TECHNICAL SPECIFICATIONS
FOR THE

LOWER ROUGE RIVER CANOE & KAYAK LAUNCH

CITY OF DEARBORN
WAYNE COUNTY, MICHIGAN

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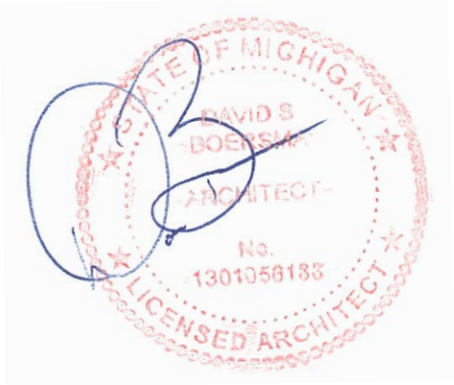

Plans Included

DPL-1131-01-13

Project I.D. Number: 126885SG2019

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SECTION 01 '0

SUMMARY OF W RK

1 PART 1 GENERAL

1.1. SECTION INCLUDES

A. Scope of Work

B. Contractor use of site and premises.

C. Owner occupancy.

D. Land Owner occupancy.

1.2. SCOPE OF WORK

A. The Contractor shall furnish all the labor, material and construction equipment and perform all the work for the construction of the Lower Rouge River Kayak/Canoe Docks as indicated on the drawings and described in the Specifications. The Contractor shall be responsible for the entire work until completed and accepted by the Owner.

B. Scope of Work includes:
   1. Concrete Path
   2. (2) Floating Docks w/ADA Kayak/Canoe Launch
   3. Heavy Stone Rip-Rap w/Natural Seeding and Native Plantings (bank stabilization)
   4. Pavement Markings
   5. Site Restoration and Clean Up
   6. River cleanup

1.3. CONTRACTOR USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:
   1. Owner occupancy.
   2. Use of site and premises by public.

B. Construction Operations: Limited to right-of-way limits and the immediate area of work as directed by the Engineer.

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

1 PART 1 GENERAL

1.1. SECTION INCLUDES

A. Application for Payment.

B. Change procedures.

1.2. RELATED SECTIONS

A. Agreement: Based on the unit prices bid per pay item as stated in the Proposal.

B. Document General Conditions.

C. Section 01300 – Submittals

D. Section 01600 – Material and Equipment.

1.3. APPLICATIONS FOR PAYMENT

A. Contractor will prepare progress payments in accordance with the schedule of values shown in the Agreement.

B. Format will follow the schedule of values bid in the proposal.

C. Submit invoices for stored materials.

D. Contractor shall submit waivers for each progress payment in accordance with the General Conditions.

E. Submit waivers for proof of payment to all subcontractors and suppliers utilized on the project prior to every progress payment after the first payment.

F. Payment will be subject to retainage as set forth in Public Act No. 524.

1.4. CHANGE PROCEDURES

A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by issuing supplemental instructions on a Field Order.

B. The Engineer may issue a Bulletin which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 10 days.

C. The Contractor may propose a change by submitting request for change to the Owner, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other Contractors. Document any requested substitutions in accordance with Section 01600. Material and equipment.

D. Stipulated Sum/Price Change Order: Based on Bulletin and Contractor's price quotation.

E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Work Directive Change: Engineer may issue a Work Directive Change signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.

H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

I. Change Order Forms: Spicer Group Change Order.

J. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.5. ALTERNATES

A. Coordinate related work and modify surrounding work as required.

B. Contractor shall be responsible for costs incurred by Owner for reviewing non-scheduled alternates.

END OF SECTION

SECTION 01028

CHANGE ORDER PROCEDURES

1 PART 1 GENERAL

1.1. SECTION INCLUDES

A. Submittals.

B. Documentation of change in Contract Price and Contract Time.

C. Change procedures.

D. Construction Change Authorization or Work Directive Change.

E. Stipulated Price change order.

F. Unit price change order.

G. Time and material change order.

H. Execution of change orders.

I. Correlation of Contractor submittals.

1.2. RELATED SECTIONS

A. Agreement Forms: Monetary values of established Unit Prices and percentage allowances for Contractor's overhead and profit.

B. General Conditions: Governing requirements for changes in the Work, in Contract Price, and Contract Time.

C. Section 01019 - Contract Considerations.

D. Section 01300 - Submittals.

E. Section 01600 - Material and Equipment: Product options and substitutions.

F. Section 01700 - Contract Closeout: Project Record Documents.

1.3. SUBMITTALS

A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Change Order Forms: See General Conditions.

1.4. DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.

C. On request, provide additional data to support computations:
1. Quantities of products, labor, and equipment.
2. Taxes, insurance and bonds.
3. Overhead and profit.
4. Justification for any change in Contract Time.
5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs, and for work done on a time and material basis, with additional information:
1. Origin and date of claim.
2. Dates and times work was performed, and by whom.
3. Time records and wage rates paid.
4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.5. CHANGE PROCEDURES

A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time as authorized by General Conditions Articles 10, 11 and 12 by issuing supplemental instructions on Field Order.

B. The Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 15 days.

C. The Contractor may propose a change by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.

1.6. CONSTRUCTION CHANGE AUTHORIZATION OR WORK DIRECTIVE CHANGE

A. Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. The document will describe changes in the Work, and will designate method of determining any change in Contract Price or Contract Time.

C. Promptly execute the change in Work.

1.7. STIPULATED PRICE CHANGE ORDER

A. Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Engineer.

1.8. UNIT PRICE CHANGE ORDER

A. For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis.

B. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Authorization or Work Directive Change.

C. Changes in Contract Price or Contract Time will be computed as specified for Time and Material Change Order.

1.9. TIME AND MATERIAL CHANGE ORDER

A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

B. Engineer will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.

C. Maintain detailed records of work done on Time and Material basis.

D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.10. EXECUTION OF CHANGE ORDERS

A. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.11. CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust time for other items of work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

1. PART 1 GENERAL

1.2 SECTION INCLUDES

A. Coordination.

B. Allowances: Construction Staking and Materials Testing

C. Alteration project procedures.

D. Cutting and patching.

E. Preconstruction conference.

1.3 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify Engineer of changes in construction schedule 48 hours prior to change.

C. Submit updated construction schedules with each progress payment submittal.

1.4 ALLOWANCES

A. MATERIALS TESTING

1. The Contractor will provided, through the Professional (Spicer Group), testing of materials. The following general classification of Work require testing and/or certificates of inspection:
   a. Backfilling for Compaction and Density
   b. Concrete Paving
   c. Concrete Path

B. CONSTRUCTION STAKING

1. Related Sections:
   a. General Conditions, Section 4.4
2. The Contractor will provide, through the Professional, reference points for construction and the Professional will be responsible for laying out (staking) the work. Staking by the Professional will be limited to the following:
   a. Marking the Control Points.
   b. Staking one side of the pathways with offsets.
   c. Staking the location of the parking lot with offsets.
   d. Staking the location of the viewing platform with offsets.
   e. Staking the location of the interpretive signs with offsets.
   f. Staking the proposed elevations with proposed cut/fill grades, based on the final grade.
   g. The contract allowance accounts for one (1) site visit to complete all necessary construction staking for this project.

3. Any additional staking requested beyond these limits will be at the Contractor's expense.
4. Contractor to locate and protect survey control, reference points and construction staked. Restaking will be at the Contractor's expense.
5. Coordinate schedule for staking three (3) days before staking is needed.

1.5 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in product Sections.

B. Remove cut and patch work in a manner to minimize damage and to provide a means of restoring products to specified condition.

C. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.

D. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.

E. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Engineer review and request instructions from Engineer.

F. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

G. Finish surfaces as specified in individual product Sections.

1.6 CUTTING AND PATCHING

A. Coordinate with Engineer 48 hours prior to cutting and patching.

B. Employ skilled and experienced installer to perform cutting and patching.

C. All bituminous surfaces shall be saw cut by the Contractor.

D. Submit written request in advance of cutting or altering elements which affects:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate contractor.

E. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.

F. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.

G. Cut rigid materials using masonry saw or core drill.

H. Restore Work with new products in accordance with requirements of Contract Documents.

I. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

K. Identify any hazardous substance or condition exposed during the Work to the Engineer for decision or remedy.

1.7 PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a conference after Notice of Award.

B. Attendance Required: Engineer, Owner and Contractor.

END OF SECTION

SECTION 01300

SUBMITTALS

1 PART 1 GENERAL

1.1. SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Shop drawings.

E. Product data.

F. Manufacturers' instructions.

G. Manufacturers' certificates.

1.2. RELATED SECTIONS

A. Section 01019 - Contract Considerations.

B. Section 01400 - Quality Control: Manufacturers' field services and reports.

C. Section 01700 - Contract Closeout.

1.3. SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Engineer. Coordinate submission of related items.

F. Identify variations from Contract Documents and Product or system limitations, which may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Engineer review stamps.

H. Revise and resubmit submittals as required, identify all changes made since previous submittal.

I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.4. CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within 15 days after date established in Notice to Proceed for Engineer and Owner review.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a horizontal bar chart with separate line for each major section of Work or operation, identifying first workday of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.5. PROPOSED PRODUCTS LIST

A. Within 5 days after Owner-Contractor agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6. PRODUCT DATA

A. Submit the number of copies, which the Contractor requires, plus two copies, which will be retained by the Engineer. The Engineer will review no more than eight copies.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.7. MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.8. MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturers' certificate to Engineer for review, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

END OF SECTION

SECTION 01400

QUALITY CONTROL

1 PART 1 GENERAL

1.1. SECTION INCLUDES

A. Quality assurance and control of installation.

B. References.

C. Field Samples.

D. Inspection and testing laboratory services.

1.2. RELATED SECTIONS

A. Section 01300 - Submittals: Submission of Manufacturers' Instructions and Certificates.

B. Section 01600 – Materials and Equipment: Requirements for material and product quality.

1.3. QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4. REFERENCES

A. Conform to reference standard by date of issue current on date of Contract Documents.

B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

D. Obtain copies of standards when required by Contract Documents.

1.5. FIELD SAMPLES

A. Acceptable samples represent a quality level for the Work.

1.6. INSPECTION AND TESTING LABORATORY SERVICES

A. Contractor will employ, and pay for services of the Engineer to perform inspection and testing.

B. The Engineer will perform inspections, tests, and other services specified in individual specification Sections and as required by the Owner.

C. Reports will be submitted by the Engineer to the Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

D. Cooperate with the Engineer and the Owner; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
   1. Notify Engineer 2 working days prior to expected time for operations requiring services.
   2. Make arrangements with Engineer and pay for additional samples and tests required for Contractor's use.

E. Retesting required because of non-conformance to specified requirements shall be performed by the same Engineer on instructions by the Owner. Payment for retesting will be charged to the Contractor.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Controls: Barriers, protection of the Work, and water control, soil erosion and sedimentation control.

B. Progress cleaning.

C. Removal of utilities, facilities, and control.

D. Temporary driveways.

1.2 RELATED SECTIONS

A. Section 01700 - Contract Closeout: Final cleaning.

B. Section 02274 - Soil Erosion And Sedimentation Control

1.3 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide protection for plant life designated to remain. Replace damaged plant life.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

D. Provide access to all adjacent buildings for use during construction.

1.4 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Trenches shall be dewatered to provide a stable base for structures and piping.

1.5 SOIL EROSION AND SEDIMENTATION CONTROL

A. Conform to Part 91 of Public Act 451 of 1994, relative to Soil Erosion and Sedimentation Control for the life of the project.

B. Minimize amount of bare soil exposed at one time.

C. Provide temporary measures such as berms, dikes, and drains to prevent sediment from entering adjacent waterways.

D. Do not deposit trash, debris, or sediment in tile or open drains.

E. Immediately repair trenches located within the traveled surface of roadways.

F. Landscape construction areas as soon as practical after work is complete according to Sections 02923 - Landscape Grading, 02936 - Seeding.

1.6 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Prohibit traffic from landscaped areas.

1.7 PROTECTION OF EXISTING

A. CALL "MISS-DIG" (1-800-482-7171) A MINIMUM OF THREE WORKING DAYS PRIOR TO CONSTRUCTION.

B. Protect landscaped areas. Damaged areas shall be replaced in kind.

C. Protect utilities encountered during the work. Replace or repair damaged utilities.

D. Protect drives, roadways, and sidewalks. Repair as required in following sections.

E. Protect trees, shrubs, and bushes:
   1. All trees outside of road right of way must be protected, sheet piled, tunneled and/or bored.
   2. Where trees, shrubs, and bushes are too large to be replaced in kind, the proposed utility shall be installed in a boring or tunneling operation unless written consent is given by the property owner for removal. Owner and Engineer shall each be given one copy of consent letters.
   3. Where requested by the Property Owner, timber from removed trees shall be cut into 6-foot lengths and stockpiled along the work or as specified in the consent letter.
   4. Proper disposal of removed trees or sections of removed trees not wanted by the property owner shall become the responsibility of the Contractor.
   5. Trees, shrubs, and bushes that are removed and replaced shall be transplanted by an established nursery.

F. Utilities must remain in service. If it becomes necessary to interrupt a utility service, the utility authority must be notified immediately and steps taken to restore temporary or permanent service as soon as possible.

G. Maintain outlets for drains. Provide temporary pumping if necessary.

H. Expose utility mains and services by hand in the trench.

1.8 PARKING

A. Arrange for surface parking areas to accommodate construction personnel.

B. When site space is not adequate, provide additional off site parking.

1.9 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Clean road surface daily to the Owner's and/or Engineer's satisfaction.

C. Complete leveling, remove excess material and debris and restore drainage not more than 1000 feet behind construction.

D. Remove waste materials, debris, and rubbish from site daily and dispose off-site.

1.10 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

D. A sufficient sum of money to remove and replace or repair any utilities damaged or relocated during the construction of the project shall be included in total contract amount.

1.11 TEMPORARY DRIVEWAY

A. Not used.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.2 RELATED SECTIONS

A. Document - Instructions to Bidders: Product options and substitution procedures.

B. Section 01400 - Quality Control: Product quality monitoring.

1.3 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer, for similar components.

1.4 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.5 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.7 SUBSTITUTIONS

A. Engineer will consider requests for Substitutions only within 5 days after date of Owner-Contractor Agreement.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the Substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Project record documents.

D. Operation and maintenance data.

E. Warranties.

F. Progress Payments.

G. Correction period.

1.2 RELATED SECTIONS

A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.

1.3 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Provide Consent of Surety and all Final Waivers.

1.4 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean site; sweep paved areas, rake clean landscaped surfaces.

C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

D. Landscape areas as required in documents.

E. Restore roads, driveways, parking areas, lawns, drainage, and other items disturbed during construction to original condition or as required by the documents.

1.5 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
   1. Contract Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other Modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract Drawings.

F. Submit documents to Engineer.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit final volumes revised, within ten days after final inspection.

1.7 WARRANTIES

A. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

B. Provide Table of Contents and assemble in three D size three ring binder with durable plastic cloth cover.

C. Submit prior to final payment.

D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.8 PROGRESS PAYMENTS

A. The Owner may request from the Contractor waivers for proof of payment to all subcontractors and suppliers utilized on this project prior to issuing payments.

B. The Owner may request from the Contractor a Sworn Statement listing all subcontractors and suppliers, their involvement with the project, their subcontracted amount, amount paid to date, and balance due prior to issuing payment.

C. Failure to provide this information may result in not receiving payments or payments not being issued in a timely manner.

1.9 CORRECTION PERIOD

A. For a period of one year from the date of final payment, promptly correct work or replace materials that are found to be defective.

END OF SECTION

SECTION 02110

SITE CLEARING

1. PART 1 GENERAL

1. 1 SECTION INCLUDES

A. Remove surface debris.

B. Clear site of plantings.

C. Remove trees and shrubs.

D. Remove root system of trees and shrubs.

E. Topsoil excavation.

1. 2 RELATED SECTIONS

A. Section 02211 - Rough Grading.

B. Section 02222 - Excavation.

C. Section 02923 - Landscape Grading.

1. 3 REGULATORY REQUIREMENTS

A. Conform to applicable code for disposal of debris.

B. Coordinate clearing Work with utility companies.

1. 4 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Site Clearing:
1. Basis of Measurement: Alternate Add bid for site clearing as stated in the proposal.
2. Basis of Payment: Includes all labor, equipment, and materials for clearing site, tree and root system removal, and loading and removing waste materials from site.

2. PART 2 EXECUTION

2. 1 PREPARATION

A. Verify that existing plant life within the clearing limits that is designated to remain, is tagged or identified.

2. 2 PROTECTION

A. Locate, identify, and protect utilities that remain, from damage.

B. Protect survey stakes.

C. Protect trees, plant growth, and features designated to remain, as final landscaping.

D. Protect bench marks and existing structures from damage or displacement.

2. 3 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Clear undergrowth and deadwood, without disturbing subsoil.

C. Clear to limits delineated by Engineer as shown on plans.

2. 4 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

B. Trees, shrubs, and bushes to be removed shall be done by falling the tree in sections, beginning from the top down and removing the stump and debris from the site.

C. The cost of removing trees, brush, and bushes and the cutting of timber and removing debris from the site shall be included in the unit price for cleanup of the project.

2. 5 TOPSOIL EXCAVATION

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

B. Stockpile in area designated on site as approved by the Engineer. Protect from erosion.

END OF SECTION

SECTION 02211

ROUGH GRADING

1 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 01400 - Quality Control Testing Laboratory Services.

B. Section 02923 - Landscape Grading: Finish grading with topsoil to contours.

1.3 REFERENCES

A. MDOT Standards.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01700 Contract Closeout.

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

1.6 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Rough Grading:
1. Basis of Measurement: The lump sum bid for Excavation and Rough Grading as stated in the proposal.
2. Basis of Payment: Includes all associated labor, equipment, and materials for excavation, fill, labor, materials, removing and stock piling topsoil, and grading required for rough grading to provide the required contours and/or return the disturbed areas back to the proposed elevations, as indicated on the plans, or to existing conditions.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil: Excavated material, graded, free of roots, rocks larger than 1 inch (25 mm), subsoil, debris, and large weeds.

B. Subsoil: Excavated material, graded, free of lumps larger than 6 inches (150 mm), rocks larger than 3 inches (75 mm), and debris.

C. Granular Fill: Type B specified in Section 02223 - Backfilling MDOT Class II for dry excavation. Type A specified in Section 02223 - MDOT 6A compacted crushed limestone for wet excavation.

D. Coarse Aggregate: Type A MDOT 6A compacted crushed limestone for wet excavation specified in Section 02223 - Backfilling.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01039 - Coordination and Meetings.

B. Verify that fill materials to be used are acceptable.

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. Notify utility company to remove and relocate utilities.

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

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

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

3.3 TOPSOIL EXCAVATION

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

B. Stockpile in area designated on site or as approved by the Engineer. Excess spoils and topsoil not being reused for this work will be removed from the site/

C. Do not excavate wet topsoil.

D. Stockpile topsoil for reuse on site to depth not exceeding 8 feet (2.5 m).

E. All stockpiles will have adequate Soil Erosion and Sedimentation Control (SESC) measures in place at all times.

3.4 SUBSOIL EXCAVATION

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

B. Stockpile in area designated on site or as approved by the Engineer.

C. Do not excavate wet subsoil.

D. 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. Granular Fill: Place and compact materials in continuous layers not exceeding 12 inches compacted depth, compacted to 95 percent.

C. Subsoil and Topsoil Fill: Place and compact material in continuous layers not exceeding 12 inches compacted depth, compacted to 95 percent.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from buildings and structures minimum 2 inches in 10 ft, unless noted otherwise.

F. Make grade changes gradual. Blend slope into level areas.

G. Remove surplus and unsuitable fill materials from site.

3.6 SPOIL LEVELING

A. The Owner may have a use for the surplus excess excavated material. If they do it shall be their property and the Contractor's responsibility to transport said material to the Owner's stockyard. All cost associated with transporting, hauling, and loading said material shall be included in other pay items of this project.

B. Contractor shall be responsible for loading and hauling of all excess excavated material generated from this project not wanted by the Owner to an approved landfill..

C. Place no excavated materials on roads without written permission of the authorities having jurisdiction of said road.

D. Place no spoils in a watercourse or drain.

3.7 TOLERANCES

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

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400 - Quality Control.
B. Tests and analysis of fill material will be performed in accordance with MDOT Standards and with Section 01400.
C. Compaction testing will be performed in accordance with MDOT Standards and with Section 01400.
D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
E. Frequency of Tests: As directed by the Engineer.

END OF SECTION

SECTION 02222

EXCAVATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation.

B. Restoration.

C. Hauling and disposal of material.

D. Other Structures.

1.2 RELATED SECTIONS

A. Section 02211 - Rough Grading.

B. Section 02223 - Backfilling.

C. Section 02110 - Site Clearing.

D. Document Section 01019 - Contract Considerations:

E. Section 01400 - Quality Control.

F. Section 01500 - Construction Facilities and Temporary Controls: Dewatering excavations and water control.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Excavation:
1. Basis of Measurement: Included in the lump sum price for Excavation and Rough Grading as stated in the proposal.

2. Basis of Payment: Includes all associated material, labor, and equipment necessary for the excavation, including hauling excess materials off site, required for a complete project.

2. PART 2 PRODUCTS

2.1 PREPARATION

A. Notify Engineer in accordance with Section 01039 - Coordination and Meetings.

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

C. Identify known underground, above ground, and aerial utilities, stake, and flag locations.

D. Notify utility company when specified to remove and relocate utilities.

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

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

G. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

H. Protect grade and slope stakes.

2.2 EXCAVATION

A. Clear site in accordance with Section 02110 - Site Clearing.

B. Excavate to the dimensions and cross sections specified on drawings.

C. Machine slope banks to required slopes.

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. Seed excavated areas daily in accordance with Section 02936 - Seeding.

G. Stockpile all excavated materials on site. All excavated material to be reused shall be stockpiled separately. Coordinate with the City of Frankenmuth. The City will haul all excess excavated material off site.

H. Match existing side slopes in reaches identified channel cleanout.

2.3 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. Provide for visual inspection of bearing surfaces.

C. Periodic field inspection will be performed.

2.4 PROTECTION

A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

C. Protect landscape areas, mailboxes, trees, lawns, etc. Any damage to these areas becomes the responsibility of the Contractor.

2.5 DUST CONTROL

A. The Contractor shall implement measures to minimize dust, especially near residents, upon the engineer's request.

B. The plan shall include but not be limited to the implementation of a combination of any or all of the following techniques as determined to be applicable to this project:
   1. Wet Suppression - How will water be applied? How often?
   2. Vehicle Speed Reduction - What will be the posted speed limit?

3. Surface Cleaning - How will this be done?
4. Traffic Control - Identify the main travel and haul roads.
5. Windbreaks - What types if any will be used?
6. Good Operating Practices - Name some good operating practices.

2.6 OTHER EXCAVATION

A. Underpin adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.

B. Grade top perimeter of excavation to prevent surface water from draining into excavation.

C. Provide, operate and maintain pumping equipment to keep excavation free of water.

D. Remove lumped subsoil, boulders, and rock.

E. Notify Owner's representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

F. In areas that are suspect and may require subgrade undercutting, notify Owner's representative immediately. Do not proceed until it is agreed subgrade undercutting is required and quantities can be documented.

G. Machine slope banks according to OSHA guidelines.

H. Correct unauthorized excavation at no extra cost to Owner.

I. Correct areas over-excavated by error in accordance with Section 02223 - Backfilling.

J. Excess excavation material is understood to mean the excess excavated and remaining after the required backfilling hereinbefore specified is completed. Such excess excavated material shall be loaded by the Contractor and trucked to approved disposal sites.

2.7 HAULING AND DISPOSAL OF MATERIAL AND DEBRIS

A. Contractor is responsible for identifying and disposing of spoils in acceptable locations in accordance with MDEQ requirements.

END OF SECTION

SECTION 02223

BACKFILLING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fill materials.

B. Backfilling.

C. Consolidation and compaction.

1.2 RELATED SECTIONS

A. Section 01400 - Quality Control.

1.3 REFERENCES

A. ANSI/ASTM C136 or ASTM 108 & 109 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. MDOT Density Control Handbook, 1991.

C. MDOT 1990 Specifications for Construction.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

1.5 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Backfilling:
   1. Basis of Measurement: Included in the lump sum price for the item being back filled.
   2. Basis of Payment: Includes all associated material, labor, and equipment necessary to backfill all material used for this project to the required density and contours.

2. PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Type A - Coarse Stone Fill: MDOT 6A - for wet excavation, excavation within open drain, refill for poor soil or over excavation in pipe trench, compacted to 95 percent of maximum density. A ballast type crushed limestone free of shale, clay, friable material, sand debris graded in accordance with ANSI/ASTM C136.

B. Type B - Granular Fill: MDOT Class II - for dry excavation and backfill around structure compacted to 95 percent of maximum density in accordance with MDOT standards.

C. Type C - Structural Fill: MDOT Class I - for lower area of excess excavation over 24", compacted to 97 percent of maximum density in accordance with MDOT standards.

D. Type D - Native Subsoil: Reused, free of gravel larger than 3 inch size, and debris,

backfill above bedding of pipe to subgrade in greenbelt area. Compacted to 90 percent of maximum density in accordance with MDOT standards. As approved by the Engineer.

E. Type E - Dense Aggregate: MDOT 22A crushed limestone for driveway and temporary patches on traveled surfaces compacted to 95 percent of maximum density in accordance with MDOT standards.

F. Type F - Coarse Stone Fill: MDOT 7A - for filling open drain over excavation. A ballast type crushed limestone compacted to 95% of maximum density in accordance with MDOT standards.

G. Type G - Flowable Fill (Fill Class C concrete) - for headwall, sheet piling repair, and culvert storm sewer back filling.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that fill materials to be used are acceptable.

B. Verify foundation and/or 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. Backfill with Type A fill (wet excavation) or Type B fill (dry excavation), and compact to density equal to or greater than requirements for subsequent backfill material.

C. Prior to placement of aggregate base course material at gravel paved areas, compact subsoil to 95 percent of its maximum dry density in accordance with MDOT standard requirements.

3.3 BACKFILLING

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

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Granular Fill: Place and machine compact materials with plate compactor in continuous layers not exceeding 6 inches compacted depth.

D. Native Fill: Place and machine compact material with plate compactor in continuous layers not exceeding 12 inches compacted depth.

E. Machine compact under springline of pipe with plate compactor or equivalent.

F. Employ a placement method that does not disturb or damage foundation perimeter drainage conduit in trenches.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Backfill against supported foundation walls. Do not backfill against unsupported

foundation walls.

I. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

J. Make grade changes gradual. Blend slope into level areas.

K. Remove surplus backfill materials from site.

L. Leave fill material stockpile areas completely free of excess fill materials.

M. Backfill wet excavation areas with Type A fill.

N. Backfill over excavation in open drain with Type F fill.

3.4 TOLERANCES

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

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400.

B. Compaction testing will be performed in accordance with MDOT standard requirements.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

D. Frequency of Tests: At the discretion of Engineer.

E. Proof roll compacted fill surfaces under slabs-on-grade.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01500.

B. Recompact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02231

AGGREGATE BASE COURSE

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 02211 - Rough Grading.

B. Section 02923 - Landscape Grading.

1.3 REFERENCES

A. ANSI/ASTM C117 - Test Method for Materials Finer than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing.

B. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

C. Test method for density of soil in place with loss by wash less than 15% - One Point Michigan Cone Test.

D. Test method for density of soil in place with loss by wash grater than 15% - One Point T-99 Test.

E. MDOT Standard Specifications for Construction.

F. ASTM D2992 - Test Methods of Density of Soil and Soil - Aggregate in Place by the Nuclear Method (Shallow Depth).

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

1.5 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Crushed Limestone Base, 22A, C.I.P., 8” depth:
   1. Basis of Measurement: Included in the lump sum bid price for Crushed Limestone Base, 22A, C.I.P., 8” depth as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, equipment and material necessary for excavation, material and installation, compaction (compacted in place) and grading in accordance with the plans and specifications.

B. Crushed Limestone Base, 22A, C.I.P., 4” depth:
   1. Basis of Measurement: Included in the lump sum bid price for Crushed Limestone Base, 22A, C.I.P., 4” depth as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, equipment and material necessary for excavation, material and installation, compaction (compacted in place) and grading in accordance with the plans and specifications.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Aggregate for base course: Type D, MDOT 22A compacted crushed limestone.

B. Subbase: Not used.

3 PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 AGGREGATE PLACEMENT

A. Spread aggregate to a total compacted thickness as shown on detail sheet.

B. Place aggregate in 1-12" layer and roller compact.

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

D. Compact placed aggregate materials to achieve compaction to 95 percent of its maximum dry density in accordance with MDOT Standard requirements.

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

F. 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. Field inspection and testing will be performed under provisions of Section 01400.

B. Gradation of Aggregate: In accordance with ASTM C136.

C. Compaction testing will be performed as specified.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

E. Frequency of Tests: At the discretion of Engineer.

END OF SECTION

SECTION 02271

SLOPE PROTECTION AND EROSION CONTROL

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stone rip-rap bank protection.

1.2 RELATED SECTIONS

A. Section 01500 - Construction Facilities and Temporary Controls.

B. Section 02211 - Rough Grading.

C. Section 02222 - Excavation.

D. Section 02223 - Backfilling.

E. Section 02279 - Filter Fabric.

F. Section 02923 - Landscape Grading.

G. Section 02936 - Seeding

1.3 REFERENCES

A. ASTM D-4595 - Test Method for geo-grid tensile strength.

B. Act No. 347, P.A. 1972 (as amended), Soil Erosion and Sedimentation Control Act.

C. Natural Crushed Stone Association (N.C.S.A.).

D. Michigan Department of Transportation: Standard Specifications for Construction.

1.4 MEASUREMENT AND PAYMENT

A. Bank Stabilization (Stone Rip-Rap and Natural Seeding):
   1. Basis of Measurement: At the lump sum price bid for Bank Stabilization, rip-rap stone and natural seeding, as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, equipment and material necessary for excavation, installation, stone, fabric, pins and materials as specified on the plans and/or determined by the Engineer.

B. Bank Stabilization (Stone Rip-Rap and Native Plantings):
   1. Basis of Measurement: At the lump sum price bid for Bank Stabilization, rip-rap stone and native plantings, as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, equipment and material necessary for excavation, installation, fabric, pins, geo-web, stone, and materials necessary for a complete project.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Heavy Rip-rap - Sound, tough, durable rock or crushed limestone free from structural defects. Material to be uniform in size and not less than 16 inches in the least dimension. MDOT 916.01.

B. Filter Fabric - In accordance with Section 02279 - Filter Fabric.

C. Geo-Web Fabric – BX 1200 Tensar Geo grid.

D. Metal Pins - Shall be those specified by the manufacturer to use with geo-grid netting and as approved by the Engineer.

E. Straw Mulch - 2" thickness of oat or wheat straw or an erosion control blanket that uses straw or straw/coconut mulch at the rate of 0.5 lbs. per sq. yd.

F. Native Plants – As identified by the Engineer.

3. PART 3 EXECUTION

3.1 PREPARATION

A. Implement temporary controls under provisions of Section 01500 - Temporary Controls.

3.2 EXECUTION

A. Grade and bank protection.

1. Over excavate protection area equal to the thickness of the protection.

2. Place filter fabric with all edges "toed in" a minimum of 12 inches.

3. Place protection on filter fabric.

4. Tamp protection until individual pieces are firmly bedded.

END OF SECTION

SECTION 02274

SOIL EROSION PREVENTION AND SEDIMENTATION CONTROL

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. System Description.

B. Quality Assurance.

C. Regulatory Requirements.

D. Method of Payment.

1.2 SYSTEM DESCRIPTION

A. Methods of control are identified on Drawings by numbers corresponding to the Michigan Department of Management and Budget keying system for soil erosion and sedimentation control.

B. The notation “T” or “P” following the number (as shown on the drawings) indicates whether the control measure is temporary or permanent.

C. Additional control measures shall be employed as required by site conditions and applicable enforcing agency having project jurisdiction.

1.3 UNIT PRICE – BASIS OF MEASUREMENT

A. Soil Erosion and Sedimentation Control:
   1. Basis of Measurement: At the lump sum bid price for Soil Erosion & Sedimentation Control Measures, as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials and equipment required for soil erosion prevention and sedimentation control required for this project and removal of any temporary measures when the site is stabilized.

1.4 QUALITY ASSURANCE

A. Perform and maintain work in accordance with the Soil Erosion and Sedimentation Control Part 91 of Act 451 of 1994, as amended, and corresponding rules of the Michigan Department of Natural Resources.

1.5 REGULATORY REQUIREMENTS

A. Contractor shall obtain permit and pay fees for plan review, inspection and bonding as required by applicable enforcing agency having jurisdiction.

B. Submit installation time schedule for temporary and permanent soil erosion and sedimentation control measures to applicable enforcing agency having jurisdiction, as well as to Engineer. Make submittals prior to start of construction.

1.6 METHOD OF PAYMENT

A. All fees require by applicable enforcing agency shall be paid as stated in the proposal.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. In accordance with standards and specifications for soil erosion and sediment control with approved plans and requirements of applicable enforcing agency.

3. PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

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

B. Field locate known utility locations. Notify Engineer of conflicts and attain removal or relocation instructions prior to continuing installation activities.

C. Maintain and protect existing utilities to remain.

3.2 PROTECTION OF ADJACENT WORK

A. Protect adjacent structures and property which may be damaged by execution of work.

B. Protect existing trees, shrubs, landscaping and lawn areas designated to remain.

3.3 INSTALLATION AND MAINTENANCE

A. Construct soil erosion and sedimentation control measures in accordance with approved plans and requirements of applicable enforcing agency.

B. Schedule planned control measures with construction operations to limit the area of any disturbed land to the shortest possible period of exposure.

C. Conduct earth changes to effectively reduce accelerated soil erosion and resulting sedimentation.

D. Remove sediment from runoff water before it leaves the site.

E. Inspect, maintain and repair temporary control measures until permanent control measures are implemented.

F. Maintain permanent control measures until final acceptance by Owner.

G. Install silt fences around catchbasin inlets, to be removed after final inspection of the project.

3.4 SOIL EROSION PREVENTION AND SEDIMENTATION CONTROL MEASURES

A. Permanent and minimum temporary control measures as scheduled on Drawings.

B. Additional temporary measures (over and above those scheduled on Drawings) due to site grading/construction activities that in any way differ from that shown on Drawings.

END OF SECTION

SECTION 02279

FILTER FABRIC

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Filter fabric for plain rip-rap bank and grade protection.

B. Filter fabric for heavy rip-rap bank and grade protection.

1.2 RELATED SECTIONS

A. Section 02271 - Slope Protection and Erosion Control.

1.3 REFERENCES

A. ASTM D-4632 - Test method for Tensile Strength and Elongation.

B. ASTM D-3787 - Test method for Mullen Burst.

C. ASTM D-4533 - Test method for Trapezoidal Tear Strength.

D. ASTM D-3787 - Test method for Puncture Strength.

E. ASTM D-4751 - Test method for Apparent Opening Size.

F. ASTM D-4491 - Test method for Coefficient of Permeability.

1.4 MEASUREMENT AND PAYMENT

A. Filter Fabric:
   1. Basis of Measurement: Included in lump sum price bid for the item the fabric is being installed with.
   2. Basis of Payment: Includes all associated labor, material round equipment and material necessary for excavation, installations, fabric, pins, and materials as specified on the plans and/or determined by the Engineer.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Mechanically-bonded, non-woven, long-chain polymetric fibers or yarns.
   1. Filter fabric for groundwater infiltration (french drains, trench drains, pipe joint wrap, bag rip-rap headwalls, etc.) shall have, at minimum, the following properties:

Tensile Strength	100 lbs
Tensile Elongation (max)	100 %
Mullen Burst	210 psi
Trapezoidal Tear Strength	40 lbs
Puncture Strength	65 lbs
Apparent Opening Size (max)	0.210 mm
Coef. of Permeability	0.15 cm/sec

2. Filter fabric for cobblestone grade and bank protection shall have, at minimum, the following properties:

Tensile Strength	120 lbs
Tensile Elongation (max)	100 %
Mullen Burst	230 psi
Trapezoidal Tear Strength	45 lbs
Puncture Strength	70 lbs
Apparent Opening Size (max)	0.210 mm
Coef. of Permeability	0.15 cm/sec

3. Filter fabric for plain rip-rap grade and bank protection shall have, at minimum, the following properties:

Tensile Strength	155 lbs
Tensile Elongation (max)	100 %
Mullen Burst	315 psi
Trapezoidal Tear Strength	65 lbs
Puncture Strength	95 lbs
Apparent Opening Size (max)	0.210 mm
Coef. of Permeability	0.15 cm/sec
Open Area	

4. Filter fabric for heavy rip-rap grade and bank protection is to have, at minimum, the following properties:

Tensile Strength	200 lbs
Tensile Elongation (max)	100 %
Mullen Burst	350 psi
Trapezoidal Tear Strength	75 lbs
Puncture Strength	100 lbs
Apparent Opening Size (max)	0.210 mm
Coef. of Permeability	0.15 cm/sec
Open Area	

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify the correct fabric is specified for the specific use.

B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Remove large stones or other debris which could damage the filter fabric.

3.3 STORAGE

A. All geotextile material shall be stored in a wrap that protects it from ultraviolet radiation and abrasion.

3.4 INSTALLATION

A. Install according to manufacture's instructions.

B. All joints/overlaps in material shall be a minimum of 12 inches.

C. Repair damaged material by placing a piece of fabric that is sufficiently large to cover the damaged area plus 2 feet of adjacent undamaged geotextile in all directions.

D. Finish according to specific use requirements.

END OF SECTION

SECTION 02762

PAVEMENT MARKINGS

1 PART 1 GENERAL

1.1 WORK INCLUDED

A. Surface preparation.

B. Surface Finish.

1.2 REFERENCES

A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Laquer, and Related Products.

B. TTP 115 Type I Federal Specifications.

1.3 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.4 QUALITY ASSURANCE

A. Product Manufacturer: As listed on the M.D.O.T. qualified product list.

B. Applicator: Company specializing in commercial painting and finishing 5 years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/fuel/smoke M.D.O.T. 2012 Standard Specifications for Construction.

1.6 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Pavement Markings:
   1. Basis of Measurement: At the lump sum bid price for Striping and Signage as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials and equipment, and all appurtenances for a complete installation.

2 PART 2 PRODUCTS

2.1 REGULAR DRY PAVEMENT MARKING PAINT IS SPECIFIED FOR THIS PROJECT UNLESS DIRECTED OTHERWISE BY THE ENGINEER.

2.2 M.D.O.T. PREQUALIFIED MANUFACTURERS - PAINT FOR PAVEMENT MARKINGS

A. Pavement Markings (Permanent Marking)
1. Liquid Pavement Marking Materials
a. * Regular Dry Solvent *

BP-5748	BP-5747	BP-10189	Baltimore Paint (Sherwin Williams)
CL-0036	CL-0037	CL-4071	Center Line Industries

B. Substitutions: Under provisions of Section 01600.

2.3 PAVEMENT MARKINGS

A. As shown on drawings.

3 PART 3 EXECUTION

3.1 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer and M.D.O.T. 2012 Standard Specification for Construction.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Beginning of installation means acceptance of existing surfaces.

3.2 PREPARATION

A. Correct minor defects and clean surfaces which affect work of this Section.

B. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

C. Concrete or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.

3.3 PROTECTION

A. Protect elements surrounding the work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this Section.

3.4 APPLICATION

A. Apply products in accordance with manufacturer's instructions and M.D.O.T. Standards.

B. Apply no sooner than 14 days after the bituminous wearing surface has been placed.

C. Do not apply finishes to surfaces that are not dry.

D. Apply each coat to uniform finish.

END OF SECTION

SECTION 02870

SITE FURNISHINGS

1. PART 1 GENERAL

1.1 SCOPE

A. This section covers furnishing and installing all items of site furnishings or amenities, including interpretive signs, floating dock with kayak/canoe launch, and bollards as shown on drawings, as herein specified and/or as required for a complete job.

1.2 RELATED SECTIONS

A. Section 01300 – Submittals.

B. Section 03300 – Cast-In-Place Concrete.

1.3 MEASUREMENT AND PAYMENT

A. Floating Dock w/ ADA Kayak/Canoe Launch and Gangway:
   1. Basis of Measurement: At the lump sum price bid for Floating Dock, as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials and equipment for a complete installation. Includes floating dock, ADA launch, gangway, stiff arm, sleeves, pipes, sockets, hinges, brackets, attachments, tools, security curbing, adaptors, hardware, shoreline anchors and cables, and other necessary appurtenances for a complete installation.

B. Folding Bollard (1):
   1. Basis of Measurement: At the lump sum price bid for Folding Bollard as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials and equipment for all bollards, including concrete footings, concrete slab, anchor hardware, primer and finish paint, and all appurtenances for a complete installation, per details as shown on the plans.

2. PART 2 PRODUCTS

2.1 MATERIAL

A. Interpretive Sign (2 total): Refer to drawings for locations and details.
   1. Sign must be constructed using DuraReader as produced by Envirosigns, Itd, 9570 Fulton Road, Marshallville, OH 44645 or approved equal supplying an equivalent digital high pressure laminate (dHPL) phenolic sign panel.
   2. 100% post-consumer recycled core.
   3. UV resistant.
   4. Graffiti resistant.
   5. Abrasion resistant.
   6. Burn resistant.
   7. Recyclable.
   8. Shatterproof.
   9. Will not delaminate.
   10. True, solid, double-sided panels.

11. 10 year limited warranty.
12. Size of sign shall be 24” x 36” and be one solid piece.
13. Frames: Frames shall be Traditional Low Profile Exhibit Base. Frames shall be designed to National Park Service standards. Frame size shall be 28” x 40” on 2”x6” posts positioned at an angle of 30 degrees. The top rail of the frame shall be removable for easy panel cleaning and maintenance. Frame posts and rails shall be constructed from highly durable extruded aluminum with up to 10% post-industrial recycled aluminum. Color by owner.

B. Floating Dock w/ ADA Kayak/Canoe Launch and Gangway: Refer to attached drawings for details and plan set for location and installation details.
1. Manufacturer: EZ Dock OIM, 1382 East Caro Road, Caro, MI 48723, (800) 252-4448, or approved equal.

C. Folding Bollard:
1. Folding Bollard: TrafficGuard, 877-727-7347, model HRP, round post 36” tall with 4” clearance height in down position, or approved equal. Include locking device and reflective end markers. Color to be standard yellow. See drawings for details.

3. PART 3 EXECUTION

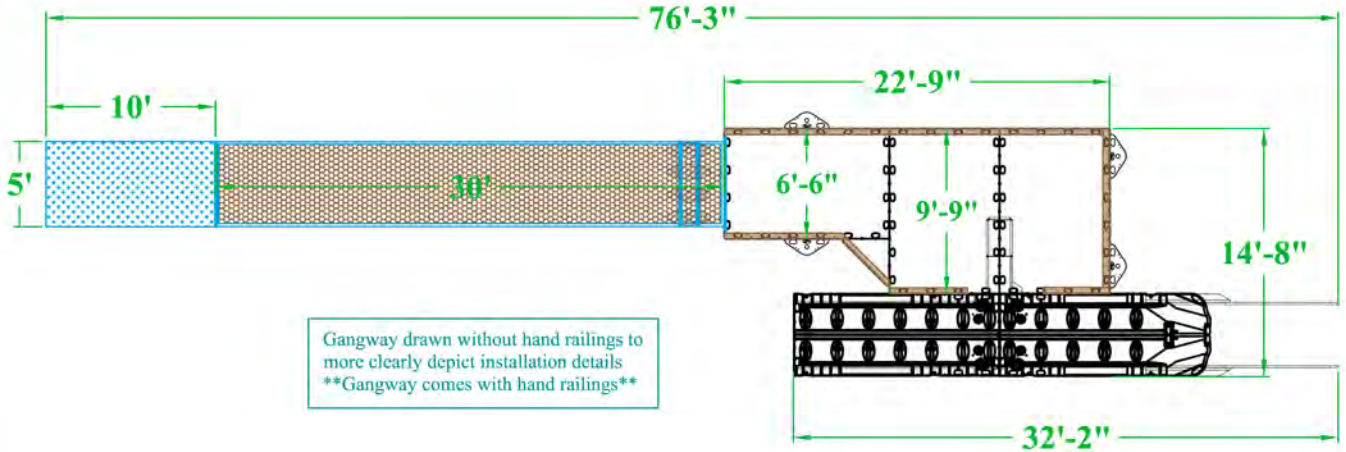
3.1 INSTALLATION

A. The contractor shall be responsible for any assembly requirements and installation of site furnishings including concrete footings. Assemble and install per manufacturer’s instructions.

END OF SECTION

Dock Live Load of 62.5 lbs/sqft

MADE IN USA



Gangway drawn without hand railings to more clearly depict installation details
Gangway comes with hand railings

Location of the Supplemental Float Pod Bracket may need adjustment by the installer to achieve balanced floatation of the dock system

NOTICE! Read EZ Dock Limited Warranty carefully. Among other things, EZ Dock does not warrant damages, failures or defects caused by unauthorized modification of EZ Dock Product, *and/or* unauthorized attachment *to/of* EZ Dock Product.

Qty	Description	Part No.	Qty	Description	Part No.
1	CORNER GUSSET	300501	1	5' TRANS. PLATE UNIVERSAL ACCESS	GL.60.TP.UA
4	AUGER KIT FOR 2.5" O.D. PIPE	100255	2	COUPLER DRIVE SOCKET	900005
1	GANGWAY COMPOSITE SKID	GL-GCS-5	1	KIT, EZ ONE WAY RIGHT W/PORTS	500960R
4	SUPPLEMENTAL FLOAT POD	208110	4	2-3/8" x 18' GALV. PIPE 10GA	118025
1	5' FLOAT POD ATTACHMENT BRKT.	GL-FPB-5	4	GALV. STEEL PIPE CAP 2-3/8"	100026
1	5' GANGWAY TO FLOAT HINGE 4PKT	GL-80-FHD	1	LAUNCH TO DOCK ADAPTER	100757SS
42	PHILLIPS HEAD SCREW	80530SS	10	COUPLER SET	301100
7	SECURITY CURBING	35116	4	HEAVY DUTY PIPE BRKT. 2.5"	215250
3	80" x 120" DOCK SECTION	208010	1	5' x 30' H.D. GANGWAY W/RAILS	GL-6030-HD
1	COUPLER IN-WATER INSTALL TOOL	9000010SS	1	ADA BENCH	5008900

Bill of Materials

Ford Field Dearborn

PREPARED FOR: **OIM**

DRAWING NUMBER: **EZ.Ford.Field.Dearb.1**

DRAWN BY: **JMW** | DATE: **5/9/19**

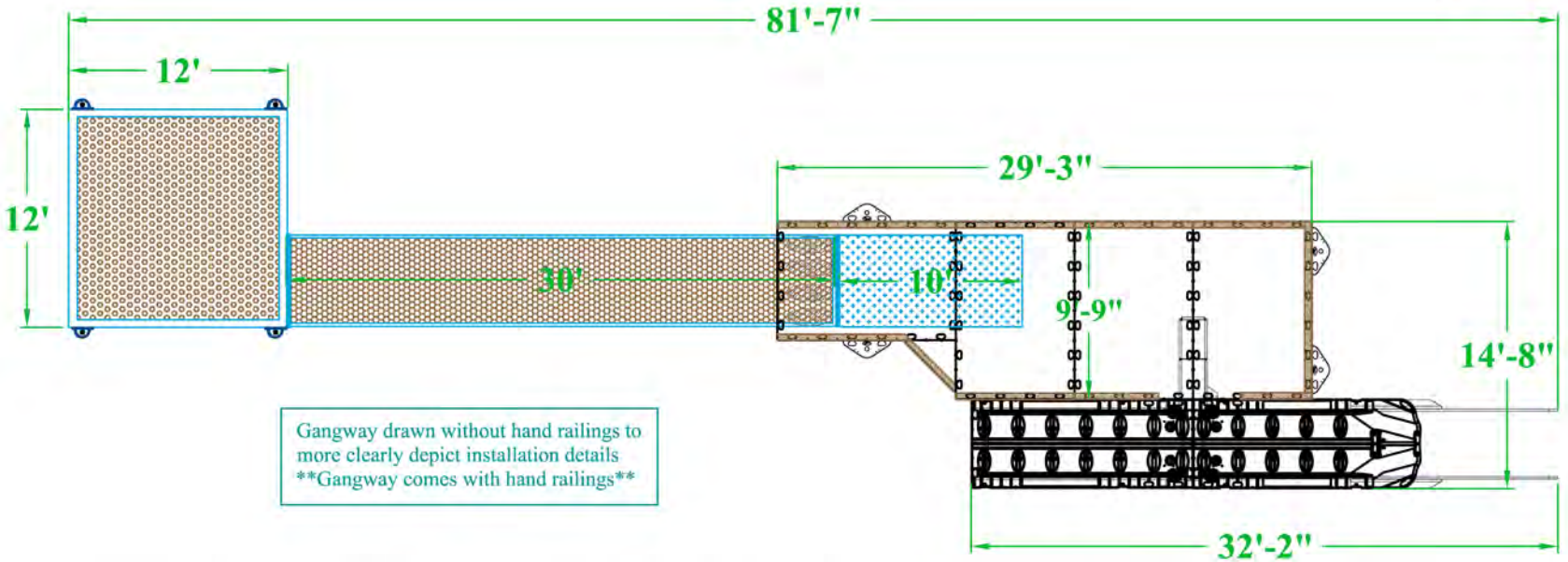
EZ Dock, Inc

878 Highway 60
Monett, MO 65708

TOLL FREE NO. **1-800-654-8168**
PHONE NO. **(417) 235-2223**
FAX NO. **(417) 235-2232**

Dock Live Load of 62.5 lbs/sqft

MADE IN USA



Gangway drawn without hand railings to more clearly depict installation details
Gangway comes with hand railings

Qty	Description	Part No.	Qty	Description	Part No.
1	CORNER GUSSET	300501	2	2-3/8" x 12' GALV. PIPE 10GA	112025
8	AUGER KIT FOR 2.5" PIPE	100255	4	2-3/8" x 16' GALV. PIPE 10GA	116025
1	GANGWAY COMPOSITE SKID	GL-GCS-5	8	GALV. STEEL PIPE CAP 2-3/8"	100026
4	SUPPLEMENTAL FLOAT POD	208110	1	LAUNCH TO DOCK ADAPTER	100757SS
1	5' GANGWAY TO SHORE ABUTMENT	GL-60-SHD	2	2-3/8" x 6' GALV. PIPE 10GA	106025
54	PHILLIPS HEAD SCREW	80530SS	18	COUPLER SET	301100
9	SECURITY CURBING	35116	1	5' x 10' ALUMINUM WEAR PLATE	GL.60x10.WP
4	80" x 120" DOCK SECTION	208010	4	H.D. 2.5" PIPE BRACKET	215250
1	COUPLER IN-WATER INSTALL TOOL	9000010SS	1	5' x 30' H.D. GANGWAY W/RAILS	GL-6030-HD
1	5'x10' TRANSITION PLATE UA	GL.60.TP.UA	1	ADA BENCH	500890
2	COUPLER DRIVE SOCKET	900005	1	12' x 12' HEAVY DUTY PLATFORM	CUSTOM
1	KIT, EZ ONE WAY RIGHT W/PORTS	500960R			

Bill of Materials

Supplemental Float pod locations may need to be adjusted by the installer to achieve balanced floatation of the dock system

NOTICE! Read EZ Dock Limited Warranty carefully. Among other things, EZ Dock does not warrant damages, failures or defects caused by unauthorized modification of EZ Dock Product, *and/or* unauthorized attachment *to/of* EZ Dock Product.

Dearborn Hills Golf Course

PREPARED FOR: **OIM**

DRAWING NUMBER: **EZ.Dearborn.Golf.1**

DRAWN BY: **JMW** DATE: **5/9/19**

EZ Dock, Inc

878 Highway 60
Monett, MO 65708

TOLL FREE NO. **1-800-654-8168**
PHONE NO. **(417) 235-2223**
FAX NO. **(417) 235-2232**

EZ Dock Product Specifications

EZ Dock General Specifications *(Revision 09-03-09)*

1. Float and Deck Design Standard

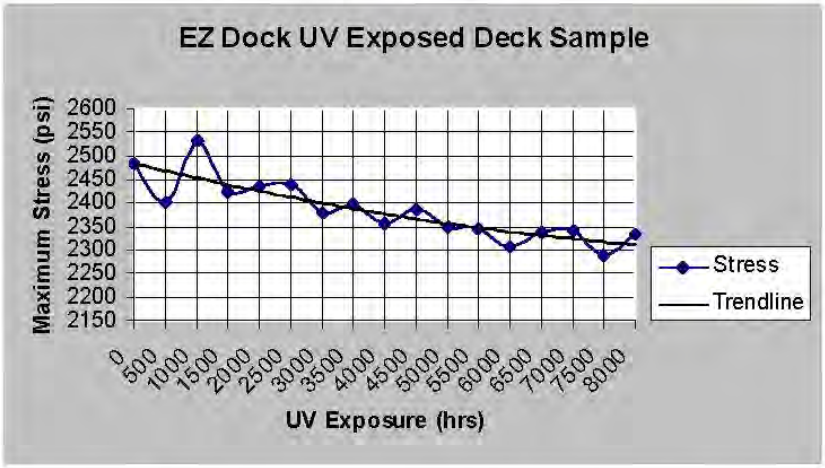
1.0 The individual dock section shall consist of decking surface and the float structure, which are to be constructed as a single, integrated component. Each section shall provide for the support of the dead load plus a specified live load of **62.5 pounds per square foot** (lb/ft^2). This shall be accomplished without the use of foam for either structural integrity or floatation. The dock sections shall be manufactured by a rotational molding process and each dock section shall be subject to the specific parameters of the particular model.

1.1 The individual dock section shall consist of a specified number of interior, air filler pylons. These pylons shall provide for flotation in the event of a breach of an exterior wall of the dock section; as well as the structural support for the deck portion of the float. Each pylon shall support the dead load plus a live load of 55 pounds (lb) The volume of each pylon shall be no less that 1540 cubic inches (in^3).

1.2 The individual dock sections shall be constructed of the following materials with the following general properties:

a. Virgin Polymer, Thermoplastic, Rotational Molding Grade **Linear Low Density Polyethylene-** (LLDPE)

b. An ultraviolet inhibitor system (UV-8) or better spectrometer specification. Laboratory testing conducted for 8000 hours yielded a 6.5% decrease in mechanical properties. The chart to the right shows the UV degradation trend line in relationship to mechanical property decrease over time. After the first 8000 hours the rate of decay is reduced significantly. Theoretical data indicated that the period of time between 8000 and 16000 hours yields an additional 0.7% decrease in mechanical properties.



(Real life scenario- 8000 hours of UV exposure can be related to approximately 9 years and 16000 hours related to 18 years of outdoor usage in southern Florida. These results show that a life expectancy in excess of 30-40 years is attainable.

c. A standard color of beige (or optional other) colorant in accordance with rotomolding standards.

d. The **density** of the section shall be approximately .932 grams per cubic centimeter (g/cm^3) or .0338 pounds per cubic inch (lbs/in^3) , per ASTM 792-00.

e. The dock section shall have a cold **brittleness** temperature equal to, or less than, -130° Fahrenheit (F), per ASTM D-746.

1.3 The properties of the exterior **wall thickness** of the dock sections shall be as follows:

a. The mean exterior material thickness shall be no less that .310 inches (in).

b. The corners shall be no less than .650 inches (in).

c. The exterior edge thickness shall be no less than 0.50 inches (in) at any particular point.

d. The walls of the dock sections shall resist a **shear** of no less that 1900 pounds per square inch (lb/in^2), per ASTM D-732, as well as having the capability of resisting a minimum **impact** of no less than 220 foot pounds (ft-lb), per ASTM D5420.

e. The **tensile strength** at failure shall be no less that 2630 pounds per square inch (lb/in^2) with 12 **elongation** at yield, per ASTM D-638.

1.4 The decking surface shall be composed of a textured or "orange peel" surface with a grid pattern for added adhesion during dry conditions. Drainage of the decking surface shall be accomplished through the use of troughs, which shall have a width of no more than 0.5 inches (in) and a depth of no more than 0.5 inches (in). The drainage troughs shall extend over the width of the dock and shall be positioned at intervals of no less that 4.5 inches (in) and no greater than 6.5 inches (in) over the entire length of the deck

a. The deck shall have an approximate **coefficient of friction** equal to 0.35 during dry conditions and 0.61 during wet conditions. Simply put, the decking surface is 37% less slick when wet than when dry per ASTM D2394.

b. The properties of the decking surface shall be as follows:

c. The mean deck thickness shall be no less that 0.315 inches (in).

d. The deck thickness shall be no less than 0.290 inches (in) at any particular point.

e. The deck shall resist a punching shear which is no less that 1900 pounds per square inch (lb/in^2), per ASTM D-732.

f. The deck shall resist a minimum impact of no less that 120 foot pounds (ft-lb) near the center, or at the point where the deck is thinnest, per ASTM D-3029.

g. The deck shall resist a minimum impact of no less that 150 foot pounds (ft-lb) within 16 inches (in) of the outside of the dock, per ASTM D-3029.

2. Floating Dock Structure

2.0 The dock structure, as a whole, shall consist of the individual sections, which are to be coupled together in the specific configuration desired by the purchaser. Any material used in the dock structure shall provide for resistance to rust, corrosion, and the effects of any fuel or gasoline. All material designed and selected for marine environment and the conditions there of.

2.1 A 2-D or 3-D layout drawing of the final configuration, including any accessories, shall be supplied for the purchaser if desired. Recommendations for anchorage can also be provided.

2.2 The dock structure shall act as one unit when assembled, so that wave and/or wind action shall produce a minimum amount of motion. The structure shall be secured with either piles, spuds, bottom anchors, or stiff arms. The securing shall allow the structure to rise and fall freely with any water level changes and allow the structure to span waves from crest to crest, while providing a stable walking surface.

3. Connections of Dock Sections

3.0 Each dock section shall have molded-in female-type pockets spaced symmetrically along the top and bottom edges, around the entire perimeter of the dock section. These pockets shall be spaced at 19.5 inch (in) intervals, center line to center line, from each other. *All un-used pockets are to be filled with supplied EZ Dock pocket filler (PN # 201030).*

3.1 The molded-in female-type pockets shall accept a male-type coupler which shall be secured into the female pocket with the use of a 0.5 inch (in) X 13 inch (in) coupler bolt and nut.

3.2 The purpose of such connections is to provide for simple assembly and disassembly, as well as providing for the securing of one section to another. The connection will also provide for the ability to attach EZ Dock accessories to the dock sections.

3.3 Each connection point shall allow for some slippage in the event that an extreme stress is applied. This slippage will allow for disconnection without causing damage either to the male-type couplers or the female-type pockets.

3.4 The dock sections shall be connected at increments of 19.5 inches (in), in relation to each other. These connections may be made from any one side of any dock section to any other side of another dock section. These connections may also be used to connect dock sections of differing dimensions and shall provide for ease of assembly, whether the sections are to be assembled on land or in the water.

3.5 The male-type coupler shall be constructed of no less than 90% post/pre-consumer recycled tire rubber.

3.6 Each male-type coupler shall withstand a pullout force of no less than 2500 pounds (lb) before failure of coupler occurs.

3.7 Each of the molded in female connection pockets shall provide for a pullout strength of no less than 3500 pounds (lb), before damage is caused to the dock section.

3.8 The accessories shall be connected to the dock system through the use of molded in coupler pockets around the perimeter of the dock sections by the use of either male or female type half-couplers. The male-type half-coupler (hardware connector, PN # S21140SS) shall have a 3.625 inch "T"–bolt embedded within it. The female type half-coupler (hardware connector, PN # S21141SS) shall have a 3.625 inch "T"–nut embedded within it Both types of half-coupler shall withstand a pullout force of no less that 2600 pounds (lb) before failure occurs.

4. Cleats

4.0 The tie up cleats shall be constructed of nylon 6,6 and shall have a length of 8-1/16 inches (in) and a height of 1-1/2 inches (in). The cleats shall be connected to the dock sections by two 5/16 inch (in) stainless steel bolts that are threaded into two stainless steel "T" nuts which are molded directly into the dock section. Each of the "T" nuts shall provide for a pull out force of no less that 2000 pounds (lb), so that the cleat may withstand a force of no less that 4000 pounds (lb).

4.1 T-nuts shall be molded in the dock sections in sets of two, with the distance between the two "T" nuts being 2-1/4 inches (in).

4.2 There shall be three sets of "T" nuts placed along the length of each side of the dock section. The sets of "T" nuts shall be placed at equal distances between the first and second pockets, between the third and fourth pockets, and between the fifth and sixth pockets, along both sides of the dock section.

4.3 There shall be one set of "T" nuts at one end of the 40 inch (in) wide dock section placed at equal distances between the two pockets.

4.4 There shall be two sets of "T" nuts at one end of the 60 inch (in) wide dock section placed at equal distances between the three pockets.

4.5 There shall be two sets of "T" nuts at both ends of the 80 inch (in) wide dock section. These "T" nuts shall be places at equal distance between the first and second pockets, and between the third and fourth pockets.

5. Anchorage

5.0 The dock system shall be designed to allow for the use of piling of various sizes, spud pipes, cables, or chains attached to a bottom anchor, or stiff-arm attachments for anchorage. Calculations can be supplied at purchaser's request to support designed anchorage with the assumption that all collected data is accurate. Calculations, permitting, and licensed engineering design available at customers expense.

6. Hand Railing Attachment

6.0 The dock structure shall have the ability to accept railing which is constructed to meet the standards established by the Americans with Disabilities Act (ADA), States Organization for Boating Access (SOBA) and the National Uniform Building Code (NUBC). The railing shall be constructed of 1.5 inch (in) O. D., 14 gauge steel tubing. The steel tubing shall be finished either by a 0.003 inch (in) Hot-Dip Galvanizing or by powder coating painting process.

7. Gangways and Access

7.0 All construction is to be accordance with the minimum provisions of States Organizations for Boating Access (SOBA) and the guidelines stated by, "Marinas and Small Craft Harbors". Gangways will be offered in several different material options but the offerings for loads, handrails, guardrails, transition plates, float mounts, shore mounts, and general designs will remain constant. Environmental conditions will influence the accessibility. Design layouts and advice can be supplied at request.

7.1 Gangways and Access Ramps shall be designed to support 90 pounds per linear foot (lbs/ftln). The deck and structural components shall be designed to support a concentrated load of 400 applied to any 12 inch X 12inch square. Lateral designed wind loads shall not exceed 77MPH.

7.2 Handrails shall be continuous along both sides of the of the walking surface and shall extend 12 inch past the walking surface on both ends. The top rail portion shall not be less than 34 inches nor more than 38 inches above the walking surface. The ends of the handrails shall be returned into the handrail body or terminate with no sharp or catching edges. The mounting and components of the handrails shall be capable of withstanding a lateral load of 50 pounds per linear foot.

7.3 Decking shall be per project specification and be skid resistant and made from marine grade appropriate materials.

8. Main Docks

8.0 The main docks are the walkways which are subjected to the most amount of traffic. These should be designed to provide for comfortable and easy walking widths. Design of the dock system for such things as pumps, power supplies, storage boxes, etc. to be attached to them, the overall width of the dock sections should have a minimum width of 60 inch (in) wide This will provide ample width for pedestrian traffic.

9. Finger Docks

9.0 The finger widths should be designed to allow for safe and comfortable walking widths. For boat or vessel mooring, a 40 inch (in) wide dock is sufficient to provide for finger stability as well as pedestrian safety for finger lengths up to 20 feet (ft) long. If the length of the finger exceeds 20 feet (ft) long, the 60 inch (in) or 80 inch (in) wide docks should be strongly considered.

10. Wind Exposure

10.0 Boat Profile Height – According to the American Society of Civil Engineers (ASCE) manual published in 1969, for the average height profile compared to the length of the boat, the following will apply.

- For a 10 foot (ft) long boat:
  ASCE average height is 3 feet (ft).
  For future considerations, will assume average heights up to 6 feet (ft).
- For a 20 foot (ft) long boat:
  ASCE average height is 3.5 feet (ft).
  For future considerations, will assume average heights up to 7 feet (ft).
- For a 25 foot (ft) long boat:
  ASCE average height is 3.6 feet (ft).
  For future considerations: will assume average heights up to 7.2 feet (ft).
- For all calculations done using the average boat profile heights, it will be considered that 100% of the boats using the dock will be twice the ASCE average profile.

10.1 Maximum Wind Exposure – From studies it has shown that forces caused by the maximum wind exposure comes from an angle to the boat, instead of directly to the side or to the front of the boat. Due to the non-feasibility of designing a dock system to handle a maximum tornado wind gust, it is suggested that a reasonable wind speed should be chosen. According to the design standards set up by the

Army Corps of Engineers, the dock system should be designed to withstand wind speeds of up to 77 miles per hour (mph) or 15 pounds per square foot (lb/ft^2).

10.2 Hidden Boats – It is a common practice to use load factors of 10% to 15% for each hidden boat affected by wind force. That is, every boat that is shielded by another boat, either in front of, or on the side of, will have a decrease in the amount of force which is applied to that boat due to the affect of the shielding boat. The use of a force factor of 15% per hidden boat shall be used in any calculations.

10.3 Load From Various Directions – In the designing of the boat dock system, if piles are to be used as the means of support, it is necessary to take into account the force being applied in the direction of the maximum wind exposure only. However; if chains, cables, or deadweights are to be used as the means of support, it would be necessary to take into account the wind exposure from all directions, when designing the dock system.

11. Load Design

11.0 **Dead Load**

a. The dead load shall consist of the entire dock system plus any additional attachments to the dock system.
b. Each dock section, without additional attachments, shall provide a **freeboard** of approximately 12.75" inches (in).
c. The surfaces of adjacent deck surfaces shall have an elevation difference of no more than 0.125 inches (in).
d. The ends of the fingers shall have an elevation of no more that 1 inch (in) above that of the main dock.
e. The deck surface of each dock section shall not slope more than 0.5 inches (in) over the 10 foot (ft) length of the dock section.
f. The deck surface of each 80 inch (in) X 10 foot (ft) dock section shall not slope more that 0.35 inches (in) over the width of the dock section.
g. The deck surface of each 60 inch (in) X 10 foot (ft) dock section shall not slope more than 0.25 inches (in) over the width of the dock.
h. The deck surface of each 40 inch (in) X 10 foot (ft) dock section shall not slope more than 0.15 inches (in) over the width of the dock section.

11.1 Live Load Due To Vertical Loads

a. Under dead load conditions plus an additional 30 pounds per square foot (lb/ft^2) of uniform live load, flotation shall provide for a minimum of 7 inches (in) of freeboard.

b. The dock structure shall support a concentrated vertical load of up to 400 pounds (lb)

at any particular point on the surface of the deck. The structure shall accomplish this while maintaining flotation.

11.2 Live Load Due To Horizontal Loads

a. The dock system shall sustain the stated design loads applied by normal current and/or debris which are normal to a particular location. (In extreme conditions other procedures such as additional anchorage, anchorage release, and/or dock system removal may be necessary.)

b. The dock system shall be capable of sustaining continuous wave action of up to 1 foot and occasional wave action not in excess of 3 feet during storm conditions.

c. The dock sections shall sustain any loads applied by non-moving ice without damage.

d. The dock system shall be compatible for the use of any boat or vessel size with a properly designed anchorage/mooring system. Boats or vessels over 35ft should be moored directly to the anchorage system.

e. The dock system and anchorage shall be capable of withstanding sustained wind loads of 77 miles per hour (mph), or 15 pounds per square foot (lb/ft^2), at 100% boat occupancy, unless otherwise specified.

f. The dock system shall be capable of withstanding the impact force caused by a 35 foot boat striking the end of a finger at a speed of 2 miles per hour (mph) and at an angle of 10° off center.

12. Designing for Layout

The dock system, anchorage, and connections shall be designed according to the recommendations of the American Society of Civil Engineers Manual and Report on Engineering Practice Number 50, "Planning and Design Guidelines for Small Craft Harbors", the revised edition.

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Works Cited:

Cambridge Materials Testing Limited: Laboratory #: 476905-08, June 5, 2008, Cambridge, Ontario

Toboasspm, P.E, Bruce O, and Kollmeyer, Ph.D., Ronald C. *Marinas and Small Craft Harbors.* New York: Van Nostrand Reinhold, 1991. Print.

Terry Boyd, John McPherson, Jill Murphey, Tim Bazley, Bobby Edwards, Mike Hough, Kent Skarr. *Design Handbook for Recreational Boating and Fishing Facilities:* Second Edition, 2006. Print

SECTION 02923

LANDSCAPE GRADING

1 PART 1 GENERAL

1.1 WORK INCLUDED

A. Finish grade subsoil and proof roll.

B. Place, level, and compact topsoil.

1.2 RELATED WORK

A. Section 01400 - Quality Control: Compaction requirements of backfill.

B. Section 02211 - Rough Grading.

C. Section 02936 - Seeding: Finish ground cover.

1.3 SAMPLES

A. Submit samples under provisions of Section 01400 - Quality Control.

B. Disregard sample submission if recent test results are available for type of fill.

1.4 PROTECTION

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

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

1.5 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Landscape Grading:
   1. Basis of Measurement: Included in unit price bid lump sum for Landscaping / Site Restoration and Cleanup as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials, and equipment necessary for fill, screening, mixing, placement, moving existing stock piles and grading necessary to obtain the required contours and replacement of necessary fences, trees, shrubs as indicated on the plans, and other landscaping necessary to return work area to the proposed contours and/or preconstruction conditions. This work also includes final cleanup for the final site completion.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil: Min. 3" compacted depth.

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.

C. Submit lab results or samples for testing as requested by the Owner or Engineer if imported topsoil is used.

3 PART 3 EXECUTION

3.1 INSPECTION

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

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

3.2 SUBSOIL PREPARATION

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

B. Scarify subgrade to depth of 4 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

A. Place topsoil to a minimum 3-inch compacted depth in areas where seeding, 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 and plants to prevent damage.

F. Lightly compact. Roll placed topsoil.

G. Remove surplus subsoil and topsoil from site.

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

I. Place required trees, shrubs, fences, and mail boxes in their proper locations.

3.4 TOLERANCES

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

END OF SECTION

SECTION 02936

SEEDING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation of subsoil.

B. Placing topsoil.

C. Seeding

D. Hydroseeding

E. Mulching and fertilizer.

F. Maintenance.

1.2 RELATED SECTIONS

A. Section 02211 - Rough Grading.

B. Section 02923 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

1.3 MEASUREMENT AND PAYMENT

A. Landscape Seeding:
1. Basis of Measurement: At the lump sum price bid for Landscaping / Site Restoration and Cleanup, as stated in the proposal.
2. Basis of Payment: Includes all associated labor, equipment and material necessary to seed yard areas as specified on the plans and/or determined by the Engineer. This includes finished grading, topsoil, subsoil, daily seeding, fertilizing, mulching, watering and maintenance to provide for uniform grass growth and any re-seeding and erosion repair. Re-seeding and erosion repair is included to provide for uniform grass growth at the completion of the project.

B. Bank Stabilization:
1. Basis of Measurement: Included in the lump sum price bid for Bank Stabilization, as stated in the proposal.
2. Basis of Payment: Includes all associated labor, equipment and material necessary to seed areas as specified on the plans and/or determined by the Engineer. This includes finished grading, topsoil, daily seeding, fertilizing, mulching, mulch mat for stepper slopes, watering, and maintenance to provide for uniform grown and any reseeding and erosion repair. Reseeding and erosion repair is included to provide for uniform growth at the completion of the project.

1.4 REFERENCES

A. FS 0-F-241 - Fertilizers, Mixed, Commercial.

1.5 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.6 PROTECTION

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

B. Protect existing structures, fences, roads, sidewalks, paving, mailboxes, curbs, etc.

1.7 SUBMITTALS

A. Submit under provisions of Section 01300 - Submittals.

B. Submit product data for all items to be installed and/or constructed within this Section.

C. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, location of packaging, any tags from seed bags and any receipt associated with seeding.

1.8 QUALITY ASSURANCE

A. The Contractor shall make arrangements to plot the pH of the existing soils and submit the results to the Engineer prior to obtaining the seed mix.

B. The Contractor shall make arrangements to obtain seed materials with nurseries a maximum 30 days after he/she is awarded contract and provide a list of suppliers and seed mix to the Engineer for approval.

C. The Contractor will provide a final list of all species purchased to the Engineer a minimum of 90 days prior to seeding.

D. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

E. Provide signed affidavit stating the amount and type of seed, fertilizer, and mulch applied per acre.

1.9 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.10 QUALIFICATIONS

A. Seed Supplier: Company specializing in growing and cultivating applicable plant species.

B. Installer: The seeding Contractor must be experienced and specialized in seeding the respective species as determined by the Engineer. He/she shall properly supervise a competent staff. The Contractor must have the necessary equipment to complete this task.

C. Maintenance Services: Shall be provided by the Contractor for up to one year to guarantee establishment of growth.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.12 COORDINATION

A. Coordinate work under provisions of Section 01039.

1.13 MAINTENANCE SERVICE

A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition and is accepted by Owner. Guarantee replacement of dead material for one year following acceptance.

1.14 MAINTENANCE DATA

A. Submit under the provisions of Section 01700.

1.15 WARRANTY AND REPLACEMENT

A. Seeded areas must have a relatively uniform stand of grass with no bare spots over 6 inches square at the time of substantial completion. Reseed at the original rate. All areas failing to establish within 90 days after germination or one growing season, whichever is longest, for any reason whatsoever, will be redone at the contractor's expense.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. 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.
1. Reused topsoil excavated from the site will be free of subsoil, roots, grass, excessive amount of weeds, stone and foreign matter.

B. Grass Seed Mixture:
1. Creeping Red Fescue: 60%
2. Perennial Rye Grass: 40%

C. Bank Stabilization (Native Seed) Mix:
1. Acceptable Seed Supplier: Michigan Wildflower Farm, or approved equal:
i. Contact: phone (517) 647-6010, fax (517) 647-6072, www.michiganwildflowerfarm.com
2. Custom Short Wetland Mix: (40% forbs, 60% grasses and sedges)

FORBS		
Latin Name	*Common Name*	*% By Weight*
Anemone Canadensis	Canadian Anemone	0.06
Euthamia graminifolia	Flat-top Goldentop	0.02
Iris virginica	Virginia Iris	0.20
Lobelia siphilitica	Great Blue Lobelia	0.02
Solidago riddellii	Riddell's Goldenrod	0.10
TOTAL		*0.40*
GRASSES		
Carex comosa	Longhair Sedge	0.15
Carex vulpinoidea	Fox Sedge	0.15
Scirpus atrovirens	Green Bulrush	0.15
Scirpus cyperinus	Woolgrass	0.15
TOTAL		*0.60*

3. Apply at a rate of 5 oz./1,000 square feet

D. Fertilizer:
1. Verify if a phosphorus fertilizer ban or limit is in place and plan accordingly.

E. Mulch: Small grain straw mulch that is clean and weed free unless otherwise indicated.
1. Hydroseeding Mulching Material: Conwed Verdoyl #2000.
2. Mulch Blankets:
    1. North American Green SC150BN, or approved equal, in areas with slopes 4 horizontal to 1 vertical and steeper as indicated on the plans or directed by the Engineer.
        i. Install all mulch blankets with 6 inch North American Green Eco Stakes, or approved equal. Stake according to manufacturer's recommendations as approved by the Engineer.

F. Soil Binding Agent: Non-toxic, biodegradable materials that are environmentally safe. Applied at a rate of 1 lb per 1000 sq ft.

G. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

H. Herbicide: 25% Prometon, 4-bis, and 75% inert ingredients.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section. See Section 02923 - Landscape Grading.

3.2 PREPARATION OF SUBSOIL

A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil. Do not bury foreign material.

C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

A. In accordance with Section 02923 - Landscaping Grading.

3.4 COMPACTION

A. Compact with a sheep's foot roller, cleated crawler tractor, vibratory roller, or equipment approved by Engineer. Equipment must produce 150-300 pounds per square inch of ground pressure.

B. Compaction shall produce a uniform rough textured surface free of tire ruts, depressions and low spots, and be ready for seeding and mulching. A minimum of four passes is required. After compaction, finish grade will be flush with the top of curbs, catch basins and other structures.

3.5 FERTILIZING

A. Apply fertilizer at a rate of 16lbs per 1000 sq ft.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.5 SEEDING (Hand Seeding)

A. Daily seeding and fertilizing shall be done as areas are ready for seed.

B. Apply lawn seed at a rate of 8 lbs per 1000 sq. ft. evenly in two intersecting directions. Native seed will be seeded at the rate earlier specified in this section. Rake in lightly.

C. Do not seed areas in excess of what which can be mulched on same day.

D. Immediately following seeding and compacting apply mulch to 1/8 inch thickness. Maintain clear of shrubs and trees.

E. Apply water with a fine spray immediately after each area has been mulched.

F. Additional seeding is required until uniform growth of grass is established.

3.6 HYDROSEEDING

A. Apply seeded slurry for lawn with a hydraulic seeder at a rate of 8 lbs per 1000 sq ft evenly in two intersecting directions. Native seed will be seeded at the rate earlier specified in this section.

B. Do not hydroseed area in excess of what which can be mulched on same day.

C. Immediately following seeding, apply mulch at a rate of 50 lbs per 1000 sq ft. Maintain clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 3 inches of soil.

3.7 QUALITY CONTROL

A. Notify Engineer 3 working days prior to seeding and fertilizing for approval to proceed.

B. Seeding shall not be done during windy weather (above 25 mph) or when the ground is overly wet (saturated) or frozen.

C. All areas that are partially completed to grade, will be prepared and seeded during the first available planting period and will not be allowed to sit idle for long periods of time without receiving the erosion control specified in the contract.

D. Planting Season: April 1 to May 31, or September 1 to October 31. No seeding shall be done before or after these dates without the Engineer's written approval.

3.8 MAINTENANCE

A. Contractor shall guarantee a uniform grass growth over the entire project and shall reseed bare and thin areas until this is accomplished at no additional cost to the project.

B. Immediately reseed areas which show bare spots.

C. Repair any eroded areas and reseed immediately.

D. Final payment will not be issued until a uniform growth of grass is established for period of one year on all areas disturbed as a result of the construction of this Project.

E. Monitor all seeded areas during site visits for water stress.

F. Protection from traffic and erosion in newly seeded areas is the responsibility of the Contractor. Safety fences and/or silt fences with appropriate signage may be used at the Contractor's expense until the grasses are fully established.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in place concrete, shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.2 RELATED SECTIONS

A. Section 03200 - Concrete Reinforcement.

B. Section 03300 - Cast-in-Place Concrete.

C. Section 02870- Site Furnishings.

1.3 REFERENCES

A. ACI 306R- Cold Weather Concreting.

B. ACI 347 - Recommended Practice for Concrete Formwork.

C. PS-1 - Construction and Industrial Plywood.

1.4 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.5 MEASUREMENT AND PAYMENT

A. Basis of Measurement: Included with other items of this project.

B. Basis of Payment: Includes all associated labor, materials, and equipment to construct formwork in the shapes as indicated on the plans. Work shall include all metal forms, woods, stakes, and hardware to prepare the concrete areas as indicated on the drawings.

1.6 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

C. Product Data: Provide data on void form materials and installation requirements.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347, 301, 318.

B. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

A. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Michigan.

1.9 REGULATORY REQUIREMENTS

A. Conform to ACI 347, ACI 301 and ACI 306R code for design, fabrication, erection and removal of formwork.

1.10 COORDINATION

A. Coordinate work under provisions of Section 01039.

B. Coordinate this Section with other Sections of work which require attachment of components to formwork.

C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

D. Notify Engineer 24-hours in advance of placing concrete that reinforcing steel and framework is installed according to contract documents and that it is ready to be inspected. The Engineer will not allow placement of concrete prior to inspection.

2 PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the contractor.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Steel construction of adequate strength and of suitable design. Wire ties will not be permitted. Use one inch deep break off ties for all structures.

B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.2 EARTH FORMS

A. Earth forms in general are not permitted.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in or passing through concrete work.

B. Locate and set in place items which will be cast directly into concrete.

C. Locate and set in place items which will be cast directly into concrete. Furnish all hardware in the completion of the work. All items of miscellaneous metals shall be positioned within the forms and cast into concrete.

D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

A. Clean and remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heat enclosures. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight.

B. Tie clamps or sleeve nuts shall be loosened 24 hours after completion of concrete placement and form ties to be removed may be withdrawn at that time, with exception of a sufficient number to hold forms in place.

C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

D. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.9 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

B. Do not reuse damaged wood formwork. Do not patch formwork.

C. Prior to the erection of forms, review the formwork operation with the Engineer and affected sub-contractors so all required inserts, openings, and embedded parts are included in the formwork.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2 RELATED SECTIONS

A. Section 03100 - Concrete Formwork.

B. Section 03300 - Cast-in-Place Concrete.

C. Section 03370 - Concrete Curing.

1.3 REFERENCES

A. ACI 318 - Building Code Requirements For Reinforced Concrete.

B. ACI SP-66 - American Concrete Institute - Detailing Manual.

C. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.

D. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

E. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

F. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.

G. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

H. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.

I. ANSI/AWS D12.1 - Reinforcing Steel Welding Code.

J. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

K. ASTM A616 - Rail Steel Deformed and Plain Bars for Concrete Reinforcement.

L. ASTM A617 - Axle Steel Deformed and Plain Bars for Concrete Reinforcement with Supplementary Requirements S1.

M. ASTM A704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.

N. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

O. ASTM A775 - Epoxy-Coated Reinforcing Steel Bars.

P. ASTM D3963 - Epoxy-Coated Reinforcing Steel.

Q. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

R. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.

S. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.

T. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.4 MEASUREMENT AND PAYMENT

A. Basis of Measurement: Included with the items of this project.

B. Basis of Payment: Includes all associated labor, materials, and equipment to install reinforcement in the concrete and forms included on the plans. Work shall include all reinforcement steel and hardware to prepare reinforced concrete as indicated on the plans.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301, ACI SP-66, and ACI 318.

B. Maintain one copy of each document on site.

1.7 COORDINATION

A. Coordinate work under provisions of Section 01039.

B. Coordinate with placement of formwork, formed openings and other Work.

2 PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish.

B. Welded Steel Wire Fabric: ASTM A185 Plain Type, ASTM A497 Welded Deformed Type coiled rolls; plain finish.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required minimum plastic thickness of 3/32".

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI SP-66, ACI 318, and ANSI/ASTM A184.

B. Weld reinforcement in accordance with ANSI/AWS D1.4.

C. Galvanized Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with manufacturer's instructions.

D. Locate reinforcing splices not indicated on Drawings, at point of minimum stress. Review location of splices with Engineer.

3 PART 3 EXECUTION

3.1 PLACEMENT

A. Prior to placement, clean reinforcing steel and dowels of loose rust, scale, dirt, grease, and other materials which could reduce or destroy bond.

B. Place, support and secure reinforcement against displacement. Do not deviate from required position.

C. Accommodate placement of formed openings.

D. Maintain minimum concrete cover around reinforcing as follows unless shown otherwise on the drawings.

Item	Coverage
Footings & Concrete	
Formed against Earth	3 inch
Slab on Fill	3 inch

E. Install lapped bars with a Class B lap length and applicable modifiers for but not limited to, bar spacing and clearances as stated per references above unless shown otherwise on the drawings.

3.2 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Footings.

B. Slabs on grade.

C. Concrete pavement pads.

1.2 RELATED SECTIONS

A. Section 01039 - Coordination and Meetings.

B. Section 01300 - Submittals.

C. Section 01400 - Quality Control.

D. Section 03100 - Concrete Formwork: Formwork and accessories.

E. Section 03200 - Concrete Reinforcement.

F. Section 03370 - Concrete Curing.

1.3 REFERENCES

A. ACI 301 – Specification of Structural Concrete for building.

B. ACI 302 - Guide for Concrete Floor and Slab Construction.

C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

D. ACI 305R - Hot Weather Concreting.

E. ACI 306R - Cold Weather Concreting.

F. ACI 308 - Standard Practice for Curing Concrete.

G. ACI 318 Building Code Requirements for Reinforced Concrete.

H. ACI 347R - Guide to Formwork for Concrete.

I. ASTM C33 - Concrete Aggregates.

J. ASTM C94 - Ready-Mixed Concrete.

K. ASTM C150 - Portland Cement.

L. ASTM C260 - Air Entraining Admixtures for Concrete.

M. ASTM C494 - Chemicals Admixtures for Concrete.

N. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide data on admixtures.

C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

D. Concrete mix design test reports and aggregate test reports a minimum of 35 days prior to beginning concrete work.

1.5 MEASUREMENT AND PAYMENT

A. Footings:
   1. Basis of Measurement: Included in the lump sum bid price with which the item is being installed with.
   2. Basis of Payment: Includes all labor, materials and equipment to excavate, install, form, reinforce, finish, cure and backfill concrete footings.

B. Concrete Path, 4” thick:
   1. Basis of Measurement: At the lump sum price bid for Concrete Path, 4” thick, as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials and equipment to excavate, install, form, finish, cure and backfill concrete path paving for a complete installation.

C. Parking Lot Concrete Pavement Reinforced, 6”:
   1. Basis of Measurement: At the lump sum price bid for Concrete Parking Lot Pavement Reinforced as stated in the proposal.
   2. Basis of Payment: Includes all associated labor, materials and equipment to excavate, install, form, reinforce, finish, cure and backfill concrete for a complete installation.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Maintain one copy of ACI 301 on site.

C. Acquire cement and aggregate from same source for all work. Course aggregate shall meet the requirements of MDOT 6AA while fine aggregate shall meet requirements of MDOT 2NS sand.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather.

1.7 COORDINATION

A. Coordinate work under provisions of Section 01039.

B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

2. PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II cement with air entraining admixtures conforming to ASTM C260.

B. Fine Aggregates: ASTM C33 and MDOT 2NS.

C. Coarse Aggregates: ASTM C33 and MDOT 6AA.

D. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

A. Fiber Reinforcement: 1/2 inch polypropylene fibers by Fibermesh Company.

B. Air Entrainment: ASTM C260; manufactured by W. R. Grace and Company or Axim Concrete Technologies.

C. Chemical: ASTM C494, Type A - Water Reducing admixture; manufactured by W. R. Grace and Company or Axim Concrete Technologies.

D. Fly Ash: ASTM C618.

E. Chloride based admixtures are prohibited in reinforced concrete without written approval from Owner/Engineer.

2.3 ACCESSORIES

A. Bonding Agent: Two component modified epoxy resin; Sikadur 32 Hi-Mod manufactured by Sika Corp., Glendale Hts., Illinois or Concresive 1001 LPL 3007 manufactured by Structural Bonding Company, Flint, MI.

B. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days; Five Star Grout manufactured by U.S. Grout Company, Flint, MI or Sika-Grout by Sika Corporation.

C. Epoxy Adhesive: Two component epoxy resin adhesive; Sikadur 35, Hi-Mod LV manufactured by Sika Corporation, Glendale Hts., IL (708) 924-7900.

D. Adhesive Anchors: Hilti HVA adhesive anchoring system. Hilti adhesive anchors shall be comprised of an HEA capsule with an ASTM A193, Grade B7, HAS stainless steel rod assembly with stainless steel ASTM F594 nuts and ANSI B18.221 (1965), Type A, plain washers under the turned element. Install per manufacturer's specifications.

E. Slab Hardener: Lapidolith Concrete Hardener and Dustproofer, manufactured by Sonneborn Building Products, Chemrex Inc.

2.4 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94 and MDOT Specifications.

B. Structural – Class A:
1. Compressive Strength (7 days): 3,000 psi.
2. Compressive Strength (28 days): 4,000 psi.
3. Slump: 4-1 inch.

C. Slab on fill:
1. Compressive Strength (7 days): 3,000 psi.
2. Compressive Strength (28 days): 4,000 psi.
3. Slump: 4-1 inch.

D. Use set retarding admixtures during hot weather only when approved by Owner/Engineer.

E. Use Type II cement with air entraining admixtures conforming to ASTM C260, air entraining portland cement shall contain a non-liquid addition conforming to the requirements of ASTM C226.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01039.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Remove hardened concrete and foreign materials from the inner surfaces of the mixing and conveying equipment.

B. Remove debris from the space to be occupied by the concrete. Secure reinforcement in position and obtain approval of the Engineer before concrete placement.

C. Remove water from the space to be occupied by the concrete before concrete is deposited. Divert flow of water into an excavation, in order to avoid washing the freshly deposited concrete.

D. Before depositing new concrete on or against concrete which has hardened, roughen the hardened concrete in a manner that will not leave loosened particles of aggregate or damaged concrete at the surface. Thoroughly clean concrete of foreign matter and laitance and saturate with water. To ensure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including vertical and inclined surfaces, shall first be thoroughly covered with a coating of mortar or neat cement grout against which the new concrete shall be placed before the grout has attained its initial set.

E. Unless otherwise noted, give surfaces of existing concrete against which new concrete

will be placed a heavy brush coat of epoxy bonding agent. Apply in accordance with manufacturer's instructions. Submit manufacturer's instructions to Engineer prior to application.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Notify Owner/Engineer minimum 24 hours prior to commencement of operations.

C. Concrete transported in a truck mixer, agitator or other transportation device shall be discharged at the job within 1-1/2 hours after the cement has been added to the water or the aggregates.

D. When hand mixing is authorized, it shall be done on a watertight platform and in such a manner as to ensure a uniform distribution of the materials throughout the mass. Mixing shall be continued until a homogeneous mixture of the required consistency is obtained.

E. The retempering of concrete or mortar which has partially hardened, that is, remixing with or without additional cement, aggregate, or water, will not be permitted.

F. Ensure reinforcement, embedded parts, formed joint fillers and joint devices are not disturbed during concrete placement.

G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

H. Do not interrupt successive placement; do not permit cold joints to occur.

I. Concrete, during and immediately after depositing shall be thoroughly compacted by means of mechanical vibrators or other suitable tools approved by the Engineer.

3.4 CONCRETE FINISHING

A. Formed Surface Finishes shall have a smooth form finish. Use selected forms producing a smooth, hard, uniform texture on the concrete. Patch tie holes and defects; completely remove all fins and burrs.

B. Provide a light broom finish on exterior concrete slabs.

3.5 CURING AND PROTECTION

A. Cure concrete in accordance with Section 03370 - Concrete Curing.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for a period necessary for the hydration of cement and hardening of concrete.

3.6 FROST PROTECTION

A. In the event that a heavy frost or near freezing weather is forecasted (below 35 degrees), the concrete must be protected from early-age freezing when in the saturated state. After form removal, protection of all exposed concrete surfaces should continue for an additional 24 and 48 hours for air-entrained and non-air-entrained concrete respectively. The internal concrete temperature must remain at 50 degrees minimum during this protection period.

B. Concrete should be protected from freezing and not be moist cured in the late afternoons if weather forecasts show possible freezing for that evening.

3.7 COLD WEATHER CONCRETING

A. Placing and curing concrete for air temperatures consistently below 50 degrees falls into the category called cold weather concreting. Cold weather is defined as more than 3 consecutive days which the average daily air temperature is below 40 degrees and, the air temperature is not above 50 degrees for more than 12 hours of a 24 hour period.

B. Cold weather shall be determined by recent project weather conditions and future weather forecasts in advance of any concrete pour. All data must be verified by the Engineer.

C. Concrete not air-entrained but maintained at 50 degrees in a moist condition shall have forms removed after 7 days except when cured by an accepted accelerated curing process. This process may include high pressure steam, steam at atmospheric pressure, heat and moisture, or any other method approved by the Engineer. Accelerated curing may reduce form removal times to 72 hours.

D. Air-entrained concrete shall have forms in place for a minimum of 72 hours regardless the type of curing.

3.8 CONCRETE PROTECTION AFTER FORM REMOVAL DURING COLD WEATHER CONCRETING

A. Additional protection period shall be 6 days for structural elements that will receive any small early age loads, which may include self weight, and 3 days for all others. At no time shall the internal concrete temperature fall below 50 degrees during the protection period.

B. At the end of the protection period, the concrete shall be gradually cooled in order that cracking does not occur due to the difference in temperature between the interior of the concrete element and the exterior surface of the concrete element.

C. The maximum allowable temperature drop during the first 24 hours after ending the protection period is 40 degrees.

D. Surface thermometers will be used to measure the temperature of the exterior concrete surface. This value will be compared to the concrete temperature prior to ending the protection period in order to assure less than a 40 degree drop in 24 hours has been achieved.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01400.

B. Provide free access to Work and cooperate with appointed firm.

C. Notify Engineer 24 hours in advance of any scheduled placement of concrete.

3.10 PATCHING

A. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify the Engineer upon discovery.

C. Upon approval from the engineer, patch imperfections in accordance with ACI 301.

3.11 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the Engineer for each individual area.

END OF SECTION

SECTION 03370

CONCRETE CURING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Initial and final curing of horizontal concrete surfaces.

1.2 RELATED SECTIONS

A. Section 03300 – Cast-In-Place Concrete.

1.3 REFERENCES

A. ACI 301 – Structural Concrete for Buildings.

B. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.

C. ACI 308 - Standard Practice for Curing Concrete.

D. ASTM C171 - Sheet Materials for Curing Concrete.

E. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide data on curing compounds, product characteristics, compatibility and limitations.

C. Manufacturer's Installation Instructions: Indicate criteria for preparation and application.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and 308.

B. Maintain one copy of document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products under provisions of Section 01600.

B. Deliver curing materials in manufacturer's packaging including application instructions.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Liquid Membrane Forming Curing Compound ASTM C309 Type 1 Class B, liquid acrylate type, clear, without fugitive dye; curing compounds shall not contain ingredients which might stain through, injure the concrete or prevent a good bond for subsequent coatings or finishes; manufactured by Sonneborn Building Products or equal.

B. Absorptive Mats ASTM C171, cotton fabric or burlap-polyethylene, minimum 8 oz/sq yd. bonded to prevent separation during handling and placing.

C. Water: Potable and not detrimental to concrete.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate conditions under provisions of Section 01039.

B. Verify that substrate surfaces are ready to be cured.

3.2 EXECUTION - HORIZONTAL SURFACES

A. Cure slabs in accordance with ACI 308.

B. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

C. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions.

3.3 EXECUTION - VERTICAL SURFACES

A. Cure surfaces in accordance with ACI 308.

B. Spraying: Spray water over surfaces and maintain wet for 7 days.

C. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions.

3.4 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01500.

END OF SECTION