 329119

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 329219 - SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish, place, and test topsoil, seed, lime, and fertilizer where shown on the drawings and protect and maintain seeded areas disturbed by construction work, as directed by the Engineer.

B. Related Work Specified Elsewhere (When Applicable): Earthwork, excavation, backfill, compaction, site grading and temporary erosion control are specified in the appropriate Sections of this Division.

1.2 SUBMITTALS AND TESTING

A. Seed:
   1. Furnish the Engineer with duplicate signed copies of a statement from the vendor, certifying that each container of seed delivered to the project site is fully labeled in accordance with the Federal Seed Act and is at least equal to the specification requirements.
   2. This certification shall appear in, or with, all copies of invoices for the seed.
   3. The certification shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates and certificates have been approved.
   4. Each lot of seed shall be subject to sampling and testing, at the discretion of the Engineer, in accordance with the latest rules and regulations under the Federal Seed Act.

B. Topsoil:
   1. Inform the Engineer, within 30 days after the award of the Contract, of the sources from which the topsoil is to be furnished.
   2. Obtain representative soil samples, taken from several locations in the area under consideration for topsoil removal, to the full stripping depth.
   3. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at the Contractor's expense.
   4. Have soil samples tested for physical properties and pH (or lime requirement), for organic matter, available phosphoric acid, and available potash, in accordance with standard practices of soil testing.
   5. Approval, by the Engineer, to use topsoil for the work will be dependent upon the results of the soils tests.

C. Lime & Fertilizer:
   1. Furnish the Engineer with duplicate copies of invoices for all lime and fertilizer used on the project showing the total minimum carbonates and minimum percentages of the material furnished that pass the 90 and 20 mesh sieves and the grade furnished.

2. Each lot of lime and fertilizer shall be subject to sampling and testing at the discretion of the Engineer.
3. Sampling and testing shall be in accordance with the official methods of the Association of Official Agricultural Chemists.
4. Upon completion of the project, a final check may be made comparing the total quantities of fertilizer and lime used to the total area seeded. If the minimum rates of application have not been met, the Engineer may require the Contractor to distribute additional quantities of these materials to meet the minimum rates.

1.3 DELIVERY, STORAGE & HANDLING

A. Seed:
   1. Furnish all seed in sealed standard containers, unless the Engineer grants exception in writing.
   2. Containers shall be labeled in accordance with the United States Department of Agriculture's rules and regulations under the Federal Seed Act in effect at the time of purchase.

B. Fertilizer:
   1. Furnish all fertilizer in unopened original containers.
   2. Containers shall be labeled with the manufacturer's statement of analysis.

1.4 JOB CONDITIONS

A. Topsoil: Do not place or spread topsoil when the subgrade is frozen, excessively wet or dry, or in any condition otherwise detrimental, in the opinion of the Engineer, to the proposed planting or to proper grading.

B. Seeding:
   1. Planting Seasons: The recommended seeding time is from April 1 to September 15. The Contractor may seed at other times except as indicated in the erosion and sedimentation control report. Regardless of the time of seeding, the Contractor shall be responsible for each seeded area until it is accepted.
   2. Weather Conditions:
      a. Do not perform seeding work when weather conditions are such that beneficial results are not likely to be obtained, such as drought, excessive moisture, or high winds.
      b. Stop the seeding work when, in the opinion of the Engineer, weather conditions are not favorable.
      c. Resume the work only when, in the opinion of the Engineer, conditions become favorable, or when approved alternate or corrective measures and procedures are placed into effect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Seed:
   1. Provide the grass seed mixture approved by the Engineer, having the following composition:
      a. Park Mixture:
         50 percent Creeping Red Fescue
         30 percent Kentucky Bluegrass
         20 percent Perennial Rye

   2. Do not use seed, which has become wet, moldy, or otherwise damaged in transit or during storage.

B. Topsoil:
   1. Provide the quantity of topsoil necessary, in the opinion of the Engineer, to complete the work.
   2. Resuse topsoil from stockpiled material or provide topsoil that is natural, friable clay-loam soil possessing the characteristics of representative soils which produce heavy growths of crops, grass, or other vegetation.
   3. Provide topsoil which is reasonably free from subsoil, brush, objectionable weeds, other litter, clay lumps, stones, stumps, roots, objects larger than 2 inches in diameter, and toxic substances which might be harmful to plant growth or be a hindrance to grading, planting, and maintenance operations.
   4. Obtain topsoil from naturally well-drained areas.

C. Lime:
   1. Provide lime, which is ground limestone containing not less than 85% of total carbonate and of such fineness that 90% will pass a No. 20 sieve and 50% will pass a No. #l00 sieve.
   2. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing a No. #l00 sieve. No additional payment will be made to the Contractor for the increased quantity.

D. Fertilizer:
   1. Provide a phosphorous-free fertilizer approved by the Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Equipment:
   1. Provide all equipment necessary for the proper preparation of the ground surface and for the handling and placing of all required materials.
   2. Demonstrate to the Engineer that the equipment will apply materials at the specified rates.

B. Soil: Perform the following work prior to the application of lime, fertilizer or seed.

1. Scarify the subgrade to a depth of 2 inches to allow the bonding of the topsoil with the subsoil.
2. Apply topsoil to a depth of 4 inches or as directed on areas to be seeded.
3. Trim and rake the topsoil to true grades free from unsightly variations, humps, ridges or depressions.
4. Remove all objectionable material and form a finely pulverized seedbed.

3.2 PERFORMANCE

A. Grading:
   1. Grade the areas to be seeded as shown on the Drawings or as directed by the Engineer.
   2. Leave all surfaces in even and properly compacted condition.
   3. Maintain grades on the areas to be seeded in true and even conditions, including any necessary repairs to previously graded areas.

B. Placing Topsoil:
   1. Uniformly distribute and evenly spread topsoil on the designated areas.
   2. Spread the topsoil in such a manner that planting work can be performed with little additional soil preparation or tillage.
   3. Correct any irregularities in the surface resulting from top soiling or other operations to prevent the formation of depressions where water may stand.
   4. Thoroughly till the topsoil to a depth of at least 3 inches by plowing, discing, harrowing, or other approved method until the condition of the soil is acceptable to the Engineer.

C. Placing Fertilizer:
   1. Distribute fertilizer uniformly at a rate determined by the soils test over the areas to be seeded.
   2. Incorporate fertilizer into the soil to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.
   3. The incorporation of fertilizer may be a part of the tillage operation specified above.
   4. Distribution by means of an approved seed drill equipped to sow seed and distribute fertilizer at the same time will be acceptable.

D. Placing Lime:
   1. Uniformly distribute lime immediately following or simultaneously with the incorporation of fertilizer.
   2. Distribute lime at a rate determined from the pH test, to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.

E. Seeding:
   1. Level out any undulations or irregularities in the surface resulting from tillage, fertilizing, liming or other operations before starting seeding operations.
   2. Hydro seeding:
      a. Hydro seeding may be performed where approved and with equipment approved by the Engineer.
      b. Sow the seed over designated areas at a minimum rate of 5 pounds per 1000 square feet.

c. Seed and fertilizing materials shall be kept thoroughly agitated in order to maintain a uniform suspension within the tank of the hydro seeder.
d. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates.

3. Drill Seeding: N/A

4. Broadcast Seeding:
   a. Broadcast seeding may be performed by equipment approved by the Engineer.
   b. Sow the seed uniformly over the designated areas at a rate of 5 pounds per l,000 square feet.
   c. Sow half the seed with the equipment moving in one direction and the remainder of the seed with the equipment moving at right angles to the first sowing.
   d. Cover the seed to an average depth of l/2 inch by means of hand raking, brush harrow, spike-tooth harrow, chain harrow, cultipacker, or other approved devices.
   e. Do not perform broadcast seeding work during windy weather.

F. Compacting:
1. Seeded areas must be raked lightly after sowing unless seeding is to be directly followed by application of an approved mulch.
2. Compact the entire area immediately after the seeding operations have been completed.
3. Compact by means of a cultipacker, roller, or other equipment approved by the Engineer weighing 60 to 90 pounds per linear foot of roller.
4. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, use a pneumatic roller (not wobbly wheel) that has tires of sufficient size to obtain complete coverage of the soil.
5. When using a cultipacker or similar equipment, perform the final rolling at right angles to the prevailing slopes to prevent water erosion or at right angles to the prevailing wind to prevent dust.

3.3 PROTECTION & MAINTENANCE

A. Protection:
1. Protect the seeded area against traffic or other use.
2. Erect barricades and place warning signs as needed.

B. Maintenance:
1. Properly care for the seeded areas during the period when the grass is becoming established.
2. The protection period shall extend for l2 months after the completion of the entire project, unless the desired cover, in the opinion of the Engineer, is established in a shorter period of time.

3.4 ACCEPTANCE

A. At final acceptance of the project all areas shall have a close stand of grass with no weeds present and no bare spots greater than three inches (3") in diameter over greater than five percent (5%) of the overall seeded area.

END OF DIVISION 329219

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 330526 - BURIED UTILITY MARKINGS (UTILITY LINE SIGNS, MARKERS & FLAGS)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. This work shall consist of providing utility line markings installed above all buried lines installed as part of this contract as indicated on the Drawings and replacing existing markings disturbed as part of this contract.

B. Related Work Specified Elsewhere:
   1. Pipe, excavation, backfill, insulation are specified in the appropriate Sections in this Division.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and color shall be in accordance with latest AASHTO specifications for pipe and utility marking.

B. For ferrous pipe material use 0.004" minimum polyethylene film; 6" wide clearly marking type of buried utility

C. For non-ferrous pipe material (e.g. Concrete, PVC, PE, etc.) use detection tape composite of polyethylene and metallic core 6" wide clearly marking type of buried utility.

D. Seton Identification Products, New Haven, CT, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Marking tape shall be installed over utility lines centerline and buried 24" below grade.

B. Markings damaged during opening of trench shall be reinstalled with 2' overlap at broken sections.

END OF DIVISION 330526

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 334113 - POLYVINYL CHLORIDE (PVC) STORM DRAINAGE PIPE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Provide and install PVC non-pressure pipe and fittings of the size(s) and type(s) and in the location(s) shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere: (When Applicable)
   1. Excavation and backfill, dewatering, pavement, borrow and bedding material, and cleaning and testing requirements are specified in the appropriate sections of this division.
   2. Pipe & Pipe Fittings.

1.2 QUALITY ASSURANCE

A. Manufacturers:
   1. Certain-Teed.
   2. J-M Manufacturing.
   3. Or equivalent.

1.3 SUBMITTALS

A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.

B. Submit manufacturer's "Certification of Conformance" that pipe and fittings meet or exceed the requirements of these Specifications.

C. Submit other documents as specified in the appropriate Sections of this Division.

1.4 DELIVERY STORAGE AND HANDLING

A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets and other materials.

B. Carefully inspect all materials at the time of delivery and just prior to installation.

C. Carefully inspect all pipe and fittings for:
   1. Defects and damage
   2. Deviations beyond allowable tolerances for joint dimensions.
   3. Removal of debris and foreign matter.

D. Examine area and structures to receive piping for:

1. Defects, such as weak structural components that adversely affect the execution and quality of work.
2. Deviations beyond allowable tolerance for pipe clearances.

E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.

F. Immediately remove all rejected materials from the project site.

PART 2 - MATERIALS

2.1 MATERIALS

A. Pipe and Fittings:
1. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM standard specification for PVC Sewer Pipe and Fittings, Designation D 3034 (SDR 35) (4" to 15"), F679 (18" to 27").
2. Straight pipe shall be furnished in lengths of not more than 20 feet.
3. Saddles will not be allowed.

B. Joints:
1. Joints for the polyvinyl chloride pipe shall be push-on joints using factory installed elastomeric ring gaskets.
2. The gaskets shall be securely fixed in place by the manufacturer, so that they cannot be dislodged during joint assembly.
3. The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and ground water, and which will endure permanently under the conditions of the proposed use.
4. The joints shall conform to ASTM Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals, Designation D3212-76.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inspection:
1. Each pipe unit shall be inspected before being installed. No single piece of pipe shall be laid unless it is generally straight.
2. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length.
3. If a piece of pipe fails to meet this requirement for straightness it shall be rejected and removed from the site.
4. Any pipe unit or fitting discovered to be defective, either before or after installation, shall be removed and replaced with a sound unit.

B. Jointing:

1. All pipe and fittings shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.
2. Pipe and fittings shall be installed to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to insure true alignments and gradients.
3. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation.
4. Each pipe unit shall than be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe units together so that they will fit with a minimum open recess inside and outside and have tightly sealed joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.
5. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.

C. Pipe Deflection:
1. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
2. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.
3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

D. Testing:
1. Clean and test pipe in accordance with appropriate sections of this division.

END OF DIVISION 334113

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 334626 - FILTER FABRIC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Furnish all materials and install filter fabric of the types, dimensions and in the location(s) shown on the Drawings and specified herein.

B. Related Work Specified Elsewhere:
   1. Temporary Erosion Control, Riprap and Stone Ditch Protection, and Gabions and Revet Mattresses are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

A. A competent laboratory must be maintained by the manufacturer of the fabric at the point of manufacture to insure quality control.

B. During all periods of shipment and storage, the fabric shall be wrapped in a heavy duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, temperatures greater than 140^{o}F, mud, dirt, dust and debris.

1.3 SUBMITTALS

A. Manufacturer shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this Specification.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Filter fabric for use in stabilization, drainage, underdrains, erosion control, landscaping and beneath structures shall be formed in widths of not less than six (6) feet and shall meet the requirements of Table 1. Both woven and non-woven geotextiles are acceptable; however no "slit-tape" woven fabrics will be permitted for drainage, underdrain, and erosion control applications.

Table 1

Geotextile Mechanical Property	Test Method	Minimum Permissible Value
Grab Tensile Strength (both directions)	ASTM D4595-2017	120 pounds
Grab Elongation	ASTM D4632-2023	50 percent
Mullen Burst Strength	ASTM D3786-2018	210 psi
Puncture Strength	ASTM D3787-2020	60 pounds
Trapezoid Tear Strength	ASTM D4533-2015	50 pounds
Water Flow Rate	ASTM D4491-2022	120 gal/min/sf
Equivalent Opening Size (EOS)	ASTM D4751-2021	80
Coefficient of Permeability	ASTM D4491-2022	0.2 cm/sec

The geotextile shall have property values expressed in "typical" values that meet or exceed the values stated above as determined by the most recent test methods specified above.

B. Filter fabric for use in reinforcement and under riprap shall meet the requirements of Table 2. Woven and non-woven geotextiles are acceptable.

Table 2

Geotextile Mechanical Property	Test Method	Minimum Permissible Value
Grab Tensile Strength (both directions)	ASTM 4595-2017	195 pounds
Grab Elongation	ASTM D4632-2023	20 percent
Mullen Burst Strength	ASTM D3786-2018	340 psi
Puncture Strength	ASTM D3787-2020	85 pounds
Trapezoid Tear Strength	ASTM D4533-2015	85 pounds
Equivalent Opening Size (EOS)	ASTM D4751 -2021	U.S. Std. Sieve number(s) between #20 and #100

The geotextile shall meet or exceed the "typical" values stated above as determined by the most recent test methods specified above.

C. Filter Fabric for use in siltation fencing shall be the following:
1. Environfence 100X (Mirafi)
2. Supac 4NP (Phillip 66)
3. Exxon 180 Siltfence
4. Amoco 1380 Silt Stop
5. Harris Siltfence
6. Or equivalent

PART 3 - EXECUTION

3.1 Install filter fabric as shown on the drawings or as directed in appropriate specifications in this division or in accordance with manufacturer's instructions or as directed by the Engineer.

END OF DIVISION 334626

SECTION 00700 – TECHNICAL SPECIFICATIONS

DIVISION 334913 - CATCH BASINS, GRATES AND FRAMES (STORM DRAINAGE STRUCTURES)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Construct catch basins, grates, frames and brick masonry in conformance with the dimensions and locations shown on the Drawings.

B. Related Work Specified Elsewhere: (Where applicable)
   1. Pipe, trench excavation and backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

A. Precast Catch Basin Field Inlet, and/or Base, Barrel and Top Sections:
   1. Conform to ASTM C478-2022 (AASHTO M199-2017) except as modified herein, on the Drawings, or as directed by the Engineer.
   2. Average strength of 4,000 psi at 28 days
   3. Testing:
      a. Determine concrete strength by tests on 6 inch by 12 inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
      b. Have tests conducted at manufacturer's plant or at an approved testing laboratory.
      c. Have not less than 2 tests made for each 100 vertical feet of precast catch basin sections.

B. Frames and Covers:
   1. Acceptable Manufacturers:
      a. Etheridge Foundry Company
      b. Neenah Foundry Company
      c. E.L.LeBaron Foundry Company
      d. Or equivalent.

C. Masonry:
   1. Brick shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick (AASHTO M91-78).
   2. Cement: ASTM C-150-2007 (AASHTO M85-79I).
   3. Hydrated Lime: ASTM C-207-2018.
   4. Sand: ASTM C33-2018 (AASHTO M6-65 C197A).

1.3 SUBMITTALS TO THE ENGINEER

A. Submit shop Drawings and manufacturer's literature in conformance with the Standard General Conditions of the Construction Contract.

B. Field Inlets, Bases, Barrel Sections and Tops: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST CATCH BASIN SECTIONS

A. Dimensions, as shown on the Drawings.

B. Use flat tops or eccentric cones as appropriate. Exterior face of cone sections shall not flare out beyond the vertical.

C. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.

D. Constructed to support an HS-25 wheel loading.

E. Openings:
1. Provide openings in the risers to receive pipes entering the catch basin of the types and materials approved by the Engineer.
2. Make openings at the manufacturing plant or cut openings in the field.
3. Size: To provide a uniform annular space between the outside wall of pipe and the riser.
4. Location: To permit setting of the entering pipes at the correct elevations.

F. Joints:
1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
   Acceptable Materials:
   a. Kent-Seal No. 2
   b. Ram-Nek
   c. Or equivalent.
2. Joints between precast sections shall conform to related standards and manufacturer's instructions.

2.2 FRAMES AND GRATES

A. All essential details of design shall conform to the Drawings. The Engineer may approve standard castings differing in non-essential details.

B. All frames and grates shall be made of cast iron and shall have machined bearing surfaces to prevent rocking under traffic.

C. Grate castings will be smooth with no sharp edges.

D. Constructed to support an HS-25 wheel loading.

2.3 MASONRY

A. Brick:
   1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
   2. Immediately remove rejected brick from the work.

B. Mortar:
   1. Composition (by volume):
      a. 1 part portland cement.
      b. 1/2 part hydrated lime.
      c. 4-1/2 parts sand.
   2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.

C. Cement:
   1. Shall be Type II portland cement.

D. Hydrated Lime:
   1. Shall be Type S.

E. Sand:
   1. Shall consist of inert natural sand.
   2. Grading:

Sieve	Percent Passing
3/8	100
4	95-100
8	80-100
16	50-85
50	10-30
100	2-10
Fineness Modulus	2.3 - 3.1

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Precast Catch Basin Sections:
   1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
   2. Install barrels and tops level and plumb.
   3. Make all joints water tight.

4. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout or other material approved by the Engineer.

5. Cut openings (as required) carefully to prevent damage to barrel sections and tops. Damaged barrel sections and tops shall be replaced by the Contractor at no additional expense to the Owner.

B. Pipe Connections to Catch Basins: Connect pipes to catch basins with joint design and materials approved by the Engineer.

C. Masonry:
   1. Laying Brick:
      a. Use only clean bricks in brickwork for catch basins.
   2. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar or so wet as to be slippery when laid.
   3. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
   4. Construct all joints in a neat workmanlike manner; construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
   5. Curing:
      a. Protect brick masonry from drying too rapidly by using burlaps, which are kept moist, or by other approved means.
      b. Protect brick masonry from the weather and frost as required.

D. Frames and Grates:
   1. Set all frames in a full bed of mortar, true to grade and concentric with the catch basin opening.
   2. Completely fill all voids beneath the bottom flange to make a watertight fit.
   3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the catch basin all around its circumference.
   4. Clean the frame seats before setting the covers in place.

E. Bedding and Backfilling:
   1. Bedding material of catch basin shall be 6 inches of screened stone (see Section 02200).
   2. Backfill 18 inches all around catch basin with gravel borrow.

END OF DIVISION 334913

SECTION E
SAMPLE CONTRACT

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

THIS AGREEMENT is by and between: Town of Brownville, Maine ("Owner") and _____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 -WORK

1.1 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: **Construction of the Lakeview Road over Alder Brook Stream Crossing in Brownville, Maine.**

ARTICLE 2 – THE PROJECT

2.1 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

This project requires the complete removal of a multiple culvert stream crossing structure and the installation of a multi-phased bridge structure. Lakeview Road is a critical travel way from Brownville center to the Village of Lakeview. There are no other passable routes. Additionally, the Village of Lakeview is primarily a summer community for the Village and the surrounding areas around Schoodic Lake. Hence, the Contractor shall be responsible to keep a single lane of traffic continuously open during the entire construction period. Therefore, this project is anticipated to require three continuous phases of work. The first phase of the on-Site construction process will include, but not be limited to, mobilization, installation of the sediment control barriers and buffers, installation of sheet piles, widening of the existing road, excavation for and installation of the Phase I abutments, removal of one-half of the existing metal culverts, Phase I reconstruction of the streambed, installation of the abutment armament, installation of the Phase I bridge superstructure, regrading the road and shoulders, and then moving the traffic over the new structure. The second phase of the on-Site construction process will include, but not be limited to, excavation for and installation of the Phase II abutments, removal of the remaining metal culverts, Phase II reconstruction of the streambed, installation of the abutment armament, installation of the Phase II bridge superstructure, regrading the road and shoulders, and then moving the traffic over the new structure. And finally, the third phase III will consist of

removal of the sheet piles, finishing the road grades, reseeding all other areas, removal of the sediment control barriers and buffers, then cleanup and demobilization.

ARTICLE 3 – ENGINEER

3.0 The **Alder Brook Stream Crossing Restoration** project has been designed by Wentworth Partners & Associates. Wentworth Partners & Associates shall act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.1 Time of the Essence

All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence for the Contract.

4.2 Dates for Substantial Completion and Final Payment

The Work will be substantially completed and ready for final payment on or before October 31, 2024. Final completion of incidental seasonal items shall be May 31, 2025.

ARTICLE 5 – CONTRACT PRICE

5.0 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents.

ARTICLE 6 – PAYMENT PROCEDURES

6.1 Submittal and Processing of Payments

Contractor shall submit Applications for Payment on a monthly basis. Applications for Payment will be processed by Engineer.

6.2 Process Payments; Retainage

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 30th day after approval of the estimate by the Engineer as provided in paragraph 6.2.A.1 below.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold.

a. 90 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 98 percent of the Work completed, less 150 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.3 Final Payment

Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price as recommended by Engineer.

ARTICLE 7 – EXEMPT

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.1 Representations

In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified.
E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site;

information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) The cost, progress, and performance of the Work; (2) The means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 8.1.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.1 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages CA1 to CA23, inclusive).
2. Performance bond (page to , inclusive).
3. Payment bond (pages to , inclusive).
4. Other bonds (pages_____to_____inclusive).
    a. (pages_____to_____, inclusive).
    b. (pages_____to_____, inclusive).
    c. (pages_____to_____, inclusive).
5. Technical sections of Maine DOT Standard specifications for Highways and Bridges latest addition.

6. Project plans, so named:

   Project Drawings for Lakeview Road @ Alder Brook
   Revision 1 Issued for Permitting
   Dated March 19, 2024;
   and consisting of 33 sheets listed as:

General Sheets	G001 through G007
Civil Sheets	C001, C101 through C116
Structural Sheets	S001 through S002, S101 through S107

7. Exhibits to this Agreement (enumerated as follows):
   a. Contractors bid
   b. Bid attachment A – Unit Prices.

8. Addenda

B. The documents listed in Paragraph 9.1.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as mutually agreed.

ARTICLE 10 – GENERAL PROVISIONS

10.1 The Contract Documents

The Contract Documents consist of this Agreement with Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order; (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Engineer. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

10.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents

the entire and integrated agreement between the parties, hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Engineer and Contractor, (2) between the Owner and a Subcontractor or sub-subcontractor, (3) between the Owner and Engineer or (4) between any persons or entities other than the Owner and Contractor.

10.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

10.4 Execution of the Contract

Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

10.5 Ownership and Use of Engineer's Drawings, Specifications and Other Instruments of Service

The Drawings, Specifications and other documents, including those in electronic form, prepared by the Engineer and the Engineer's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Engineer or the Engineer's consultants, and unless otherwise indicated the Engineer and the Engineer's consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved fights, in addition to the copyrights. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Engineer, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Engineer and the Engineer's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Engineer and the Engineer's consultants. The Contractor, Subcontractors, sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Engineer

and the Engineer's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and .other documents prepared by the Engineer and the Engineer's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Engineer's or Engineer's consultants' copyrights or other reserved rights.

ARTICLE 11 – OWNER

11.1 Information and Services Required of the Owner

11.1.1 The Owner shall furnish and pay for surveys and a legal description of the site.

11.1.2 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

11.1.3 Except for permits and fees which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for other necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or permanent changes in existing facilities.

11.2 Owners Right to Stop the Work

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

11.3 Owner's Right to Carry Out the Work

If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents, or fails to perform a provision of the Contract, the Owner, after 10 days' written notice to the Contractor and without prejudice to any other remedy the Owner may have, may make good such deficiencies and may deduct the reasonable cost thereof, including Owner's expenses and compensation for the Engineer's services made necessary thereby, from the payment then or thereafter due the Contractor.

ARTICLE 12 – CONTRACTOR

12.1 Review of Contract Documents and Field Conditions by Contractor

12.1.1 Since the Contract Documents are complementary, before starting, each portion of the Work, the Contractor shall carefully study and compare the various. Drawings and other Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Subparagraph 11.1.1, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating construction by the Contractor and are not for the purpose of discovering errors, omissions or inconsistencies in the Contract Documents; however, any errors, omissions or inconsistencies discovered by the Contractor shall be reported promptly to the Engineer as a request for information in such form as the Engineer may require.

12.1.2 Any design errors or omissions noted by the Contractor during this review shall be reported promptly to the Engineer, but it is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

12.2 Supervision and Construction Procedures

12.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall be fully and solely responsible for the jobsite safety thereof unless the Contractor gives timely written notice to the Owner and Engineer that such means, methods, techniques, sequences or procedures may not be safe.

12.2.2 The Contractor Shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

12.3 Labor and Materials

12.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work whether temporary or

permanent and whether or not incorporated or to be incorporated in the Work.

12.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

12.3.3 The Contractor shall deliver, handle, store and install materials in accordance with manufacturers' instructions.

12.3.4 The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Engineer and in accordance with an approved Change Order.

12.4 Warranty

The Contractor warrants to the Owner and Engineer that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The' Contractor's warranty excludes remedy for damage or defect caused by abuse by other than the Contractor, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear and normal usage.

12.5 Taxes

The project is exempt from State sales taxes. The Town shall provide the Contractor with the Tax Exemption number for all purchases and services required to fulfill the duties of the Contract.

12.6 Permits, Fees and Notices

12.6.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work.

12.6.2 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities applicable to performance of the Work. The Contractor shall promptly notify the Engineer and Owner if the Drawings and Specifications are observed by the Contractor to be at variance therewith. If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such

notice to the Engineer and Owner, the Contractor shall assume appropriate responsibility for such Work and shall, bear the costs attributable to correction.

12.7 Submittals

12.7.1 The Contractor shall review for compliance with the Contract Documents, approve in writing and submit to the Engineer Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness. The Work shall be in accordance with approved submittals.

12.7.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

12.8 Use of Site

The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

12.9 Cutting and Patching

The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

12.10 Cleaning Up

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus material. Cigarettes, cigars, vaping pens, etc. are considered trash and shall be removed properly.

12.11 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees; shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Engineer harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Engineer, unless the Contractor has reason to believe that there is an infringement of patent or copyright and fails to promptly furnish such information to the Engineer.

12.12 Access to Work

The Contractor shall provide the Owner and Engineer access to the Work in preparation and progress wherever located.

12.13 Indemnification

12.13.1 To the fullest extent permitted by law and to the extent claims, damages, losses or expenses are not covered by Project Management Protective Liability insurance purchased by the Contractor in accordance, with Paragraph 20.3, the Contractor shall indemnify and hold harmless the Owner, Engineer, Engineer's consultants and agents and employees of any
of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 12.13.

12.13.2 In claims against any person or entity indemnified under this Paragraph 12.13 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Subparagraph 12.13.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 13 – ENGINEER'S ADMINISTRATION OF THE CONTRACT

13.1 The Engineer will provide administration of the Contract and will be an Owner's representative (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the one-year period for correction of Work described in Paragraph 21.2.

13.2 The Engineer, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the Work, and (3) to determine in general if the Work is being performed

in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Engineer will neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or] procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Subparagraph 12.2.1.

13.3 The Engineer will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Engineer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

13.4 Based on the Engineer's evaluations of the Work and of the Contractor's Applications for Payment, the Engineer will review, and certify, the amounts due the Contractor and will issue Certificates for Payment in such amounts

13.5 The Engineer will have authority to reject Work that does not conform to the Contract Documents.

13.6 The Engineer will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

13.7 The Engineer will interpret and decide matters concerning performance under requirements of, the Contract Documents on written request of either the Owner or Contractor. The Engineer will make initial decisions on all claims, disputes and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions so rendered in good faith.

13.8 Duties, responsibilities and limitations of authority of the Engineer as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Engineer. Consent shall not be unreasonably withheld.

13.9 Exempt

13.10 Claims and Disputes

13.10.1 Claims, disputes and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Engineer but

excluding those arising under Paragraph 19.2, shall be referred initially to the Engineer for decision. Such matters shall, after initial decision by the Engineer or 30 days after submission of the matter to the Engineer, be subject to mediation as a condition precedent to arbitration or the institution of legal or equitable proceedings by either party.

13.10.2 If a claim, dispute or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to resolution of the matter by the Engineer, by mediation or by arbitration.

13.10.3 The parties shall endeavor to resolve their disputes by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Request for mediation shall be filed in writing with the other party to this Agreement and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for arbitration but, in such event, mediation shall proceed in advance of arbitration or legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

13.10.4 Claims, disputes and other matters in question arising out of or relating to the Contract that are not resolved by mediation, except those waived as provided for in Paragraph 13.11 and Subparagraphs 18.5.3 and 18.5.4, shall be decided by arbitration which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect. The demand for arbitration shall be filed in writing with the other party to this Agreement and with the American Arbitration Association and shall be made within a reasonable time after the dispute has arisen. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. Except by written consent of the person or entity sought to be joined, no arbitration arising out of or relating to the Contract Documents shall include, by consolidation, joinder or in any other manner, any person or entity not a party to the Agreement under which such arbitration arises, unless it is shown at the time the demand for arbitration is filed that (1) such person or entity is substantially involved in a common question of fact or law, (2) the presence of such person or entity is required if complete relief is to be accorded in the arbitration, (3) the interest or responsibility of such person or entity in the matter is not insubstantial and (4) such person or entity is not the Engineer or any of the Engineers employees or consultants. The agreement herein among the parties to the Agreement and any other written agreement to arbitrate referred to herein shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

13.11 Claims for Consequential Damages

The Contractor and Owner waive claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

13.11.1 Damages incurred by the Owner for rental expenses for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

13.11.2 Damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 19. Nothing contained in this Paragraph shall be deemed to preclude an award of liquidated direct damages, when applicable, in accordance with the requirements of the Contract Documents.

ARTICLE 14 – SUBCONTRACTORS

14.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

14.2 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Engineer the names of the Subcontractors for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor to whom the Owner or Engineer has made reasonable and freely objection within fifteen days. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

14.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Engineer, and (2) allow the Subcontractor the benefit of all rights, remedies and redress afforded to the Contractor by these Contract Documents.

ARTICLE 15 – OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

15.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under conditions of the contract identical or substantially similar to these, including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such claim as provided in Paragraph 13.10.

15.2 The Contractor shall afford the Owner and separate contractors' reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's activities with theirs as required by the Contract Documents.

15.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a separate contractor because of delays, improperly timed activities or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work or defective construction of a separate contractor.

ARTICLE 16 – CHANGES IN THE WORK

16.1 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor and Engineer, or by written Construction Change Directive signed by the owner and Engineer.

16.2 The cost or credit to the Owner from a change in the Work shall be determined by mutual agreement of the parties or by unit prices or, in the case of a Construction Change Directive, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit.

16.3 The Engineer will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be affected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

16.4 If concealed, or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those

conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted.

ARTICLE 17 – TIME

17.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

17.2 The date of Substantial Completion is the date certified by the Engineer in accordance with Subparagraph 18.4.2.

17.3 If the Contractor is delayed at any time in the commencement or progress of the Work by changes ordered in the Work, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties or any causes beyond the Contractor's control, or by other causes which the Engineer determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Engineer may determine, subject to the provisions of Paragraph 13.10.

ARTICLE 18 – PAYMENTS AND COMPLETION

18.1 Applications for Payment

18.1.1 Payments shall be made as provided in Article 6 of this Agreement. Applications for Payment shall be in a form satisfactory to the Engineer.

18.1.2 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner's interests.

18.2 Certificates for Payment

18.2.1 The Engineer will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Engineer determines is properly due, or notify the Contractor and Owner in writing of the Engineer's reasons for withholding certification in whole or in part as provided in **Subparagraph 18.2.3**.

18.2.2 The issuance of a Certificate for Payment will constitute a representation by

the Engineer to the Owner, based on the Engineer's evaluations of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Engineer's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract documents prior to the completion and to specific qualifications expressed by the Engineer. The issuance of a Certificate of Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Engineer has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the contractor has used money previously paid on account of the Contract Sum.

18.2.3 The Engineer may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the owner, if in the Engineer's opinion the representations to the Owner required by Subparagraph 18.2.2 cannot be made. If the Engineer is unable to certify payment in the amount of the Application, the Engineer will notify the Contractor and Owner as provided in Subparagraph 18.2. The Engineer may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Engineer's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Subparagraph 8.2.2, because of:

18.2.3.1 defective Work not remedied;

18.2.3.2 third party claims filed or reasonable evidence indicating probably filing of such claims unless security acceptable to the Owner is provided by the Contractor;

18.2.3.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

18.2.3.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

18.2.3.5 damage to the Owner or another contractor;

18.2.3.6 reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

18.2.3.7 persistent failure to carry out the Work in accordance with the Contract Documents.

18.2.4 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

183 Payments to the Contractor

18.3.1 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in similar manner.

18.3.2 Neither the Owner nor Engineer shall have an obligation to pay or see to the payment of money to a Subcontractor except as may otherwise be required by law.

18.3.3 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

184 Substantial Completion

18.4.1 Substantial Completion is the stage in the progress if the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

18.4.2 When the Engineer determines that the Work or designated portion thereof is substantially complete, the Engineer will issue a Certificate of Substantial Completion which shall establish the date of Substantial Completion, establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate, Warranties required by the Contractor Documents shall commence on the date of Substantial Completion of the work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. Upon the issuance of the Certificate of Substantial Completion, the Engineer will submit it to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

18.5 Final Completion and Final Payment

18.5.1 Upon receipt of written notice that the Work is ready for final inspection and

acceptance and upon receipt of a final application for Payment, the Engineer will promptly
make such inspection and, when the Engineer finds the Work acceptable under the Contact Documents and .the Contract fully performed, the Engineer will promptly *issue* a final Certificate for Payment slating that to the best of the Engineer's knowledge, information and belief, and on the basis of the Engineer's on-site *visits* and *inspections,* the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Engineer's final Certificate for Payment will constitute a further representation that conditions stated in Subparagraph 18.5.2 as precedent to the Contractor's being entitled to final payment have been Fulfilled.

18.5.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.

18.5.3 The making of final payment shall constitute a waiver of claims by the Owner except those arising from:

18.5.3.1 lien, claims, security interests or encumbrances arising out of the Contract and unsettled;

18.5.3.2 failure of the Work to comply with the requirements of the Contract Documents; or

18.5.3.3 terms of special warranties required by the Contract Documents.

18.5.4 Acceptance of final payment by the Contractor a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and indemnified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 19 – PROTECTION OF PERSONS AND PROPERTY

19.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall, take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

19.1.1 employees on the Work and other persons who may be affected thereby;

19.1.2 the Work and materials and equipment to be incorporated therein; and

19.1.3 other property at the site or adjacent thereto.

The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Subparagraphs 19.1.2 and 19.1.3, except For damage or loss attributable to acts or omissions of the Owner or Engineer or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 12.13.

19.2 Hazardous Materials

19.2.1 If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Engineer in writing. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. The Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shutdown, delay and start-up, which adjustments shall be accomplished as provided in Article 16 of this Agreement.

19.2.2 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Engineer, Engineer's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Subparagraph 19.2.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or
{o injury to or destruction of tangible property, (other than the work itself), and provided that such damage, loss or expense is not due to the sole negligence of a party seeking indemnity.

19.2.3 If, without negligence on the part of the Contractor, the Contractor is held liable for the cost of mediation of a hazardous material or substance solely by reason

of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

ARTICLE 20 – INSURANCE

20.1 The Contractor: shall purchase from and maintain in a company or companies, lawfully authorized to do business in the jurisdiction in which the Project is located insurance for protection from claims under workers' compensation acts and other employee benefit acts which are applicable, claims for damages because of bodily injury, including death, and claims for damages, other than to the Work itself, to property which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by the Contractor or by a Subcontractor or anyone directly or indirectly employed by any of them. This insurance shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater, and shall include contractual liability insurance applicable to the Contractor's obligations. Certificates of Insurance acceptable to the Owner shall be filed, with the Owner prior to commencement of the Work. Each policy shall contain a provision that the policy will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner.

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

20.2 Property Insurance (N/A)

20.2.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance on an "all-risk" policy form, including builder's risk, in the initial Contract Sum plus the value of subsequent modifications and cost of materials supplied and installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Paragraph 18.5 or until no person or entity other than the Owner has an insurable interest in the property required by this Paragraph to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and sub-subcontractors in the Project.

20.2.2 The Owner shall file a copy or each policy with the Contractor before an exposure to loss may occur. Each policy Shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

20.3 Waivers of Subrogation

20.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the
Engineer, Engineers' consultants, separate contractors described in Article 15, if any, and any of their subcontractors, sub-contractors, agents and employees for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to Paragraph 20.4 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contactor, as appropriate, shall require of the Engineer, Engineer's consultants, separate contractors described in Article 15, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly and whether or not the person or entity has an insurable interest in the property damaged.

20.3.2 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insured's, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their sub-subcontractors I similar manner.

ARTICLE 21 – CORRECTION OF WORK

21.1 The Contractor shall promptly correct Work rejected by the Engineer or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial" Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

21.2 In addition to the Contractor's obligations under Paragraph 12.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Subparagraph 22.4.2, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written

notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one- year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.

21.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Paragraph 11.3.

21.4 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work.

21.5 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Article 21.

ARTICLE 22 – MISCELLANEOUS PROVISIONS.

22.1 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other.

22.2 Governing Law

The Contract shall be governed by the law of the place where the Project is located.

22.3 Tests and Inspections

Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner. or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Engineer timely notice of when and where tests and inspections are to be made so that the Engineer may be present for such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

22.4 Commencement of Statutory Limitation Period

As between Owner and Contractor, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued:

22.4.1 not later than the date of Substantial Completion for acts or failures to act occurring prior to the relevant date of Substantial Completion;

22.4.2 not later than the date of issuance of the final Certificate for Payment for acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to the issuance of the final Certificate for Payment; and

22.4.3 not later than the date of the relevant act or failure to act by the Contractor for acts or failures to act occurring after the date of the final Certificate for Payment.

ARTICLE 23 – TERMINATION OF THE CONTRACT

23.1 Termination by the Contractor

If the Engineer fails to recommend payment for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment thereon for a period of 90 days, the Contractor may, upon seven additional days' written notice to the Owner and the Engineer, terminate the Contract and recover from the owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages applicable to the Project.

23.2 Termination by the Owner

23.2.1 The Owner may terminate the Contract if the Contractor:

23.2.1.1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

23.2.1.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

23.2.1.3 persistently disregards laws, ordinances, or rules, regulations or orders from a public authority having jurisdiction; or

23.2.1.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

23.2.2 When any of the above reasons exists, the Owner, upon certification by the Engineer that sufficient cause exists to justify such action may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' written notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the

Owner may deem expedient. Upon request of the Contractor the owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

23.2.3 When the Owner terminates the Contract for one of the reasons stated in Subparagraph 23.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

23.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Engineer's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Engineer, upon application, and this obligation for payment shall survive termination of the Contract.

ARTICLE 24 – OTHER CONDITIONS OR PROVISIONS

24.1 The Owner shall withhold 5% of the money due to Contractor until the work under the Contract has been accepted by or for the Owner. The Owner may, upon the completion of part or parts of the contract and with the approval of the General Contractor and Designer, pay all or part of the retainage on those parts completed as the Owner deems prudent, provided satisfactory release of lien has been provided.

24.2 Liability Insurance shall be carried with the Town of Brownville and Wentworth Partners & Associates listed as additionally insured for the following limits:

General Liability	$2,000,000
Each occurrence	$1,000,000
Automobile Liability	$1,000,000
Workers Compensation	As prescribed by Law

The Insurance Certificate shall stipulate that a per project endorsement applies.

24.3 "Reasonable overhead and profit", as described in Article 16, shall mean an allowance to be added to or subtracted from the "cost" in lieu of overhead and profit and of any other expense which is not included in the cost of the Work covered by the change. Percentage for a Contractor shall be 15% of any net increase or decrease of Cost of any Work performed by his own forces and 10% for Work performed by any Subcontractors.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on_____(which is the Effective Date of the Agreement).

OWNER:	CONTRACTOR
Town of Brownville, Maine	
By:	By:
Title: Town Manager	Title:

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

Attest:	Attest:
Title:	Title:
Address for giving notices: 586 Main Street Brownville, Maine 04414	Address for giving notices:

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

APPENDIX A
PROJECT PERMITS

APPENDIX B
PROJECT DRAWINGS

DRAWING INDEX	
SHT. NO.	DESCRIPTION
G001	TITLE SHEET
G002	LOCATION MAPS
G003	SITE PHOTOS
G004	STREAM ASSESSMENT
G005	STREAM ASSESSMENT
G006	STREAM PROFILE
G007	HYDRAULIC ANAYLSIS
C001	GENERAL NOTES & SPECIFICATIONS
C101	EXISTING SITE PLAN
C102	SEDIMENTATION & DEWATERING PLAN
C103	DEWATERING & SILT FENCE DETAILS
C104	CONSTRUCTION LAYOUT PHASE 1
C105	CONSTRUCTION LAYOUT PHASE 2
C106	PROPOSED SITE PLAN PHASE 3
C107	ROAD PROFILE
C108	BRIDGE ABUTMENT PERSPECTIVES
C109	LEFT BRIDGE ABUTMENT
C110	RIGHT BRIDGE ABUTMENT
C111	FOUNDATION DETAILS - PHASE 1
C112	FOUNDATION DETAILS - PHASE 2
C113	FOUNDATION PERSPECTIVE & COLUMN TIE LAYOUT
C114	BRIDGE ABUTMENT DETAILS
C115	GUARDRAIL PLAN & ELEVATION
C116	GUARDRAIL DETAILS
S001	GENERAL NOTES
S002	GENERAL NOTES
S101	BRIDGE PERSPECTIVE
S102	BRIDGE PLAN & ELEVATION
S103	BRIDGE TRANSVERSE SECTIONS
S104	BRIDGE FRAMING PLAN & GIRDER DETAILS
S105	BRIDGE RAIL DETAILS
S106	BRIDGE DECK PANEL & DETAILS
S107	BRIDGE DRAIN DETAILS