



MISSOURI
HIGHWAYS and TRANSPORTATION
COMMISSION
JEFFERSON CITY, MISSOURI
SPECIFICATIONS
FOR
CONSTRUCTING OR IMPROVING

District-1
Sanitary Sewer
Cameron, MO

9-081029

TABLE OF CONTENTS

DIVISION		PAGE
DIVISION 0 - BIDDING AND CONTRACT INFORMATION		
	BIDDER CHECKLIST	
	FINAL CHECKLIST BEFORE SUBMITTING PROPOSAL	
	NEWSPAPER ADVERTISEMENT	Notice to Contractors
00020	INVITATION TO BID	
00100	INSTRUCTIONS TO BIDDER	
00301	BID FORM	
00430	SUBCONTRACTOR LISTING	
00600	BID BOND	
DIVISION 1 - GENERAL REQUIREMENTS (BROAD SCOPE)		
01010	GENERAL CONDITIONS	
01011	SUPPLEMENTARY CONDITIONS	
01019	CONTRACT CONSIDERATIONS	
01039	COORDINATION AND MEETINGS	
01300	SUBMITTALS	
01400	QUALITY CONTROL	
01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS	
01600	MATERIAL AND EQUIPMENT	
01650	STARTING OF SYSTEMS	
01700	CONTRACT CLOSEOUT	
	PROJECT SOLUTIONS SPECIFICATIONS INSERTED	
	WAGE ORDER #015 INSERTED	

BIDDER CHECKLIST

FINAL CHECKLIST BEFORE SUBMITTING PROPOSAL

- _____1. The orange bound Request for Proposal includes a complete set of bidding forms, specifications, and appendices which are made part of the proposal by reference. It is for the bidders information and convenience only and is not to be returned with the proposal.

- _____2. The blue bound Proposal contains a complete set of bidding forms only. It is to be completed, executed and submitted in a sealed envelope marked "_____”
 - _____ a. Complete the Bid Form by filling in the total dollar amount of the bid; listing any addenda which may have been issued; filling in the dollar amount of the bidder's check or Bid Bond, sign the proper signature line, and supply the required information in connection with the signature for the individual bidder, joint adventurer, or corporation.

 - _____ b. Submit Bid Bond executed by the bidder and surety. The bidder may use the Bid Bond furnished by the Commission or AIA Document A310 or approved equivalent or attach cashier's check to Bid Bond form. Personal checks are not accepted.

 - _____ c. Complete Subcontractor section by listing major subcontractor(s) and general supervisor(s), sign as required.

 - _____ d. Complete Certification Regarding Missouri Domestic Products Procurement Act section, if applicable.

- _____3. If addenda are issued attach to the back of the blue bound Proposal. Copy addenda and add to the appropriate section of the orange bound Request for Proposal and retain for your records.

NEWSPAPER ADVERTISEMENT

Notice to Contractors

Bids for constructing a Sanitary Sewer Connection, Cameron, MO will be received by the Missouri Department of Transportation at its One Stop Central Office Building, 1320 Creek Trail Drive, PO Box 270, Jefferson City, MO until 1:00 P.M., October 29, 2008. Contact Clayton Hanks at 573-522-9565 or Clayton.Hanks@modot.mo.gov to obtain plans, forms, and information or download them at no charge from http://modot.org/business/contractor_resources/FacilitiesConstructionandMaintenance.htm. A pre-bid conference is scheduled for October 22, 2008, at the District 1, Cameron Maintenance Facility located at 513 Grand, Cameron, Missouri, at 10:30 A.M.

SECTION 00020

INVITATION TO BID

Notice is given hereby that the Missouri Department of Transportation will accept bids for construction of the proposal marked "**Proposal for Sanitary Sewer Connection, Cameron, MO, DISTRICT 1, DeKALB COUNTY, Missouri**", according to Drawings and Specifications, and described in general as:

The project consists of the construction of a sanitary sewer extension, consisting of one 1,000 gallon oil-water separator, approximately 880 linear feet of 4 inch diameter PVC gravity sewers, 5 standard manholes, and all appurtenances to make a complete and usable system.

Sealed bids will be received by the Missouri Department of Transportation at its **Central Office, Creek Trail Drive, PO Box 270, Jefferson City, MO 65102-0270 until 1:00 P.M., October 29, 2008.**

Bids will be opened and read aloud at that time and that place. Bids received after that time will not be accepted.

Contact Clayton Hanks at 573-522-9565 or Clayton.Hanks@modot.mo.gov to obtain plans, forms, and information or download them at no charge from http://modot.org/business/contractor_resources/FacilitiesConstructionandMaintenance.htm.

Prevailing wages as established by the Missouri Department of Labor and Industrial Relations, for **DeKalb County**, as shown in the Proposal, will apply.

Bid securities in the amount of 5% of the bid will be required to accompany bids.

Proposals must be made on forms provided by the Commission. The Commission reserves the right to reject any or all bids and to waive irregularity in the bids and the bidding. **No bid may be amended or withdrawn after the bid is opened.**

A pre-bid conference is scheduled for **October 22, 2008**, at the **District 1, MoDOT Maintenance Facility located at 513 Grand, Cameron, Missouri, at 10:30 A.M.**

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

Building Design Supervisor

SECTION 00100

INSTRUCTIONS TO BIDDER

1. SCOPE OF WORK

The project consists of the construction of a sanitary sewer extension, consisting of one 1,000 gallon oil-water separator, approximately 880 linear feet of 4 inch diameter PVC gravity sewers, 5 standard manholes, and all appurtenances to make a complete and usable system.

2. BID FORM

In order to receive consideration, bids must be made in strict accordance with the following.

- A. Make bids, upon the forms provided herein, properly signed and with all items filled out. Do not change the wording of the bid form and do not add words to the bid form. Unauthorized conditions, limitations or provisions attached to the bid will be cause for rejection of the bid.
- B. No telegraphic bid or telegraphic modification of a bid will be considered. No bids received after the time fixed for receiving them will be considered. Late bids will be returned to the bidder unopened.
- C. Address bids to the Missouri Department of Transportation, and deliver to the address given in the Invitation to Bid, on or before the day and hour set for opening the bids. Enclose each bid in a sealed envelope bearing the title of the Work, the name of the bidder, and the date and hour of the bid opening. Submit only the original signed copy of the bid. It is the sole responsibility of the bidder to see that the bid is received on time.

3. BONDS

- A. Bid securities, a cashiers check, a Bank Money Order, or a Certified Check made payable to "Director of Revenue, Credit Road Fund", in the amount stated in the invitation to bid must accompany each bid. The successful bidder's security will be retained until he has signed the Contract and has furnished the required Certificates of Insurance.
- B. The Owner reserves the right to retain the security of all bidders until the successful bidder enters into the Contract. Other bid securities will be returned as soon as practical. If any bidder refuses to enter into a Contract, the Owner may retain his bid security as liquidated damages but not as a penalty.
- C. Prior to signing the Contract, the successful bidder will secure a Performance Bond in the amount of 100% of the Contract Sum. Surety, acceptable to the Owner, shall issue the bond. Costs of such bonds will be the responsibility of the bidder.

4. EXAMINATION OF DOCUMENTS AND SITE OF WORK

Before submitting a bid, each bidder shall examine the Drawings carefully, read the Specifications and all other proposed Contract Documents, and visit the site of the work. Each bidder shall fully inform himself, prior to bidding, as to existing conditions and limitations under which the Work is to be performed and shall include in his bid a sum to cover the cost of items necessary to perform the Work, as set forth in the proposed Contract Documents. No allowance will be made to a bidder because of lack of such examination or knowledge. The submission of a bid will be considered conclusive evidence that the bidder has made such examination.

5. INTERPRETATION

No oral interpretations will be made to any bidder as to the meaning of the plans and specifications or the

acceptability of alternate products, materials, form or type of construction. Every request for interpretation shall be made in writing and submitted with all supporting documents not less than ten (10) calendar days before opening of bids. The request shall be sent directly to the project Designer. Every interpretation made to a bidder will be in the form of an addendum and will be sent as promptly as is practicable to all persons to whom plans and specifications have been issued. All such addenda shall become part of the contract documents.

6. PROOF OF COMPETENCY OF BIDDER

A bidder may be required to furnish evidence, satisfactory to the Commission, that he and his proposed subcontractor(s) have sufficient means and experience in the types of work called for to assure completion of the Contract in a satisfactory manner.

7. WITHDRAWAL OF BIDS

- A. A bidder may withdraw his bid, either personally or by written request, at any time prior to the scheduled time for opening bids.
- B. No bid may be amended or withdrawn after the bid is opened.

8. AWARD OR REJECTION OF BIDS

- A. The Contract, if awarded, will be awarded to the responsible bidder who has proposed the lowest Contract Sum, subject to the Commission's right to reject any or all bids and to waive informality and irregularity in the bids and in the bidding.
- B. Award of alternates, if any, will be made in numerical order to result in the maximum amount of work being accepted within available construction funds.
- C. Bidder's proposal price shall include all city, state, and federal sales, excise and similar taxes that may be lawfully assessed in connection with his performance of work and purchase of materials to be incorporated in the work.

9. EXECUTION OF CONTRACT

- A. The Contract, which the successful bidder will be required to execute, will be included in the Contract Documents.
- B. The bidder to whom the Contract is awarded shall, within fourteen calendar days after notice of award and receipt of Contract Documents from the Commission, sign and deliver required copies to the Commission.
- C. Upon delivery of the signed Contract, the bidder to whom the Contract is awarded shall deliver to the Commission those Certificates of Insurance required by the Contract Documents and Performance Bond, as required by the Commission.
- D. Execution of the Contract by the Commission must be done before the successful bidder may proceed with the work.

10. CONSTRUCTION TIME AND LIQUIDATED DAMAGES

- A. Time of Completion - If this proposal is accepted, it is hereby agreed that work will begin not later than the date specified in the "Notice to Proceed" and will diligently be prosecuted in order to complete the work and billing within **60-calendar days** from the date specified which includes **15-on-site working days**. Completion of work will be based on FINAL ACCEPTANCE of the building; "SUBSTANTIAL COMPLETION" will not be accepted as basis for completion.
- B. Liquidated Damages - It is agreed that time is of the essence. Because failure to complete the contract within the time fixed herein will cause serious inconvenience, loss, and damage to the state, liquidated damages will be assessed in the amount of **\$200.00** per working day, for each working day after the agreed completion date that the Work is not fully completed.

11. NONDISCRIMINATION

- A. The Bidder/Offeror understands that this project involves state funds and the Bidder/Offeror awarded the contract will be required to comply with the Executive Order 05-30 of the Governor of the State of Missouri dated September 8, 2005. This order stipulates that there shall be no discriminatory employment practices by the Contractor or his subcontractors, if any, based on race, sex, religion, national origin, age, color, disability, or veteran status. The undersigned Contractor or his subcontractors, if any, shall give written notice of their commitments under this clause to any labor union with which they have bargaining or other agreements.
- B. The Contractor shall comply with the Regulations relative to nondiscrimination in federally-assisted programs of the Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
- C. All solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of the Contractor's obligations under this contract and the Regulations, will be relative to nondiscrimination on the grounds of race, color, or national origin.
- D. Sanctions for Noncompliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, MoDOT shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to: (i) withholding of payments to the Contractor under the contract until the Contractor complies, and/or, (ii) cancellation, termination or suspension of the contract, in whole or in part.

12. EXECUTIVE ORDER

- A. The Contractor shall comply with all the provisions of Executive Order 07-13, issued by the Honorable Matt Blunt, Governor of Missouri, on the sixth (6th) day of March, 2007. This Executive Order, which promulgates the State of Missouri's position to not tolerate persons who contract with the state engaging in or supporting illegal activities of employing individuals who are not eligible to work in the United States, is incorporated herein by reference and made a part of this Agreement.
- B. "By signing this Agreement, the Contractor hereby certifies that any employee of the Contractor assigned to perform services under the contract is eligible and authorized to work in the United States in compliance with federal law."
- C. In the event the Contractor fails to comply with the provisions of the Executive Order 07-13, or in the event the Commission has reasonable cause to believe that the contractor has knowingly employed individuals who are not eligible to work in the United States in violation of federal law, the Commission reserves the right to impose such contract sanctions as it may determine to be appropriate, including but not limited to contract cancellation, termination or suspension in whole or in part or both.
- D. The Contractor shall include the provisions of this paragraph in every subcontract. The Contractor shall take such action with respect to any subcontract as the Commission may direct as a means of enforcing such provisions, including sanctions for noncompliance.

13. BIDDERS CERTIFICATION

- A. Preference in Purchasing Products: - Sections 34.073 and 34.076 RSMo 1994 give preference to Missouri corporations, firms, and individuals, when letting contracts or purchasing products. All bids will be evaluated on the basis of Sections 34.073 and 34.076 RSMo 1994. Any successful bidder which is a corporation organized in a state other than Missouri shall furnish to the owner, attached to the Proposal, a properly certified copy of its current Certificate of Authority to do business in the State of Missouri, such certificate to remain on file with the Commission. The Commission will award no Contract unless the bidder furnishes such certificate.
- B. Any successful bidder which is a corporation organized in the State of Missouri shall furnish, at its own cost, if requested, a Certificate of Good Standing issued by the Secretary of State, such certificate to remain on file with the owner.
- C. If the successful bidder is doing business in the State of Missouri under a fictitious name, he shall furnish to the Commission, attached to the Proposal, a properly certified copy of the certificate of Registration of Fictitious Name from the State of Missouri, such certificate shall remain on file with the Commission. The Commission will award no contract until the bidder furnishes such certificate.
- D. Certification Regarding Missouri Domestic Products Procurement Act: - The bidder's attention is directed to the Missouri Domestic Products Procurement Act, Sections 34.350 to 34.359, RSMo. which requires all manufactured goods or commodities used or supplied in the performance of this contract or any subcontract to be manufactured or produced in the United States. Section 34.350, RSMo, does not apply if the total contract is less than One Thousand Dollars (\$1,000.00). Section 34.355, RSMo, requires the vendor or contractor to certify his compliance with Section 34.353 and, if applicable, Section 34.359, RSMo, at the time of bidding and prior to payment. Failure to comply with Section 34.353, RSMo, during performance of the contract and to provide certification of compliance prior to payment will result in nonpayment for those goods or commodities.

Failure to complete this document will cause the State to presume the manufactured goods or products listed in the bid are not manufactured or produced in the United States, and the bid will be evaluated on that basis.

If all the goods or products specified in the attached bid which the bidder proposes to supply to the State shall be manufactured or produced in the "United States" as defined in Section 34.350, RSMo, check the box at left.

If only one line of any particular goods or products specified in the attached bid is manufactured or produced in the "United States" as defined in Section 34.350, RSMo, check the box at left and list the item(s) here:

If any or all of the goods or products specified in the attached bid which you proposed to supply to the State are not manufactured or produced in the "United States" as defined in Section 34.350, RSMo, then: (a) check the box at left; (b) list below by item number the country other than the United States where each goods or product you propose to furnish is manufactured or produced; and (c) check the box(es) at left of the paragraphs below if applicable, and list the corresponding item numbers in the spaces provided.

Item	Location Where Manufactured or Produced
_____	_____
_____	_____
_____	_____

(use additional sheet if necessary)

- [] The following specified goods or products cannot be manufactured or produced in the United States in sufficient quantities or in time to meet the contract specifications.

Item	Location Where Manufactured or Produced
_____	_____
_____	_____

- [] The following specified goods or products must be treated as manufactured or produced in the United States, in accordance with an existing treaty, law, agreement or regulation of the United States, including a treaty between the United States and any foreign country regarding export-import restrictions or international trade.

Item	Location Where Produced or Manufactured
_____	_____
_____	_____

CERTIFICATION

By submitting this document, completed as directed above, with a bid, the bidder certifies under penalty of making a false declaration (Section 575.060, RSMo) that the information contained in this document is true, correct and complete and may be relied upon by the State in determining the bidders qualifications under and compliance with the Missouri Products Procurement Act.

The bidder's failure to complete this document as directed above would cause the State to presume the manufactured goods or products listed in the bid are not manufactured in the United States and the bid will be evaluated on that basis pursuant to section 34.353.3(2), RSMo.

SECTION 00301

BID FORM

To: The Missouri Highway and Transportation Commission
105 West Capitol Avenue
Jefferson City, Missouri 65101

1. The undersigned, having examined the proposed Contract Documents titled: **“ENTER COMPLETE PROJECT NAME”** and having visited the site and examined the conditions affecting the Work, hereby proposes and agrees to furnish all labor, materials, equipment and everything which may be necessary or incidental thereto, as proposed by said Contract Documents, all to the satisfaction of the Chief Engineer of the Missouri Department of Transportation and the Missouri Highway and Transportation Commission, for the stipulated sum of:

_____ DOLLARS (\$_____).
2. The undersigned, acknowledges having examined and being familiar with the contract documents including the drawings, the Instructions to Bidders, General Conditions, Supplementary Conditions and the body of technical specifications.
3. The undersigned acknowledges receipt of Addenda number _____ through _____ inclusive.
4. Enclosed with this bid is bid security in the amount of not less than 5% of the bidder's proposed Contract Sum, the amount being _____ DOLLARS (\$_____).

IF AN INDIVIDUAL

_____	_____
Name of individual	Residence address
_____	_____
Social Security Number	Telephone Number
_____	_____
Firm Name, If Any	

_____	_____
Address for communications	Signature

IF A PARTNERSHIP

Name of Partnership

(State Name and Residence Address of All Partners)

Partner

Residence Address

Partner

Residence Address

Address for Communications

Federal Tax I.D. Number

Telephone Number

Signature of Either Partner

IF A CORPORATION

Name of Corporation

Incorporated under the laws of the
State of _____

Name and Title of Officer

Corporate License No. _____
(If a corporation organized in a state other than
Missouri, attach Certificate of Authority to do
business in the State of Missouri.)

Signature of officer

Federal Tax I.D. Number

Address for Communications

(ATTEST)

Telephone Number

(SEAL) Secretary

(Each bidder must complete the Bid Form by signing in the proper signature line above and by supplying the required information called for in connection with the signature. The information called for is necessary in the proper preparation of the contract and performance bond.)

SECTION 00430

SUBCONTRACTOR LISTING

1. For portions of Work equaling or exceeding 1% of the total proposed Contract Sum, the undersigned proposes to use the following subcontractors. Except as otherwise approved by the Owner, the undersigned proposes to perform all other portions of the Work with his own forces.

2. Portion of the Work:	Subcontractor name and address:
_____	_____

_____	_____

_____	_____

_____	_____

_____	_____

_____	_____

SECTION 00600

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____,
as Principal, and _____,
as Surety, are held firmly bound unto the State of Missouri (acting by and through the Missouri Highway and
Transportation Commission) in the penal sum of _____ Dollars (\$ _____),
to be paid to the State of Missouri, or the Missouri Highway and Transportation Commission, to be credited to the
State Road Fund and Principal and Surety binding themselves, their heirs, executors, administrators, successors and
assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated this _____ day of _____, 20_____

THE CONDITION OF THIS OBLIGATION is such that:
WHEREAS, the Principal is submitting herewith a bid to the Missouri Highway and Transportation Commission on
Route(s) _____,
in _____ County(ies), Project(s) _____,
for construction or improvement as set out in said proposal.

NOW THEREFORE, if the Missouri Highway and Transportation Commission shall accept the bid of the Principal,
and if said Principal shall properly execute and deliver to the Missouri Highway and Transportation Commission the
Contract, Contract Bond, Specifications and evidence of insurance coverage in compliance with the requirements of
the Proposal, to the satisfaction of the Missouri Highway and Transportation Commission, then this obligation shall
be void and of no effect, otherwise to remain in full force and effect.

In the event the said Principal shall, in the judgment of the Missouri Highway and Transportation Commission, fail to
comply with any requirement as set forth in the preceding paragraph, then the State of Missouri, acting through the
Missouri Highway and Transportation Commission, shall immediately and forthwith be entitled to recover the fees,
and any other expense of recovery.

Principal

Surety

By _____

Attorney in Fact (SEAL)

Attest: (CORPORATE SEAL)

Corporate Secretary

Note: This bond must be executed by the Principal and by a Corporate Surety authorized to conduct
surety business in the State of Missouri.

SECTION 01010
GENERAL CONDITIONS

1. General. The contractor shall do all things necessary to the performance of the contract in a substantial and acceptable manner in accordance with the specifications and plans.
2. Employer's Liability. Contractor shall furnish evidence to the Commission that with respect to the operations it performs, it either carries employers' liability or worker's compensation insurance or is qualified as self-insured under the provisions of law of the state relating to worker's compensation.
3. The Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation acts and other employee benefit acts, from claims for damages because of bodily injury, including death, and from claims for damages to property which may arise out of or result from the Contractor's operations under this Contract, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by any of them.
4. This insurance shall be written for not less than any limits of liability specified as part of this contract, or required by law, whichever is the greater, and shall include contractual liability insurance as applicable to the Contractor's obligations under this contract. Unless otherwise specified, insurance limits shall be as follows:
 - A. Workmen's Compensation: Workers Compensation Insurance, including "Occupational Disease Act" requirements, must be maintained if required by law.
 - B. Public Liability (includes property damage and personal injury):
 - i Not less than \$400,000 for any one person in a single accident or occurrence.
 - ii. Not less than \$2,500,000 for all claims arising out of a single occurrence.
5. Duration of Insurance. The evidence of insurance required by sections 2, 3, and 4 above shall be furnished to the Commission prior to the effective date of the Notice to Proceed. All insurance herein before specified shall be carried until all work required to be performed under the terms of the contract is satisfactorily completed as evidenced by the formal acceptance by the Commission and in the event that the limits of coverage for property damage are depleted or decreased by the payment of claims, the contractor shall procure a reinstatement of the limits. The cost of all insurance required to be carried by the contractor shall be considered as completely covered by the contract price.
6. Inspection of Work. Commission's engineer shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other data and records relating to the work. If requested by Commission's engineer, the contractor shall at any time before final acceptance of the work uncover any portion of the finished work as directed for inspection. After examination, the contractor shall restore said portions of the work to the standards required by the contract. Should the work thus exposed and examined prove acceptable, the actual cost of uncovering, removing and replacing shall be paid by the Commission. Should the work so exposed and examined prove unacceptable, the uncovering, removing and replacing shall be at the expense of the contractor.
7. Change Orders. All departures from the plans and specifications will be considered unauthorized unless, before proceeding with the work, the contractor has had delivered to it a change order, signed by the Commission's engineer, authorizing and directing such changes or departures. All unauthorized work shall be at the contractor's expense and the engineer may order such unauthorized work removed and replaced at the contractor's expense.
8. Defective Work. All work which has been rejected shall be remedied, or if necessary, removed and replaced in an acceptable manner by the contractor at its expense. If the contractor fails to remedy or replace such defective work immediately after receiving written notice from the Commission's engineer, Commission may employ labor to correct the defective work, and the cost incurred in making such corrections shall be deducted from the payment due or to become due the contractor under this contract.

9. Contractor's Responsibility for Work. Until Commission's engineer accepts the work, it shall be in the custody and under the charge and care of the contractor. Contractor shall rebuild, repair, restore or make good at its own expense any lost or stolen Commission-owned material and all injuries or damages to any portion of the work caused by action of the elements or from any other reason before its completion and final acceptance. Issuance of a payment estimate on any part of the work done will not be considered as final acceptance of any work completed up to that time.
10. Preservation of Utilities and Monuments. The contractor shall be responsible for the preservation of all public and private utilities, wires, lines, pipes, poles, cables, and conduit at the site of the work and shall use every precaution necessary to prevent damage or injury thereto. The contractor shall not disturb or damage any land monument or property landmark until an authorized agent has witnessed or otherwise referenced, their location and shall not remove them until directed by Commission's engineer.
11. Cooperation with Other Contractors. The contractor shall arrange its work so as not to interfere with the operations of other contractors of the Commission which might be engaged in performing adjacent or nearby work. Whenever work being done by other contractors is contiguous or related to the work involved in this contract, the respective rights of the various contractors will be determined by the Commission's engineer in order to secure the completion of the work under all contracts in general harmony.
12. Temporary Suspension of Work. Commission's engineer shall have authority to suspend work, wholly or in part, for such period or periods of time as he may deem necessary when weather or other conditions are such that in the opinion of the engineer the work may be done at a later time with advantage to the Commission or for failure on the part of the contractor to comply with any of the provisions of the contract. The contractor may suspend work for reasonable cause with written approval of the engineer. Liquidated damages shall not accrue during the period in which work is suspended with the approval of the engineer, however, if the suspension is because of the contractor's failure to comply to any of the provisions of the contract, the contractor shall not be entitled to an extension of completion time nor to a waiver of liquidated damages. In the event work is suspended, the contractor shall store all materials in a manner that will protect them from damage, and shall take every precaution to prevent damage or deterioration of, the portions of the work completed. If work has been discontinued for any reason, the contractor shall give Commission's engineer written notice at least forty-eight (48) hours before resuming operations.
13. Contractor's Procedure for Claims. If the contractor considers additional compensation may be due for work or material not clearly covered in the contract or ordered in writing by the engineer as extra work, or if additional compensation may be requested beyond the scope of such provisions, the contractor shall notify the engineer in writing of the intention to make a claim before beginning the work in question. If notification is not given and the engineer is not afforded proper facilities by contractor to provide necessary inspection and for keeping strict account of actual cost, the contractor agrees to waive any claims for additional compensation. Notice by the contractor, and the fact that the engineer has kept account of the cost shall not be construed as substantiating the validity of the claim. The contractor shall file a written notice of claim for additional compensation in triplicate within 60 days after completing the work in question.

If the claim is against the Commission, the notice of claim shall be personally delivered, or sent by certified mail to the office of the Secretary of the Commission in Jefferson City, Missouri. All notices of claims shall contain an itemized statement showing completely and fully the items and amounts forming the basis of the claim.

Any claim or an item of any claim, not included in the notice and statement, or any claim included but not clearly defined and specifically set out and itemized or any claim not filed within the time and in the manner provided, shall be forever waived and shall neither constitute the basis of nor be included in any legal action, counterclaim, set-off, or arbitration.

All claims filed with Missouri Highway and Transportation Commission's Secretary will be forwarded to the Missouri Department of Transportation's Claims Committee.

14. Overhead and Profit on Change Orders. The percentages for overhead and profit charged on Change Orders and Field Work Authorizations shall be negotiated and may vary according to the nature, extent and complexity of the work involved. However, the overhead and profit for the contractor or subcontractor actually performing the work shall not exceed 15%. When one or more tiers of subcontractors are used, in no event shall any contractor or subcontractor receive as overhead and profit more than 7% of the cost of the work performed by any of his subcontractors. In no case shall the total overhead and profit paid by the owner on any change order exceed twenty five percent (25%) of the cost of materials, labor and equipment necessary to put the change order work in place.
15. Review of Submittals. The architect's review of submittals is only for the limited purpose of checking for conformance with information given and seeing if they conform to design intent. The architect is not responsible for determining the accuracy of measurements and completeness of details, for verifying quantities, or for checking fabrication or installation procedures. The architect's review does not relieve the contractor of his or her responsibilities under the contract documents.
16. A working day. Is defined as any day when, soil and weather conditions would permit the major operation of the project for six hours or more unless other unavoidable conditions prevent the contractor's operation. If conditions require the contractor to stop work in less than six hours, the day will not be counted as a working day. Working days will begin as soon as notice to proceed is issued. In order for MoDOT not to change a workday due to unavoidable conditions, the contractor must have enough forces, equipment, and materials on site to begin the project. The contractor must notify MoDOT inspector before 12:00 noon of said working day if forces will not be present.

END OF SECTION

SECTION 01011

SUPPLEMENTARY CONDITIONS

- A. The following supplements modify, change, delete from or add to the "General Conditions."
1. The proposed work includes the furnishing of all materials, equipment and labor for the work as set forth in the plans, proposal and specifications.
 2. The contractor will be required to remove from the Highway and Transportation Commission's property all debris.
 3. The contract price shall include any necessary permits and licenses required by law incidental to the work. Local ordinances requiring building permits are not applicable to the state. Contractor will comply with local laws involving safety in the prosecution of the work.
 4. Contractor will provide a one-year warranty for parts and labor on all building material, and equipment or a standard manufacturer's warranty which ever is greater. All warranties, including extended service agreements shall begin on the date of Final Acceptance of this project.
 5. The plans holders list may be obtained from the One Stop Facility located at 1320 Creek Trail Dr., Jefferson City, Mo 65102 , by calling 573/522-5591 or electronically down-loaded from http://www.modot.org/business/contractor_resources/FacilitiesConstructionandMaintenance.htm
- B. DEFINITIONS
1. Architect: When the term "Architect" is used herein, it shall refer to Doug Record, (Building Designer) or Jerrold Scarlett (Architect) Missouri Department of Transportation, General Services Division, (573) 526-7937, FAX (573) 526-6948.
 2. Construction Inspector: When the term "Construction Inspector" is used herein, it shall refer to Kevin Griep, Missouri Department of Transportation, General Services Division, (573) 526-4860, FAX (573) 526-6948.
 3. Engineer: When the term "Engineer" is used herein, it shall refer to Paul Osborne, THHinc.

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Schedule of values.
- B. Application for payment.
- C. Change procedures.
- D. Alternatives.

1.2 RELATED SECTIONS

- A. Section 01600 - Material and Equipment: Product substitutions.

1.3 SCHEDULE OF VALUES

- A. Submit a printed schedule on Contractor's standard form. Electronic media printout will be considered.
- B. Submit Schedule of Values in duplicate within 20 days after date of Owner-Contractor Agreement.
- C. Revise schedule to list approved Change Orders, with each Application For Payment.

1.4 APPLICATIONS FOR PAYMENT

- A. Submit four copies of each application on Contractor's electronic media driven form.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: 30 days.
- D. Submit waiver of liens from vendors.
- E. Include an updated construction progress schedule.
- F. Certified payroll records.

1.5 CHANGE PROCEDURES

- A. The Architect/Engineer may issue a Notice of Change that 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.
- B. The Contractor may propose changes by submitting a request for change to the Architect/Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, the effect on the Contract Sum/Price and Contract Time, and a statement describing the effect on Work by the MoDOT District or other Contractors.
- C. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer.
- D. Construction Change Directive: Architect/Engineer may issue a directive 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.

- E. 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. Architect/Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
- F. 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.
- G. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.6 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specify requirements.
- B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct an appropriate remedy or adjust payment.

1.7 ALTERNATIVES

- A. Accepted Alternatives will be identified in Owner-Contractor Agreement.

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Preinstallation meetings.
- G. Equipment electrical characteristics and components.
- H. Examination.
- I. Preparation.
- J. Cutting and Patching.
- K. Alteration project procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of Missouri and acceptable to Architect/Engineer.
- B. Owner will locate and protect survey control and reference points.
- C. Control datum for survey is that established by Owner provided survey.
- D. Verify setbacks and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines and levels, utilizing recognized engineering survey practices.

1.4 PRECONSTRUCTION MEETING

- A. Architect/Engineer will schedule a meeting after Notice of Award.
- B. Attendance Required: District engineer or representative, Architect/Engineer and Contractor.

- C. Record minutes and distribute copies within 5 days after meeting to participants, with two copies to District Engineer, Architect/Engineer, participants and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

- A. Architect/Engineer will schedule a meeting at the Project site prior to Contractor occupancy.
- B. Architect/Engineer will record minutes and distributes copies within 5 days after meeting to participants, with two copies to Architect/Engineer, participants and those affected by decisions made.

1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at when arranged by architect/engineer.
- B. Architect/Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, District engineer representative, Architect/Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review of Work progress.
 - 2. Field observations, problems, and decisions.
 - 3. Identification of problems, which impede planned progress.
 - 4. Maintenance of progress schedule.
 - 5. Corrective measures to regain projected schedules.
 - 6. Coordination of projected progress.
 - 7. Effect of proposed changes on progress schedule and coordination.
- E. Record minutes and distributes copies within 5 days after meeting to participants and those affected by decisions made.

1.7 PREINSTALLATION MEETING

- A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Notify Architect/Engineer seven days in advance of meeting date.
- C. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- D. Record minutes and distributes copies within 5 days after meeting to participants and those affected by decisions made.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements, which affect:

1. Structural integrity of element.
 2. Integrity of weather-exposed or moisture-resistant elements.
 3. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching to complete Work, and to:
1. Uncover Work to install or correct ill-timed Work.
 2. Remove and replace defective and non-conforming Work.
 3. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Cut masonry and concrete materials using masonry saw or core drill.
- E. Fit Work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- F. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- G. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- H. Identify hazardous substances or conditions exposed during the Work to the Architect/Engineer for decision or remedy.

3.2 ALTERATION PROJECT PROCEDURES

- A. Materials: As specified in Product sections; match existing Products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. 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 submit recommendation to Architect/Engineer for review.
- D. Patch or replace portions of existing surfaces that are damaged, lifted, discolored or showing other imperfections.
- E. Finish surfaces as specified in individual Product sections.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed Products list.
- D. Product Data.
- E. Shop Drawings.
- F. Samples.
- G. Design data.
- H. Test reports.
- I. Certificates.
- J. Manufacturer's instructions.
- K. Manufacturer's field reports.
- L. Erection drawings.
- M. Construction photographs.

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals
- B. Section 01400 - Quality Control: Manufacturers' field services and reports.
- C. Section 01700 - Contract Closeout: Contract warranties, bonds, manufacturers' certificates and closeout submittals.

1.3 REFERENCES

- A. AGC Associated General Contractors of America publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.4 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Architect/Engineer accepted form.
- B. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number and specification section number, as appropriate.
- C. Apply Contractor's stamp, signed or initialed certifying that review, approval, 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.
- D. Schedule submittals to expedite the Project, and deliver to Architect/Engineer at business address. Coordinate submission of related items.
- E. For each submittal for review, allow 15 days excluding delivery time to and from the contractor.
- F. Identify variations from Contract Documents and Product or system limitations, which may be detrimental to successful performance of the completed Work.
- G. Submittals not requested will not be recognized or processed.

1.5 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedule in duplicate within 15 days after date established in Notice to Proceed.
- 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 portion of Work or operation, identifying first workday of each week.

1.6 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit 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.

1.7 PRODUCT DATA

- A. Product Data For Review:
 - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.
- B. Product Data For Information:
 - 1. Submitted for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Product Data For Project Closeout:
 - 1. Submitted for the Owner's benefit during and after project completion.
- D. Submit the number of copies, which the Contractor requires, plus two copies that will be retained by the Architect/Engineer.
- E. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- F. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700 - CONTRACT CLOSEOUT.

1.8 SHOP DRAWINGS

- A. Shop Drawings For Review:
 - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.
- B. Shop Drawings For Information:
 - 1. Submitted for the Architect/Engineer's knowledge as contract administrator or for the Owner.

- C. Shop Drawings For Project Closeout:
 - 1. Submitted for the Owner's benefit during and after project completion.
- D. Indicate special utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.
- E. Submit in the form of one reproducible transparency and one opaque reproduction.

1.9 SAMPLES

- A. Samples For Review:
 - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.
- B. Samples For Information:
 - 1. Submitted for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Samples For Selection:
 - 1. Submitted to Architect/Engineer for aesthetic, color, or finish selection.
 - 2. Submit samples of finishes for Architect/Engineer selection.
 - 3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

1.10 DESIGN DATA

- A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.11 TEST REPORTS

- A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.12 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product but must be acceptable to Architect/Engineer.

1.13 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, and start-up, adjusting and finishing, to Architect/Engineer for delivery to owner in quantities specified for Product Data.

- B. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.
- C. Refer to Section 01400 - Quality Control, Manufacturers' Field Services article.

1.14 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Architect/Engineer's benefit as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.15 ERECTION DRAWINGS

- A. Submit drawings for the Architect/Engineer's benefit as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer or Owner.

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance - control of installation.
- B. Tolerances
- C. References and standards.
- D. Mock-up.
- E. Inspecting and testing laboratory services.
- F. Manufacturers' field services.

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01600 - Material and Equipment: Requirements for material and product quality.
- C. Section 01650 - Starting of Systems.

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 with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 TOLERANCES

- A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.5 REFERENCES AND STANDARDS

- A. For Products or workmanship specified by association, trade or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

- B. Conform to reference standard by date of issue current on date for receiving bids or date specified in the individual specification sections, except where a specific date is established by code.
- C. Neither the contractual relationships, duties or responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 TESTING SERVICES

- A. Contractor to provide all testing services as called out in these specifications.
- B. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- C. Testing does not relieve Contractor to perform Work to contract requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same MoDOT personnel on instructions by the Architect/Engineer.

1.7 INSPECTION SERVICES

- A. Owner will employ MoDOT Personnel to perform inspection.
- B. Inspecting may occur on or off the project site. Perform off-site inspecting as required by the Architect/Engineer or the Owner.
- C. Inspecting does not relieve Contractor to perform Work to contract requirements.

1.8 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and the balancing of equipment as applicable and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Refer to Section 01300 - SUBMITTALS, MANUFACTURERS' FIELD REPORTS article.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

2.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities: Electricity, telephone service, facsimile service and sanitary facilities.
- B. Temporary Controls: enclosures and fencing, protection of the Work and water control.
- C. Construction Facilities: progress cleaning and temporary buildings.

1.2 TEMPORARY ELECTRICITY

- A. Cost: By Contractor; pay for temporary power service furnished by MoDOT.

1.3 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office and Architect/Engineer's field office at time of project mobilization.

1.4 FACSIMILE SERVICE

- A. Provide, maintain and pay for facsimile service and a dedicated telephone line to field office and Architect/Engineer's field office at time of project mobilization.

1.5 TEMPORARY WATER SERVICE

- A. Connect to existing water source as directed for construction operations at time of project mobilization.
- B. Contractor will reimburse Owner for water used in construction as agreed upon at time of project mobilization.

1.6 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

1.7 FENCING

- A. Construction: Use plastic mesh safety fencing or better.
- B. Provide 48" high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.8 WATER CONTROL

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

1.9 EXTERIOR ENCLOSURES

- A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.10 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 prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.11 SECURITY

- A. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism or theft.
- B. Coordinate with Owner's security program.

1.12 ACCESS ROADS

- A. Provide and maintain access to fire hydrants, free of obstructions.
- B. Provide means of removing mud from vehicle wheels before entering streets.
- C. Designated existing on-site roads may be used for construction traffic.

1.13 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris and rubbish from site periodically and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 FIELD OFFICES AND SHEDS

- A. Office: Weather tight, with lighting, electrical outlets, heating and ventilating equipment and equipped with drawing rack and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities and materials prior to 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.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

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. Instructions to Bidders: Product options and substitution procedures.
- B. Section 01400 - Quality Control: Product quality monitoring.

1.3 PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacture for components being replaced.

1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure 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 manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement or damage.

- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description is acceptable.
- 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 in accordance with the following article.

1.7 SUBSTITUTIONS

- A. Architect/Engineer will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.
- 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 that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that 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. Burden of proof is on proposer.
 - 3. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01650

STARTING OF SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting and balancing.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control: Manufacturers field reports.
- B. Section 01700 - Contract Closeout: System operation and maintenance data and extra materials.

1.3 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, and control sequence and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01300 that equipment or system has been properly installed and is functioning correctly.

1.4 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Final Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance and shutdown of each item of equipment at agreed time, at equipment location.

- E. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instruction.
- F. The amount of time required for instruction on each item of equipment and system that's specified in individual sections.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Spare parts and maintenance Products.
- G. Warranties.

1.2 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.
- B. Section 01650 - Starting of Systems: System start-up, testing, adjusting and balancing.

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 Architect/Engineer's review.
- B. Provide submittals to Owner that is required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.
- D. Owner will occupy portions of the building as specified in Section 01010.

1.4 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- C. Clean or replace filters of operating equipment used during construction and/or adjustment.
- D. Clean debris from roofs, gutters, downspouts and drainage systems.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish and construction facilities from the site.

1.5 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.6 PROJECT RECORD DOCUMENTS

- A. Store record documents separate from documents used for construction.
- B. Record information concurrent with construction progress.
- C. 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.
- D. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish main floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.
- E. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned with Architect/Engineer comments. Revise content of all document sets as required prior to final submission.
- E. Submit two sets of revised final volumes, within 10 days after final inspection.

1.8 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra Products in quantities specified individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.9 WARRANTIES

- A. Execute and assemble transferable warranty documents from Subcontractors, suppliers and manufacturers.
- B. Submit prior to final Application for Payment.
- C. For items of Work delayed beyond date of Final Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of the warranty period.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

PROJECT SOLUTIONS SPECIFICATIONS INSERTED

**SECTION 02230
SITE CLEARING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work necessary to clear the site of existing vegetation and other items indicated within the limits of the proposed improvements.

1.02 BENCHMARKS AND CONTROL

- A. Maintain and protect benchmarks, monuments, and other reference points.
- B. If disturbed or destroyed, replace as directed by Owner's Representative.

1.03 RELATED SECTIONS

- A. Section 02300 – Earthwork
- B. Section 02315 – Utility Excavation and Backfill

1.04 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- A. Work under this section will not be measured for payment. Plan quantity will be utilized unless the Owner or the Owner's Representative authorizes a change in the project limits.
- B. Payment will be made in accordance with the Bid Document of the Project Manual. If no bid item is noted, this work will be considered incidental to the project.

PART 2 – PRODUCTS

2.01 BACKFILL

- A. Backfill excavations resulting from removal in accordance with these Specifications.

PART 3 – EXECUTION

3.01 CLEARING AND GRUBBING

- A. Clearing shall consist of the satisfactory disposal of the vegetation in areas designated for construction.
- B. Grubbing shall consist of the removal and disposal of roots larger than 3" in diameter, matted roots, and other organic material from the construction areas. Excavate and remove this material, together with other debris not suitable for foundation purposes, to a depth of not less than 18" below the level of paved surfaces.

3.02 CLEAN UP AND DISPOSAL

- A. Removed materials shall be promptly disposed of off the site and not allowed to accumulate on the premises.
- B. Remove and transport debris in a manner as to prevent spillage on streets or adjacent areas.

END OF SECTION 02230

**SECTION 02240
EROSION CONTROL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Installation of temporary water pollution control measures to prevent discharge of pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful material from the project.

1.02 GENERAL

- A. The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.
- B. The Contractor shall furnish, install, maintain, and remove temporary erosion control measures. The Contractor shall prevent discharging silt or polluted storm water from the site.
- C. The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative the Contractor's efforts are inadequate.

1.03 DEFINITIONS

- A. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.
- B. Temporary Slope Drain: A temporary facility used to carry water down a slope.
- C. Ditch Check: An obstruction placed at frequent intervals across ditches, creating small ponds to cause sediment to settle and be contained.
- D. Sediment Basin: An excavated or dammed storage area to trap and store sediment and prevent the discharge of silt.
- E. Temporary Seeding and Mulching: Placement of a quick ground cover to reduce erosion in areas expected to be re-disturbed.
- F. Straw Bales: Standard agricultural bales used to filter the flow of water trap, deposit sediment, and/or divert water.
- G. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.
- H. Temporary Pipe: Conduit utilized to carry water under haul roads, silt fences, etc., and prevent equipment from direct contact with water when crossing an active or intermittent stream.
- I. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

1.04 SUBMITTALS

- A. The Contractor shall submit his proposed "Erosion Control Plan" for review and approval by the Owner's Representative. Approval of the plan does not relieve the Contractor of his contractual responsibility to prevent the discharge of pollutants into the receiving drainage ways.

1.05 RELATED SECTIONS

- A. Section 02921 – Surface Restoration

**SECTION 02240
EROSION CONTROL**

1.06 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- A. No measurement of Erosion Control Facilities will be made. The Contractor will include all labor and material costs in the Lump Sum bid price for "Erosion Control".
- B. Removal of accumulated sediment will be paid per cubic yard if listed as a bid item in the contract. Sediment removal will include removal and disposition in a location where it will not erode into construction areas or watercourses.
- C. If listed as a bid item, the quantity of temporary silt fence may increase or decrease due to weather, construction procedures, and actual site conditions. Such variations in quantity will not be considered an alteration in the detail of construction or a change in the character of the work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Temporary slope drains: Stone, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe or flexible rubber pipe.
- B. Ditch Checks:
 - 1. Rock ditch checks: 2" to 3" clean gravel or limestone.
 - 2. Straw bale ditch checks: Rectangular wheat straw bales in good condition. Other foliage may be substituted for straw in accordance with MoDOT 802.2.1.
 - 3. Silt fence ditch checks: Geotextile meeting the requirements of this specification.
- C. Riprap for Temporary Erosion Control: Type 1 Rock Blanket conforming to MoDOT 611.30.2.
- D. Pipe: Corrugated metal (16 Ga.) or ADS N12 Corrugated Plastic.
- E. Temporary Seeding:
 - 1. December 1 to March 1: 50 lbs oats/acre.
 - 2. March 1 to December 1: 50 lbs cereal rye or wheat.
 - 3. Mulch shall be wheat straw.
- F. Wire Supported and Self Supporting Silt Fence:
 - 1. Geotextile Fabric
 - a. Fibers used in geotextiles shall consist of longchain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.
 - b. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.
 - c. Geotextile shall be furnished in 36" width rolls.
 - d. Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.
 - e. Each roll shall be labeled or tagged to provide product identification sufficient for inventory.
 - f. Rolls shall be stored in a manner, which protects them from the elements.

**SECTION 02240
EROSION CONTROL**

g. Geotextile shall conform to the following:

TABLE 1
PHYSICAL REQUIREMENTS¹ FOR
TEMPORARY SILT FENCE GEOTEXTILES

<u>Property</u>	<u>Test Method</u>	<u>Wire Fence Supported Requirements</u>	<u>Self Supported Requirements</u>
Tensile Strength, Lbs. Elongation at 50% Minimum	ASTM D4632	90 Minimum ²	90 Minimum ²
Tensile Strength (45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51 ³	75	75
Flow Rate gal/ft/min	VTM-51 ³	0.3	0.3
Ultraviolet Degradation at 500 hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

Notes: 1. All numerical values represent minimum average roll value.
2. When tested in any principal direction.
3. Virginia DOT test method.

2. Posts: Wood, steel, or synthetic posts may be used. Posts shall have a minimum length of 36" plus embedment depth (24" min.). Posts shall have sufficient strength to resist damage during installation and to support applied loads.
3. Support Fence: Wire or other support fence shall be at least 24" high and strong enough to support applied loads.
4. Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

2.02 CERTIFICATION AND SAMPLING:

- A. The Contractor shall furnish a manufacturer's certification, stating the material conforms to the requirements of these specifications.
- B. The certification shall include, or have attached, typical results of tests for the specified properties, representative of the materials supplied.
- C. The Owner's Representative reserves the right to sample and test any material offered for use.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.
- B. The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lakes, ponds, or other areas of water impoundment. Work may involve the

**SECTION 02240
EROSION CONTROL**

construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.

- C. The Contractor shall incorporate permanent erosion control features at the earliest practicable time.
- D. The Contractor at no additional cost shall provide temporary pollution control measures needed to control erosion during normal construction practices to the Owner.

3.02 LIMITATION OF AREA DISTURBED:

- A. The Contractor's operations shall be scheduled to install permanent erosion control features immediately after clearing and grubbing, and grading.
- B. The surface area of erodible earth material exposed at one time by clearing and grubbing, excavating, fill, or borrow shall not exceed 200,000 square feet without written approval of the Owner's Representative.
- C. The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching, seeding, and other such permanent pollution control measures current.
- D. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

3.03 RIVERS, STREAMS, AND IMPOUNDMENTS:

- A. Construction operations in rivers, streams, and impoundments shall be restricted to areas, which must be entered for the construction of temporary or permanent structures.
- B. Rivers, streams, and impoundments shall be promptly cleared of falsework, piling, debris, or other obstructions as soon as practical.
- C. Frequent fording of live streams with construction equipment will not be permitted.
- D. Temporary bridges or other structures shall be used when the Contractor's operations include cycling of equipment across streams, rivers, or impoundments.
- E. Mechanized equipment shall not be operated in flowing streams except as required to construct channel changes and temporary or permanent structures.

3.04 BORROW AND WASTE AREAS

- A. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

3.05 CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS

- A. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

3.06 TEMPORARY BERMS

- A. Temporary berms shall be constructed at the top of newly constructed slopes and / or transverse to grade to divert runoff and prevent erosion until permanent controls are installed

**SECTION 02240
EROSION CONTROL**

and / or slopes are stabilized. Two types of temporary berms will be utilized under conditions listed below:

1. Type "A" Berm: At the end of each day's operations on embankments.
 2. Type "B" Berm: At shut down of embankment operations for the winter season or discontinuation of work at the direction of, or with concurrence of the Owner's Representative.
- B. Interceptor berms transverse to centerline may be used when temporary berms are installed on grades in excess of 1 percent and at locations where water is to be carried down the fill slope by temporary or permanent slope drains.
- C. Construction Requirements:
1. Type A Berms shall be constructed to the approximate dimensions indicated on the drawings. Berms shall be machine compacted with a minimum of one pass over the entire width with a bulldozer tread, grader wheel, or other approved method.
 2. Type "B" Berms shall be constructed to the approximate dimensions indicated on the drawings. These berms shall be machine compacted with a minimum of three passes over the entire width with a bulldozer tread, grader wheel, or other approved method.
 3. Type "A" and Type "B" Berms must drain to a compacted outlet at a slope drain. The top width of these berms may be wider and the side slopes flatter on transverse berms to allow equipment to pass over these berms with a minimal disruption.

3.07 TEMPORARY SLOPE DRAINS

- A. General:
1. Temporary slope drains are required to concentrate water flowing down a slope prior to installation of permanent facilities. Slope drains shall be placed at approximately 500-foot intervals or as directed by the Owner's Representative.
- B. General Requirements
1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flow carrying silt, and other locations necessary to prevent the discharge of silt from the site.
 2. Installation shall conform to the drawing detail.
 3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.
- C. Construction Requirements:
1. Temporary slope drains shall be anchored to prevent disruption by the force of the water flowing in the drain.
 2. The inlet end shall be constructed to channel water into the drain.
 3. The outlet ends of these temporary slope drains shall have some means of dissipating the energy of this water to reduce erosion downstream.
 4. Unless otherwise directed by the Owner's Representative, temporary slope drains shall be removed when no longer necessary and the site restored to match the surroundings.

3.08 DITCH CHECKS

**SECTION 02240
EROSION CONTROL**

A. General:

1. Rock ditch checks may be used on ditches with grades of 4 percent or less.
2. Straw bale ditch checks may be used on all ditches.
 - a. The silt fence fabric may be eliminated for grades of 2 percent or less.
3. Silt fence ditch check may be used on all ditches.
4. A straw bale ditch check or a silt fence ditch check may be used in lieu of a sediment basin for drainage areas less than two acres. The basin shall have a volume of 1,815 CF per acre of contributing drainage area.

B. Construction Requirements:

1. Construct rock ditch checks in accordance with the drawing detail.
 - a. Achieve complete coverage of the ditch or swale and insure the center of the check is lower than the edges.
2. Construct straw bale ditch checks in accordance with the drawing detail.
3. Construct silt fence ditch checks in accordance with the drawing detail.

C. Maintenance:

1. Inspect ditch checks for sediment accumulation after each rainfall.
2. Sediment shall be removed when it reaches one-half of the original height.
 - a. Regular inspections shall insure that the center of a rock check is lower than the edges. Correct erosion caused by high flows around the edges of the check immediately.

3.09 SEDIMENT BASIN

A. General

1. Sediment basins are used for drainage areas of two (2) to five (5) acres or for a roadway ditch exceeding 1,000 consecutive feet in length. Break larger drainage areas or longer ditches into smaller areas.

B. Construction Requirements:

1. The area where a sediment basin is to be constructed shall be cleared of vegetation.
2. Construct the inlets of sediment basins with a wide cross-section and a minimum grade to prevent turbulence and allow deposition of soil particles.
 - a. The minimum depth is 2'; the maximum depth is 6'.
 - b. The minimum width is 5'; the maximum width is 20'.
 - c. The minimum length is 25'; the maximum length is 200'.
 - d. The minimum volume shall be 1,815 CF per acre of drainage area.
3. Sediment basins shall remain in service until all disturbed areas draining into the structure have been stabilized.
4. When use of sediment basin is discontinued, backfill all excavations and compact fill. Fill material shall be removed and the existing ground restored to the original or plan grade.

C. Maintenance

**SECTION 02240
EROSION CONTROL**

1. When the depth of sediment reaches 1/3 of the depth of structure in any part of the pool, all accumulation shall be removed.
2. Removed sediment shall be disposed of in locations that the sediment will not erode into the construction areas or into natural waterways. The same holds true for excavated material removed during construction of the sediment basin.

3.10 TEMPORARY SEEDING AND MULCHING

A. General

1. This item is applicable to all projects.
2. Seeding and/or mulching shall be a continuous operation on all cut slopes, fill slopes, and borrow pits during the construction process. All disturbed areas shall be seeded and mulched within five (5) working days after the last construction activity in all locations where necessary to eliminate erosion.

B. Construction Requirements:

1. Permanent seeding and mulching following temporary seeding will be performed during the favorable seeding seasons only.
2. Temporary seeding mixtures and planting season:
 - a. December 1 to March 1: 50 lbs. oat grain per acre
 - b. March 1 to December 1: 50 lbs. (cereal rye or wheat) per acre
3. Temporary mulch, fertilizer, and lime for seeding:
 - a. Fertilizer and mulch for temporary seed mixtures shall be applied in accordance with Section 02921.
 - b. Fertilizer shall be applied at the rate specified for permanent seeding.
 - c. Lime will not be required for temporary seeding.

3.11 STRAW BALES

A. General

1. Install at the bottom of embankment slopes less than 10' high to divert runoff from sheet flow and intercept some of the sediment in the sheet flow.
2. Install as ditch checks in small ditches and drainage areas.
3. Install on the lower side of cleared areas to catch sediment from sheet flow.

B. Construction Requirements:

1. Bales of straw shall be utilized to control erosion, trap sediment, and divert runoff.
2. Bales must be adequately braced from behind.

3.12 SILT FENCE

A. General

1. Install along the toe of fills over 10' in height, along the right-of-way line, parallel to streams or around an inlet to prevent sediment from entering the pipe system.

B. General Requirements:

**SECTION 02240
EROSION CONTROL**

1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.
2. Installation shall conform to the detail at the end of this section.
3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

C. Installation

1. Geotextile at the bottom of the fence shall be buried as indicated on the detail.
2. The trench shall be backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.
3. Post Installation
 - a. Post spacing shall not exceed 8' for wire support fence installation or 5' for self supported installations.
 - b. Posts shall be driven a minimum of 24" into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner's Representative.
 - c. Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.
4. When support fence is used, the mesh shall be fastened securely to the upstream side of the post.
 - a. The mesh shall extend into the trench a minimum of 2" and extend a maximum of 36" above the original ground surface.
5. When self-supported fence is used, the geotextile shall be securely fastened to fence posts.
6. Maintenance
 - a. The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.
 - b. The Contractor shall inspect all temporary silt fences immediately after each rainfall. Inspect daily during prolonged rainfall.
 - c. The Contractor shall immediately correct deficiencies.
 - d. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.
 - e. Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.
7. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.
8. The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area in accordance with Section 02921.

3.13 TEMPORARY PIPE

A. General:

**SECTION 02240
EROSION CONTROL**

1. The Contractor shall install temporary pipes and fill at locations, to be crossed by the Contractor's equipment, which carry a concentrated flow during rain events.

B. Construction Requirements:

1. All temporary pipes shall be installed in the same manner as permanent pipe is installed on the project to assure that the water does not cause erosion around the pipe.
2. Material to backfill the pipe should be placed in 6" lifts and mechanically compacted. Compaction testing will not be required.

3.14 SEDIMENT REMOVAL

A. General

1. Sediment deposits shall be removed when:
 - a. The deposits reach approximately one-half the height of a ditch check, straw bale barrier or silt fence.
 - b. The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.
 - c. Requested by the Owner's Representative.
- B. Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

END OF SECTION 01570

**SECTION 02315
UTILITY EXCAVATION AND FILL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section encompasses the work required for excavation of trenches, structures, appurtenances, bedding, over-excavation of unsuitable material, and backfilling for the installation of utilities.
- B. Definitions
1. Maximum Density: Maximum dry weight in pounds per cubic foot of a specific material, as determined by ASTM D698, Standard Proctor Density.
 2. Optimum Moisture: Percentage of water at maximum density.
 3. Rock Excavation: Material that requires blasting or jack hammering for its practical and effective removal.
 - a. Materials include sandstone, limestone, flint, granite, quartzite, or similar material, in masses measuring more than one (1) cubic yard in volume or in ledges 4" or more in thickness.
 - b. Rock encountered in two or more ledges, being 3" or thicker, with interlaying earth strata ≤ 12 " thick, the entire volume from the top of the top ledge to the bottom of the bottom ledge will be classified as rock.
 4. Rubble: Buried concrete foundations, beams, walls, and other material which requires blasting or jack hammering for its practical and effective removal.
 5. Earth Excavation: Earth excavation will include all material not otherwise classified. Decomposed or disintegrated shale, which can be effectively plowed, spaded, or removed with power drive excavation equipment, and gravel base will be classified as earth excavation.
 6. Unstable Subgrade is subgrade softened, eroded by flooding or placement during unfavorable weather, or other Contractor controlled actions.
 7. Unsuitable Subgrade is natural material that cannot be compacted to the requirements of this section.
 8. Over excavation of Unsuitable Material: Removal of material that is too soft to provide adequate support as determined by the Owner's Representative for pipe being placed in the bottom of the trench.
 9. Granular Material Backfill and Bedding: Coarse sand, crushed rock or gravel, free from dust, clay, organic, and other undesirable materials.
 10. Payment Line: Used for over excavation of unsuitable material. The payment line shall be considered the lower of the bottom of the bedding material or a line 6" below and parallel to the pipe flow line. Width of over excavation shall be 2-feet greater than the outside diameter of the pipe.

1.02 JOB CONDITIONS

- A. Blasting: Blasting is not permitted on this project.
- B. Length of open trench.
1. The maximum length of open trench shall be 200 feet in public right-of-way and 400 feet elsewhere.

**SECTION 02315
UTILITY EXCAVATION AND FILL**

2. The Contractor shall not leave an unattended open trench without fencing.
- C. Protection of existing underground utilities.
1. The location of existing utilities shown on the drawings is based upon information and data supplied to the Owner or Engineer by the owner of the utility. The utilities are shown for information only. The information is not guaranteed to be either complete or accurate. It is the Contractor's responsibility to contact all utilities and obtain utility staking prior to construction.
 2. Any damage to existing utilities shall be reported to the utility and repaired in accordance with the utility's standards.
 3. The cost of repairs to damaged utilities shall be borne by the Contractor.
 4. If utility service must be interrupted to complete a construction operation, the Contractor shall obtain permission from the utility.
 - a. The Contractor shall provide affected residents or businesses written notice at least 48 hours in advance of the time of the interruption and the expected duration of the interruption.
 - b. Notice shall be hand delivered to each affected structure.
 - c. If the utility requires standby service, it shall be provided at the Contractor's expense.
 5. If a non-scheduled interruption of utility service results from accidental damage, the Contractor shall take immediate steps as necessary to notify the utility and restore service. The Contractor's personnel shall not leave the site until the interruption has been restored.
- D. Work within Highway, Railroad, or Utility Right of Way
1. When the Contractor performs work within the right-of-way of other jurisdictions such as railroads, highways, or utilities, such work shall comply with applicable permits or regulations of such jurisdiction in addition to the requirements of this section.
- E. Scheduling
1. Clean up shall be performed promptly following utility installation backfill.
 2. Repair of trench settlement shall be performed promptly.
- F. Erosion Control
1. The Contractor shall comply with the Drawings, Specifications, and all applicable Federal, State, or Local erosion control regulations.
 2. The Contractor shall perform regular maintenance of all erosion control devices until time of final acceptance.
- G. Maintenance
1. The Contractor is responsible for repair of trench settlement up to the level of the adjacent grade that occurs during construction, as well as the warranty period. This shall include restoration of the finish surface as appropriate.

**SECTION 02315
UTILITY EXCAVATION AND FILL**

H. Driveway Closing

1. Driveway closing will be limited to a maximum of 12 hours, except during reconstruction of the driveway or main line paving in front of a residence. Provisions shall be made for alternate parking and pedestrian access.
2. Access shall be continuously maintained to non-residential properties.
3. Costs associated with construction phasing shall be considered incidental to the Project, unless noted otherwise.

1.03 SITE COMPACTION TESTING

- A. The Owner's Representative will perform testing of compacted fill materials.
- B. Notify the Owner's Representative when work or portions of work under this Section are completed.
- C. If, during progress of work, tests indicate that compacted materials do not meet specified requirements, remove defective work. Replace at no cost to Owner.
- D. Allow the Owner's Representative the opportunity to test compacted fills before proceeding with placement of surface materials.
- E. Absence of compaction testing shall not relieve the Contractor of his obligation to satisfy the compaction requirements of this section.

1.04 PROTECTION

- A. Protect trees, shrubs and lawns, areas to receive planting, rock outcroppings, and other features remaining as part of final landscaping.
- B. Protect benchmarks and existing structures, roads, sidewalks, paving, and curbs against damage from equipment and vehicular or foot traffic.
- C. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods, as required to prevent cave-ins or loose dirt from falling into excavations.
- D. Underpin adjacent structure(s), which may be damaged by excavation work, including service lines and pipe chases.
- E. Notify the Owner's Representative of unexpected subsurface conditions and discontinue work in area until the Owner's Representative provides notification to resume work.
- F. Grade around excavations to prevent surface water runoff into excavated areas.

1.05 METHOD OF MEASUREMENT AND BASIS OF PAYMENT:

- A. Unless specifically set forth as a bid item, excavation, bedding, and backfilling for trenches and appurtenances is incidental to the construction of the utility
- B. Rubble or Rock: Payment for trench excavation in rubble or rock as defined in this specification shall be made at the unit price per cubic yard for "rock excavation" **only** if set forth as a separate bid item. The upper pay limit for "rock excavation" shall be the top surface of the rubble or rock and the lower pay limit shall be the bottom stratum or layer of rubble or rock, or a line 6" below the pipe, whichever is higher in elevation. The width limit for payment in rubble or rock shall be the outside diameter of the pipe being installed plus 24".
- C. Over excavation of unsuitable material and the granular material used for backfill within payment lines will be measured by the Owner's Representative and paid for by the cubic

**SECTION 02315
UTILITY EXCAVATION AND FILL**

yard. Excavation below the payment line and payment for special pipe foundation requires the approval of the Owner's Representative.

- D. Clearing and Grubbing: Clearing and grubbing will be a non-bid item and is incidental to the work unless otherwise noted in the bid documents.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Backfill

1. Suitable Excavated Material: Free of cinders, ashes, refuse, sod, vegetative, or organic matter, boulders, rocks, or pavement fragments.
2. Sand backfill is not permitted unless specifically called out on the drawings.
3. Granular backfill: Crushed limestone or gravel with 100% passing a 1" sieve, 20-75% passing a No. 4 sieve, 20-40% passing a No. 8 sieve, and 6-16% passing a No. 200 sieve.

B. Trench Stabilization

1. Trench stabilizing material shall consist of crushed rock or other approved material with 100% passing the 3" sieve and 25-95% passing the 1" sieve.

C. Concrete

1. Concrete shall be a commercial grade with a minimum 28-day compressive strength of 4,000 psi.

D. Bedding

1. Gravity Storm Sewer or Sanitary Sewer Pipe Bedding Material:
 - a. Rigid Pipe: Clean gravel or crushed rock shall meet the following gradation for rigid sewer pipe (RCP, DIP, VCP).

Pipe Size	95% Passing	95% Retained	Maximum Size
Up to 18"	½ - inch	No. 4	¾ - inch
20"- 30"	1 - inch	No. 4	1-½ inch
Over 30"	2 - inch	No. 4	3 - inch

- b. Non-Rigid Pipe (PVC or CMP): Gravel or crushed rock meeting the following gradation; 100% passing a ¾" sieve, 50-80% passing a No. 4 sieve, and 25-60% passing a No. 8 sieve.
 2. Water Main and Force Main Bedding Material
 - a. Not required except for trench bottoms carried below required grade. Use compacted sewer pipe bedding or gravel for trench bottoms carried below required grade.

**SECTION 02315
UTILITY EXCAVATION AND FILL**

PART 3 - EXECUTION

3.01 GENERAL

- A. Replace or reinstall obstructions removed to accommodate construction equipment or to facilitate excavation after construction.
- B. Do not remove trees unless noted on the drawings. Exercise care in operating equipment beneath the drip line or adjacent to trees to prevent damage. If damage occurs, the Contractor shall retain a Professional Arborist at the Contractor's expenses to repair the damage.
- C. Pile excavated material suitable for backfill in an orderly manner a sufficient distance from the edge of excavation to avoid rollbacks, slides, or cave-ins.
- D. Excavate by open-cut method for utilities and structures except as noted on Drawings.
- E. The Contractor shall be responsible for providing barricades and protection around excavation and work areas.
- F. The Contractor shall be responsible for removing and replacing fences that are disturbed by construction operations. Materials shall be new and type shall match existing.
- G. Work in areas containing crops, where practical, shall be started after the crops have been harvested or before the crops are planted. Compensation for crop damage outside the easement limits shall be the responsibility of the Contractor.

3.02 SAFETY

- A. The means of the work and the safety of the Contractor's employees are solely the responsibility of the Contractor. The Contractor has a contractual obligation to comply with all applicable laws and regulations including those of OSHA. At no time will either the Owner or Owner's Representative take responsibility for either the means of the work or the safety of the Contractor's employees.

3.03 SHEETING, SHORING, AND BRACING

- A. Construct sheeting, shoring, and bracing required to hold walls of excavation, provide a safe area for workmen, protect existing utilities and structures, and to permit construction in the dry.
- B. Sheeting may be wood or steel.
- C. Wood Sheeting Driven below Level of Utility: Leave in place to a level of 5' below finished grade.
- D. Pull steel sheeting.
- E. When using a moveable trench box, below the spring line of pipe, it shall be lifted prior to any forward movement to avoid pipe displacement.
- F. Sheeting, shoring, and bracing shall not be paid for separately, but is considered incidental to the project.
- G. Sheeting and shoring shall be in accordance with OSHA and other applicable governmental regulations. The Contractor shall be solely responsible for complying with the regulations.
- H. Provide the Owner's Representative with shop drawings of proposed sheeting or shoring, signed and sealed by a registered Professional Engineer, licensed to practice in the state that the project is in.

**SECTION 02315
UTILITY EXCAVATION AND FILL**

3.04 PREPARATION

A. Clearing

1. Remove vegetative material and obstructions as necessary for construction.
2. The Contractor shall properly dispose of removed material off the project site.
3. The greater of the existing topsoil layer or the top 6" of native material shall be removed and stockpiled for the finish surface of backfill, except in areas of existing or proposed pavement or noted otherwise on the Drawings.

3.05 PERFORMANCE

A. General

1. General: Surplus and rejected unsuitable excavated material becomes property of the Contractor for disposal.

B. Excavation for Utility Structures

1. Stockpile topsoil for later distribution on the finished grade.
2. Remove rubble or rock to 12" below the bottom of the foundation and 12" horizontally from any vertical surface.
3. Subgrade: The subgrade below each major portion of a structure shall be inspected by the Owner's Representative prior to placing stone base course or placing reinforcing bars.
4. Excavation shall be to firm undisturbed soil. If excavation is carried below the bottom of foundations, the Contractor shall fill with concrete or compacted granular material in accordance with this Specification.

C. Trench Excavation

1. Excavated material shall be stored in such a manner as to avoid property damage. Repair any damage at the Contractor's expense.
2. Excavate the base of the trench to provide a uniform and continuous bearing and support on solid and undisturbed material.
3. The minimum trench width shall be sufficient to allow space for jointing and bedding. The maximum allowable trench width at a point 12" above the top of the pipe (pipe envelope) shall be 30" for pipes 6-10" in diameter. For pipes 12" in diameter or larger, the maximum trench width shall be the outside diameter plus 24". For elliptical or arch pipes, it shall be the outside dimension at the spring line plus 24".
4. If rubble or rock is encountered, the trench shall be excavated to provide clearance of at least 6" below and 12" on each side of the utility line and fittings.
5. Remove and repair Unstable Subgrade at the Contractor's expense.
6. Over excavation of Unsuitable Material: When the Contractor encounters material that is not suitable for supporting the pipe line or structure being constructed, the Contractor shall notify the Owner's Representative to obtain written instructions on how to proceed. Material removed prior to authorization of the Owner's Representative will not be eligible for payment. The over excavation will be backfilled to the payment line with granular material.

**SECTION 02315
UTILITY EXCAVATION AND FILL**

D. Bedding

1. Provide rigid gravity storm or sanitary sewer pipe with compacted granular bedding having a minimum thickness of 4" or 1/8th of the outside pipe diameter, whichever is greater.
2. Provide non-rigid gravity storm or sanitary sewer pipe with compacted granular bedding having a minimum thickness of 4" or 1/4th of the outside pipe diameter, whichever is greater.
3. Water mains or sanitary sewer force mains may be installed with undisturbed or compacted soil bedding provided the subgrade is consistent and the Contractor provides hand excavation for bells such that the pipe barrel bears evenly on the subgrade.

E. Dewatering

1. Excavation, installation of bedding, pipes, structures, and backfilling shall be done in dry conditions. If the subgrade is saturated or standing water exists, the work area shall be dewatered prior to installation or backfilling operations.
2. The Contractor shall make provisions to handle water encountered during construction. The Contractor shall obtain approval from the Owner's Representative of the proposed method of dewatering.
3. The Contractor shall prevent surface water from flowing into the excavated area. Divert or pump stream flow past the area of construction. Remove water accumulating in the area of construction.
4. Do not pump water onto adjacent property without approval of the Owner's Representative and adjacent property owner.

F. Backfill for Structures

1. Do not place backfill, adjacent to concrete structures, until the concrete has achieved at least 75% of its design strength.
2. Backfill simultaneously on all sides of structure. Protect structures from damage.
3. Place backfill in lifts of 8" or less prior to compaction.
4. Compact backfill areas to 95% of maximum Standard Proctor Density or 75% Relative Density (ASTM D4253 or ASTM D4254) for clean granular material.

G. Trench Backfill

1. Trenches shall be backfilled only after the locations of connections and appurtenances have been recorded by the Contractor on the drawing set. This information is to be submitted to the Owner's Representative with other construction record information.
2. Place backfill in lifts of 8" or less prior to compaction.
3. Carefully place backfill in the pipe envelope (top of bedding to a point 12" above the pipe). Material shall be of even consistency and free of clumps and boulders, finely divided. Compact material to 95% maximum Standard Proctor Density. Material within the pipe envelope shall be the same as specified for trench backfill, unless noted otherwise on the Drawings.
4. Place backfill simultaneously on both sides of pipe to prevent displacement.
5. Place backfill into the trench at an angle so that impact on installed pipe is minimized.

**SECTION 02315
UTILITY EXCAVATION AND FILL**

6. Install a 3' minimum cushion of backfill above pipe envelope before using heavy compacting equipment. If pipe is damaged, replace the section of damaged pipe and provide additional depth of cushion.
7. Backfill Above the Pipe Envelope
 - a. Under and within 5' of pavement and undercut structures or right of way, compact suitable excavated material to 95% of maximum Standard Proctor Density. The Contractor may substitute granular backfill with no additional cost to the Owner.
 - b. Under landscaped and lawn areas, compact suitable excavated material to 90% of maximum Standard Proctor Density. The top 12" of the backfill shall be soil equal to the stockpiled topsoil.
 - c. Under all other areas, unless noted otherwise on the plans, compact suitable, native material to 85% of maximum density. The top 12" of the backfill shall be soil equivalent to the stockpiled topsoil. Round the surface neatly, 2-4" above the original surface.
8. Sand backfill shall be used only if specifically called out in the Drawings or authorized by the Owner's Representative. If utilized the Contractor shall:
 - a. Backfill with sand up to bottom of specified surface restoration.
 - b. Compact to 75% Relative Density (ASTM D4253) under and within 5' of pavement; 70% Relative Density (ASTM D4253) in other areas.
 - c. Place sidewalk and pavement base and/or surface above compacted backfill as noted on the Plans.
 - d. Place top 12" of soil equivalent to stockpile topsoil in all other locations.

3.06 FIELD QUALITY CONTROL

- A. The Contractor shall furnish and provide equipment and personnel to provide access for the Owner's Representative to any test location and test depth necessary, in the Owner's Representative's opinion, to properly evaluate compaction effort.
- B. If specified compaction rates are not attained, the Owner's Representative may require the Contractor to utilize different compaction methods or lift thickness.
- C. Compaction Testing
 1. The Owner's Representative will perform compaction testing, unless noted otherwise.
 2. The moisture density relation to be used in establishing compaction will be ASTM D698 (Standard Proctor) or ASTM D4253 (Relative Density).
 3. Compaction effort may be evaluated by the use of any of the following standard test methods:
 - a. ASTM D-2937 (drive cylinder)
 - b. ASTM D-2167 (rubber balloon)
 - c. ASTM D-1 556 (sand cone)
 - d. ASTM D-2922 (nuclear)
 4. The Owner's Representative will determine the Compaction Testing Frequency.

END OF SECTION 02315

**SECTION 02530
SANITARY SEWERAGE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Gravity sanitary sewers and appurtenances including submittals, materials, material tests, manholes, pipe, installation of pipe and appurtenances, and testing.

1.02 RELATED SECTIONS

- A. Section 01320 - Submittals
- B. Section 02315 - Utility Excavation and Fill

1.03 SUBMITTALS

- A. Manufacturer's specifications and/or catalog data listing for pipe, manhole steps, covers and frames, and other special items.
- B. Shop drawings showing reinforcing steel details, structural steel details, structural steel supports, and mechanical details for structures and specialty items.
- C. Pipe manufacturers installation instructions.
- D. Material and pressure test certifications.
- E. Such other information as the Owner's Representative may request.

1.04 PRESENCE OF UNDERGROUND UTILITIES

- A. If utility services are encountered, the Contractor is responsible to have the services relocated if necessary or repaired if damaged.
- B. If a main line utility is in direct conflict to the proposed work, the Contractor shall report the conflict to the Owner's Representative immediately. The Owner's Representative will advise the Contractor how the conflict will be resolved.
 - 1. A direct conflict is defined as the existing utility occupying the exact location that the sewer is to be laid.
 - 2. Relocation and/or support of utilities which are near the sewer location, but not in direct conflict, shall be considered incidental to the sewer work. It is the Contractor's responsibility to arrange and pay for such relocation or support.
- C. Separation from Water Lines:
 - 1. Sanitary sewer lines shall be a minimum of 10' from a water line when running parallel.
 - 2. At water line crossings, provide a minimum of 18" between pipes. Sewer line shall have a full length of pipe centered over or under the crossing water line.
 - 3. If the separation requirements are not available, immediately notify the Owner's Representative.
- D. Service Line Witnesses: Promptly record the location of wyes along the sewer line. Distance from the downstream manholes may be used or record the actual station along the sewer line. Wyes shall be shown on the Contractor's Record Drawing Set.

1.05 JOB CONDITIONS

- A. Existing Wastewater System: The Contractor shall maintain operation of the existing wastewater system during construction.

**SECTION 02530
SANITARY SEWERAGE**

B. Scheduling:

1. Backfill, grading, and clean up shall be no more than 200 feet behind the location of the pipe placement.
2. The Contractor shall maintain trenches for settling.

1.06 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. Manholes:

1. Standard Manhole: A precast concrete structure, with eccentric or concentric cone, for vertical access to a sewer line. For payment purposes, a standard manhole is considered to have a depth of 8' or less, measured from the lowest invert to the top of the casting. Standard manholes will be counted and paid for by the unit.
2. Drop Manhole: A standard manhole, with eccentric or concentric cone, with one or more drop assemblies. For payment purposes, a drop manhole has a depth of 8' or less measured from the lowest invert to the top of the casting. Drop manholes will be counted and paid for by the unit.
3. Shallow Manhole: A precast concrete structure for vertical access to a sewer line when the manhole depth is 4'-8" or less. For payment purposes, a flat top or shallow manhole will be counted and paid for by the unit.
4. Additional manhole depth in excess of 8' in standard or drop manholes will be measured to the nearest 0.1' and paid for by the vertical foot bid price.

B. Wastewater Pipe will be measured to the nearest foot along the ground surface from center of manhole, to center of manhole. Payment for all labor and materials, including bedding, shall be made per the linear foot bid price.

C. Cleanouts are constructed from wastewater pipe material for access to a sewer line at the end of a main. Cleanouts will be counted and paid for by the unit.

D. Service Lines: Service lines shall include the main wye, lines, risers as required, and fittings. The length of the service line shall be to the right-of-way line of the street or easement, or to the limits shown on the Drawings. Service lines will generally be bid per each basis. If noted in the bid documents, service lines may be bid on a per linear foot basis. The length of the service line is measured from the centerline at the main to the reconnection point or termination point of the service line. No direct payment will be made for reconnection of existing services.

E. Wastewater Pipe through Casing Pipe: Will be measured and paid for in accordance with Item B above.

F. Fittings: No direct payment will be made for any fittings, including wyes. Fittings will be considered incidental to pipe installation.

G. Existing utility service or main line utilities that require adjustment to construct the sewer main shall be the responsibility of the Owner of the utility. The Contractor shall be responsible for any damage by the Contractor to the utility.

**SECTION 02530
SANITARY SEWERAGE**

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe:

1. The Contractor may select particular pipe material for a project from the below listed table, unless specified on the Drawings or in the Bid Documents. These pipe specifications shall govern when cover is 16' or less.
2. Service Lead Piping: Minimum 4" diameter.
3. Plastic Pipe: Provide seating marks where couplings are used for jointing.

**PIPE CLASSIFICATION TABLE
Design Classification by Depth of Cover**

Type and Size	Size Limitations	Pipe Material Spec	Joint Spec
Reinforced Concrete	18" Min	ASTM C76, Class III	ASTM C361
Plastic Truss (ABS)	8"-15"	ASTM D2680	ASTM D3212
Plastic PVC	4"-6"	ASTM D1785	ASTM D3033 / D3034
Plastic PVC	8"-15"	ASTM D3034-SDR35	ASTM D3033 / D3034 Type 1, Grade 1
Plastic (PE)	6"- 24"	ASTM D3034-SR100	ASTM D2239
PS-46 (PVC)	None	ASTM F789	ASTM D3132
A2000 PVC	None	ASTM F949	ASTM D3132
Ultra Rib	None	ASTM F794	ASTM D3212
Ductile Iron	None	ANSI / AWWA C151 / A21.51 Pressure Class 350	ANSI / AWWA C111 / A21.11
Vitrified Clay Pipe (VCP)	8"- 36"	ASTM C700 Extra Strength	ASTM C425
Hancor Sure-Lok	4"-60"	AASHTO M252, Type S; M294, Type S; MP-7	ASTM F477

B. Manholes:

1. Manholes will be precast units and shall conform to ASTM C478 or ASTM C76 Class III.
 - a. Joints shall meet ASTM C361 or ASTM C443.
 - b. Pipe openings shall be provided with flexible connectors designed to produce a positive watertight connection for pipes entering the manhole. These connectors shall be A-LOK produced by A-LOK Products Inc. or equal.
2. Grade rings shall conform to ASTM C478.
3. Waterproofing will be required for all manholes. The bitumen shall consist of two coats of asphaltic pitch. Asphalt shall conform to the requirements of ASTM D449.
4. Prior to backfilling, lift holes shall be fully grouted and/or plugged. Waterproofing shall be field applied in accordance with Item 3 above.
5. Manhole Castings:

**SECTION 02530
SANITARY SEWERAGE**

- a. Standard frame and lid shall be Neenah R-1764, Deeter 1270, or equal.
 - b. Watertight frame and lid shall be Neenah R-1916-F, Deeter 1247 B, or equal.
6. Manhole steps shall be Neenah R-1980-J, Deeter 1606, M. A. Industries PS2-PF, or equal.

PART 3 - EXECUTION

3.01 ALIGNMENT AND GRADE

- A. Before installation of new sewer facilities, verify sizes, measurements, type, and location of existing piping, and appurtenances at points of connection to existing system. If a deviation from the Drawings is found, the Contractor shall notify the Owner's Representative and obtain instruction on how to proceed.
- B. Line and grade control shall be done with a laser beam. The Contractor shall spot check the accuracy of the laser beam in accordance with the following requirements:
 1. Elevation shall be checked at the set up point, 25' point, 50' point, 100' point, and 100' intervals thereafter to the next set up point.
 2. Projector shall be advanced and reset at each manhole with 600' maximum distance prior to advancement.
 3. Grade shall be checked with a rod and level at each checkpoint.
 4. Pipe ventilation shall be provided, to prevent beam refraction.

3.02 BEDDING

- A. Bedding shall be provided to the spring-line for concrete and ductile iron pipe. Bedding for PVC, plastic, and ABS shall be to 6" above the top of the pipe. Bedding shall be uniformly placed and hand tamped below the haunch area of the pipe.
- B. Granular material for pipe bedding shall be crushed rock or 3/4" clean stone extending 6" below and to the spring line for concrete and ductile iron pipe and to the top of all other pipe materials.
- C. The entire length of the pipe barrel shall be supported evenly.
- D. In a casing pipe, the carrier pipe shall be supported in accordance with Section 02445, Boring and Jacking Casing Pipe.

3.03 PIPE INSTALLATION

- A. Work shall be done in accordance with the following standards: ASTM D2321; Underground Installation of Flexible Thermal Plastic Sewer Pipe, AWWA C600; Installation of Cast Iron Water Mains.
- B. Pipe shall be laid commencing at downstream end of line and install pipe with spigot or tongue end downstream. Provide bell holes at each pipe joint to allow barrel of pipe to support trench load.
- C. Use no defective pipe; check each length for defects and hairline cracks at ends prior to lowering into trench.
- D. Place pipe in trench in sound, undamaged condition using chains or straps. Lifting holes will not be allowed except for the manholes.

**SECTION 02530
SANITARY SEWERAGE**

- E. Clean the interior of all pipefittings and joints prior to installation. Exclude entrance of foreign matter during installation. Close open ends of pipe with snug fitting closures. Include provisions to prevent flotation should trench fill with water. Remove water, sand, mud, and other undesirable materials from trench before removal of cap.
- F. Install pipe only when conditions are suitable. Do not lay pipe in water or water filled trench.
- G. Pipe shall not be placed on frozen subgrade. Backfill material shall not be frozen.
- H. Except where pipe sections are being encased in concrete, no pipe is to be supported by blocks or other means.
- I. Pipes installed on grades in excess of 20% shall be anchored securely with concrete anchors spaced as follows:

<u>Grade</u>	<u>Maximum Anchor Spacing</u>
20% - 35%	36'
35% - 50%	24'
Greater than 50%	16'

- J. Cutting Pipe:
 - 1. Pipe shall be cut in a neat and workmanlike manner to provide an even surface, perpendicular to the pipe centerline.
 - 2. All bumps and irregularities shall be removed prior to pipefitting.
 - 3. Bevel ends of push-on type pipe.
- K. Jointing:
 - 1. The gasket position shall be verified prior to compressing the pipe joint together.
 - 2. Only those solvents, adhesives, and lubricants furnished by the pipe manufacturer shall be permitted.
 - 3. Perform push-on joint installation per manufacturer's instructions.
 - 4. Junctions with other materials shall require the use of adapter type and technique recommended by pipe manufacturer.

3.04 MANHOLES

- A. Manholes shall be constructed in accordance with the drawing detail.
- B. Bases:
 - 1. A cast-in-place base may be poured on undisturbed, frost-free, dry subgrade.
 - 2. If a precast base is utilized, it shall be placed on crushed limestone with a full and even bearing.
 - 3. If unsuitable base material exists, the contractor shall remove the unsuitable material and replace it with 3/4" clean rock or other suitable material compacted to provide a bed with full and even bearing.
- C. Casting Setting:

**SECTION 02530
SANITARY SEWERAGE**

1. Existing Pavement: In asphalt or concrete pavements, or gravel drives / parking areas, set the manhole ring and lid to match the finished grade.
 2. Gravel Roadway Surfaces: Set the ring and lid 4" below finished grade surface.
 3. Unpaved Areas: Match finished ground elevation, unless otherwise noted.
- D. Waterproof the outside surface of manholes with two coats of bitumen material. The bitumen wall shall consist of asphaltic pitch conforming to the requirements of ASTM D449.

3.05 CONNECTIONS

A. Existing Wastewater System:

1. Connection of new pipe to an existing structure shall be made as follows:
 - a. Prepare the existing structure by making an opening with at least a 2" clearance all around the pipe to be connected.
 - b. Insert the pipe so that the end of the pipe is flush with the inside wall.
 - c. Fill the opening between pipe and manholes wall with an expansive grout in such a manner that watertight condition will result.
 2. Connection to an existing line:
 - a. Manholes to be built on an existing sewer shall be constructed without damaging the existing sewer.
 - b. The manhole base, walls, and invert shall be completed before the top half of the existing sewer pipe is cut or broken away.
 - c. Rough edges of the pipe shall be covered with an expansive grout to produce a smooth finish.
 - d. The Contractor shall repair any existing sewer line damaged by his work, at no expense to the Owner.
 3. Connections between different pipe materials shall be made using Fernco transition couplings or equal meeting the specifications of the pipe manufacturer.
- B. Existing system carrying wastewater may be bypassed using pumping when necessary. Discharge directly to closest downstream manhole on normal line of flow.
- C. Provisions for future wastewater extensions, where indicated on the Plans, shall include extending a short section of pipe from the manhole and plugging with a standard disc for pipes 21" or smaller.

3.06 SERVICE LINES

A. Line and Grade:

1. Horizontal Alignment: Service lines shall be constructed at right angles to the sewer.
2. Grade: Service lines shall be laid at a minimum uniform grade of 1/8" per foot.
3. Depth: The service elevation, at the property or easement line, shall allow a minimum 1/8" per foot grade from the existing building service. If a service is to be provided for a vacant lot, the service shall be kept at the lowest possible elevation.

**SECTION 02530
SANITARY SEWERAGE**

B. Connection Fittings:

1. Location of the connection fitting shall match an existing service or as directed by the Owner's Representative.
2. 45° or 60° wyes shall be utilized for connection of the service leads to the sanitary sewer. Wye tees and tees will not be permitted.

C. Main Risers: Where the cover is excessive at the main, a riser may be placed to bring the service to a reasonable depth to match an existing service except as follows:

1. Service leads under street or parking lot pavements shall be constructed at minimum grade from the main to a point 10' outside the pavement.

D. Vertical bends greater than 45° are not permitted for service lines.

E. Horizontal bends 45° degrees or less will be permitted in service lines, provided a cleanout is provided immediately upstream of the bend.

F. Standard plugs or caps shall be securely placed and blocked at the end of all service leads.

G. Markers shall be placed at the end of service leads left for future connections. Markers shall conform to the following:

1. Material Markers: A 12" long x 2" x 4" horizontal member nailed to a vertical 2" x 4" at the terminus of the service lateral.
2. The vertical 2" x 4" shall be placed extending from the lateral end to 18" above grade.
3. The vertical 2" x 4" shall be provided with four wraps of #9 iron wire placed 6" below finished grade.

H. Witnesses:

1. Wyes and tees shall be witnessed to the nearest downstream manhole. Contractor shall measure the distance from the center of the downstream manhole to the wye and maintain an accurate log of these locations.
2. At the end of the service lead Contractor shall take three measurements to permanent surface features and place this information in a log. Permanent surface features shall be defined as items such as building corners, fence corners, etc.
3. The Contractor shall provide a copy of all witness data to the Owner's Representative prior to backfilling.

3.07 FIELD QUALITY CONTROL

A. General:

1. The Contractor shall maintain his work site in a manner that will be fully accessible by the Owner's Representative for observation of the work.
2. The Contractor shall conduct the leakage test promptly following installation of wastewater pipe. This test shall include services that have been constructed.
3. The Contractor shall notify the Owner's Representative 48 hours before conducting the leakage test so that the Owner's Representative can schedule inspection and observation of the test.
4. The Contractor shall provide all equipment and conduct the test.

**SECTION 02530
SANITARY SEWERAGE**

- B. The following drift from proposed alignment between structures is as follows:
1. Horizontal Alignment:
 - a. Through 36" Diameter Pipe: 0.20'
 - b. Over 36" Diameter Pipe: 0.40'
 2. Grade:
 - a. Through 36" Diameter Pipe: 0.02'
 - b. Over 36" Diameter Pipe: 0.05'
- C. Plastic Pipe Deformation: In addition to leakage tests, a deformation test will be done as follows:
1. The test shall be conducted not less than one month (30 days) after backfill has been properly installed.
 2. The maximum allowable deflection shall not exceed 5% of the pipe's internal diameter.
 3. Mandrel testing shall be performed on 100% of the pipeline.
 4. Mandrels shall be "Wortco 9-Arm Mandrel" (5% deflection) for flexible or semi-rigid pipe or approved equal.
 5. Gauge shall be pulled through the pipe by hand. Mechanical pulling assistance is not permitted.
 6. If any section of pipe does not conform to this requirement, the Contractor at no cost to the Owner shall replace it. Leakage re-testing and mandrel re-testing shall take place 30 days after backfilling.
 7. The Owner may, prior to the end of warranty (guarantee period), conduct another deflection test. The Contractor at no cost to the Owner shall replace any pipe not conforming to this requirement. The Contractor shall provide an additional warranty (guarantee) of one year for that portion of the replaced pipeline.
- D. Leakage:
1. General:
 - a. Contractor shall clean pipe of excess mortar, joint sealant, and other dirt and debris prior to inspection.
 - b. Sewer will be inspected by flashing a light (lamping) between manholes and/or by physical passage where space permits.
 - c. The Owner's Representative will determine from illumination and/or physical inspection the presence of visible infiltration or other defects.
 - d. Defects shall be corrected prior to conducting leakage tests.
 2. Leakage test shall be done either by a water exfiltration test or air exfiltration test.
 - a. For water tests, the allowable exfiltration shall be less than 0.15 gallons per inch of internal diameter per hour per 100' of pipe length (200 gallons per inch of ID per day per mile) per 24 hours.
 - b. For air exfiltration tests, the holding time shall not be less than that listed in the table at the end of this Section.

**SECTION 02530
SANITARY SEWERAGE**

- c. The Contractor may use air exfiltration testing for pipes of all sizes.
 - d. The Contractor shall perform water exfiltration tests on manholes and may perform water exfiltration tests on sewer pipe larger than 18" ID.
3. Any sections of pipe not meeting the test requirements shall be repaired and the test shall be repeated until work is acceptable.
- a. The Contractor is encouraged to pretest the pipes prior to notifying the Owner's Representative and formal testing.
 - b. For any section of pipe not passing the test when requested by the Contractor, the Contractor shall be responsible for the total cost of re-inspection. The Owner reserves the right to deduct the cost of re-inspection from the Contractor's payment for the work.

E. Exfiltration Test (Water)

- 1. The Contractor shall furnish all labor, equipment, tools, and materials required including bulkheads, water, and miscellaneous items to perform the test.
- 2. Perform all tests for lines at a minimum water depth 2' above the high point of the system or 2' above ground water elevation, whichever is higher. Perform tests at a minimum water depth of 2' above casting elevation for manholes.
- 3. Tests shall be maintained to locate all leaks, but not less than two hours. The Owner's Representative shall confirm measurement of exfiltration amounts.
- 4. Tests shall be repeated after repair of leaks and defects, until leakage meets the requirements of this specification.
- 5. Manholes and other structures shall be protected by means of bulkheads to prevent bursting pressure from being applied inside the structure.
- 6. Pipe shall be de-watered upon completion of the successful test.

F. Exfiltration Test (Air)

- 1. In the areas where ground water is known to exist, the Contractor shall install a 1/2" diameter capped pipe nipple approximately 10" long through the manhole wall on top of one of the sewer lines entering the manhole.
 - a. Install at the time the sewer line is installed.
 - b. Immediately prior to the line acceptance test, determine the ground water level. Remove the pipe cap, blow air through the pipe nipple into the ground to clear it, and then connect a clear plastic tube to pipe nipple.
 - c. The hose shall be held vertically and measurement of height of water, in feet, shall be taken after the water stops rising in this plastic tube.
 - d. The height shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings.
- 2. Contractor shall furnish all facilities required including necessary piping connections, test pumping equipment, pressure gauges, bulkheads, regulators to avoid over-pressurization, and all miscellaneous items required.
 - a. The pipe plug for introducing air to the sewer pipe shall be equipped with two taps. One tap will be used to introduce air into the line being tested, through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valves

**SECTION 02530
SANITARY SEWERAGE**

and fittings to accept a pressure test gauge indicating internal pressure in the sewer pipe. An additional valve and fitting will be incorporated on the tap used to check internal pressures so that a second test gauge may be attached to the internal pressure tap. Pressure test gauge will also be used to indicate loss of air pressure due to leaks in the sewer line.

- b. The pressure test gauge shall meet the following minimum specifications:
 - (1) Size (diameter) -- 4-1/2".
 - (2) Pressure Range -- 0 to 15 psi.
 - (3) Figure Intervals 1 psi. increments.
 - (4) Minor Subdivisions -- 0.05 psi.
 - (5) Pressure Tube Bourdon 2 or diaphragm; Accuracy -- +/- 0.25% of maximum scale reading.
 - (6) Dial white coated aluminum with black lettering, 270° arc and mirror edge.
 - (7) Pipe Connection - low male, 1/2" NPT.
- c. Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will be available to the Owner's Representative whenever air tests are performed.
- 3. Test each reach of sewer pipe between manholes. Test at the completion of the installation of pipe and appurtenances and the backfill of the sewer trench.
- 4. Plug ends of line, cap, or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment.
 - a. After connecting air control equipment to air hose; monitor air pressure so that the internal pressure does not exceed 5 psig.
 - b. After reaching 4 psig, throttle the air supply to maintain between 4 and 3.5 psig for at least two minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage.
 - c. If plugs are found to leak, bleed off air, tighten plugs, and re-pressurize. After the temperature has stabilized, the pressure is allowed to decrease to 3.5 psig.
 - d. At 3.5 psig, begin timing. Measure the time for air pressure to drop to 2.5 psig. If the time in seconds for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than the time shown in the table at the end of this section, the pipe shall be presumed free of defects.
- G. If the air test fails to meet the above requirements, repeat test as necessary after all leaks and defects have been repaired. Prior to acceptance, all constructed sewer lines shall satisfactorily pass the low-pressure air test or the exfiltration test.

3.08 ADJUSTING AND CLEANING

- A. General: Pipe and structures shall be kept clean as work progresses.

**SECTION 02530
SANITARY SEWERS**

**TABLE 1
MINIMUM TIME REQUIRED FOR A 1.0 psig PRESSURE DROP FOR SIZE AND LENGTH
OF PIPE INDICATED FOR Q = 0.0015 (CFM/SF INTERNAL SURFACE AREA)**

Pipe Diameter, (in.)	Minimum Time, (min:sec)	Length for Minimum Time, (ft)	Time for Longer Length, (sec)	Specification Time for Length (L) Shown, (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

**SECTION 02530
SANITARY SEWERS**

**TABLE 2
MINIMUM TIME REQUIRED FOR A 0.5 psig PRESSURE DROP FOR SIZE AND LENGTH
OF PIPE INDICATED FOR Q = 0.0015 (CFM/SF INTERNAL SURFACE AREA)**

Pipe Diameter, (in.)	Minimum Time, (min:sec)	Length for Minimum Time, (ft)	Time for Longer Length, (sec)	Specification Time for Length (L) Shown, (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

END OF SECTION 02530

**SECTION 02921
SURFACE RESTORATION**

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Providing material, labor, and equipment necessary to restore all disturbed areas to original or better than original condition, including soil preparation, fertilizing, liming, seeding, and mulching.

1.02 GENERAL

- A. All disturbed areas shall be fertilized, seeded, and mulched, except surfaced areas, solid rock, and slopes consisting primarily of broken rock.
- B. All disturbed or regraded swales and ditch lines shall be netted.
 - 1. Bank slope of 3:1 or flatter: Net to 1' above flow line.
 - 2. Bank slopes greater than 3:1: Net to the top of bank.

1.03 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- A. Measurement of restored areas will not be made unless a change in project limits is authorized.
- B. Compensation for all work under this section will be made in accordance with the contract bid price.

PART 2 - PRODUCTS

2.01 LIME

- A. Material for soil neutralization shall be agricultural lime with not less than 90 percent passing the No. 8 sieve and containing at least 65 percent calcium carbonate equivalent.
- B. Lime application rate shall provide at least 800 pounds per acre. The quality of material required to provide the specified pounds of effective neutralizing material per acre shall be determined from the producer or distributor's certification of analysis furnished by the Director of the Missouri Agriculture Experiment Station, Columbia, Missouri in accordance with the Missouri Agricultural Liming Materials Act.

2.02 FERTILIZER

- A. Fertilizer shall be a standard commercial product. Material shall supply at least 30 pounds of total nitrogen (N), 90 pounds of phosphoric acid (P₂O₅) and 90 pounds of soluble potash (K₂O) per acre.
- B. Material may be accepted based on bag label analysis, supplier's certification, or based on samples tested in the laboratory.
 - 1. Tolerances for samples tested in the laboratory: Nominal composition shown by label or certification of -10 percent up to the maximum of two units (2% plant food) for the individual constituents, and -3 percent for the sum of the constituents.
 - 2. There is no limit on the plus tolerances for such samples.

**SECTION 02921
SURFACE RESTORATION**

2.03 SEED

- A. Seed shall be labeled in accordance with US Department of Agriculture rules and regulations under the Federal Seed Act. Seed shall comply with the requirements of the Missouri Seed Law. The following percentages for purity and germination will be the minimum requirements in the acceptance of seed, unless otherwise permitted by the Owner's Representative.

	Purity	Germination Including Hard Seed	Germination (a) Excluding Hard Seed	Maximum % Weed Seed
Perennial Rye	98%	85%		1.00
Redtop	92%	85%		2.00
Rye Grain	98%	80%		1.00
K31 Fescue	97%	85%		2.00
Red Fescue	97%	85%		1.00
Red Clover	98%	85%	55%	1.00

(a) Does not apply if unhulled or unscarified seed is specified.

- B. No reduction will be permitted in the specified quantity of seed if the purity or germination, or both, are higher than the minimum required by the specifications.
- C. Red Clover seed shall be inoculated or treated with the proper quantity of cultures approved for the legume seed.
- D. The inoculant for treating leguminous seed shall be a pure culture of nitrogen-fixing bacteria. The containers of the inoculant shall be plainly marked with the expiration date for use and the manufacturer's directions for inoculating seed.
- E. The process for inoculation shall be in accordance with the manufacturer's directions for the particular species of legume. The time lapse for sowing the seed following inoculation shall not exceed 24 hours.
1. If hydraulic slurry seeding is used, a quantity of inoculant equal to five times the normal rate required to inoculate only the legume seed shall be used. The inoculant shall be placed directly into the slurry and thoroughly mixed immediately before seeding.
 2. If other than the hydraulic slurry method is used, the legume seed may be inoculated at the normal rate if it is to be sown alone or if the legume seed is inoculated prior to mixing with other seed.
 3. A seed mixture, which contains a legume that was not inoculated prior to mixing and is not to be seeded by the slurry method, shall be inoculated with sufficient inoculant to cover all seed.

F. Seed Mixture: The pure live grass seed mixture:

Type	Rate (# per acre)	Percent by Weight
K31 Fescue	36	40
Bluegrass	27	30
Redtop	9	10
Red Fescue	9	10
Red Clover	<u>9</u>	<u>10</u>
TOTAL	90	100

The following formula shall be used to determine the amount of commercial seed required to provide in each kind of seed the specified quantities of pure live seed.

$$\frac{\text{Pure Live Seed} \times 100 \times 100}{\text{Purity} \times \text{Germination}} = \text{Pounds Seeds Required}$$

2.04 TYPE 1 MULCH

- A. Type 1 Mulch (vegetative mulch) shall be the cereal straw from stalks of oats, rye, wheat, or barley.
- B. The straw shall be free of prohibited weed seed defined in the Missouri Seed Law. Straw shall be relatively free of all other noxious and undesirable seed.
- C. The straw shall be clean and bright, relatively free of foreign material, and be dry enough to spread properly.
- D. If the above straw specifications cannot be met, the foliage of the following plants may, with the Owner’s Representative’s approval, be substituted.
 - 1. Smooth brome, timothy, orchard grass, reed canary grass, tall fescue, red top, millet, blue stem, Indian grass, alfalfa, birdsfoot trefoil, and vetch.
 - 2. The foliage shall be taken from areas of current season’s growth with relatively pure stands of plants.
- E. The straw shall be relatively free of noxious and undesirable seed and foreign material.

2.05 NETTING

- A. North American Green SS150BN or approved equal.
- B. Excelsior Blanket:
 - 1. Excelsior blanket shall consist of a machine-produced mat of wood excelsior with approximately 80 percent of the fibers having a minimum length of 6”.
 - 2. The wood from which the excelsior is cut shall be properly cured to achieve adequately curled and barbed fibers.
 - 3. The blanket shall be of consistent thickness, with the fibers evenly distributed over the entire area of the blanket.

4. The blanket shall be covered on the top side with a netting having a maximum mesh size of 1½ x 3", composed of cotton cord, twisted Kraft paper yard, or degradable extruded plastic.
 5. The netting shall be entwined with the excelsior mat for maximum strength and ease of handling.
 6. The blanket shall be made smolder resistant with a treatment that shall be non-leaching, non-toxic to vegetation, and shall not be toxic or injurious to humans.
 7. The blanket shall meet the following requirements:
 - a. Weight: 0.75 pound per square yard, minimum.
 - b. Smolder Resistance: Blanket in air-dry condition shall not flame or smolder, from a lighted cigarette, for a distance along the surface of more than 12".
- C. Staples: Staples for plastic netting or excelsior blanket shall be of No. 11 gage, or heavier, ungalvanized steel wire, "U"-shaped, with approximately a 1" or larger crown, and have a length of not less than 6".

PART 3 - EXECUTION

3.01 FERTILIZING

- A. The seedbed shall be prepared by placing lime and fertilizer. The area shall have a uniform surface free from rills, washes, and depressions.
- B. The soil shall be thoroughly broken up, worked, tilled, and loosened to a minimum depth of two inches.
- C. The seedbed shall be prepared by loosening the existing soil on the slope, rather than by the addition of loose soil.
- D. Lime and fertilizer shall be applied evenly and only when the soil is in a tillable condition.
- E. After application, the lime and fertilizer shall be mixed into the soil by disking, harrowing, or raking to a minimum depth of two inches unless applied hydraulically on slopes steeper than 2:1.
- F. Lime and fertilizer shall be applied separately, but may be incorporated into the soil in one operation.
- G. Lime and fertilizer shall be applied not more than 48 hours before the seed is sown.

3.02 SEEDING

- A. The seedbed shall be prepared, to provide a firm but uncompacted condition with a relatively fine texture at the time of seeding.
- B. During the months of December through May, August and September, all lime, fertilizer, seed and mulch shall be applied at the specified rates. During the months of June, July, October, and November, the rates shall be modified as follows:
 1. Lime: 100 percent of the specified quantity.
 2. Fertilizer: 75 percent of the specified quantity.
 3. Seed: 50 percent of the specified quantity.
 4. Mulch: 100 percent of the specified quantity.

- C. Seeding shall be done before the proposed seedbed becomes eroded, crusted over, or dried out and shall not be done when the ground is in a frozen condition or covered with snow.
- D. When the partial application has been made during June, July, October, or November, the remainder of the fertilizer plus 75 percent of the specified quantity of seed shall be applied by over seeding during August, September, December, January, or February.
- E. Seed shall be uniformly applied at the rates specified. Provisions shall be made by markers or other means to insure that the successive seeded strips will overlap or be separated by a space no greater than the space left between the rows planted by the equipment being used.
- F. If inspection during the seeding operations indicates that strips wider than the space between rows planted have been left unplanted, additional seed shall be planted on these areas.
- G. Hydraulic Seeding and Fertilizing:
 - 1. In lieu of mechanical application of seed and fertilizer, hydraulic application may be used.
 - 2. On slopes steeper than 2:1, or when seeding is applied to a previously seeded and mulched area, apply the seed and fertilizer hydraulically and in a single operation. Incorporation into the soil is not required.
 - 3. On all other slopes, seed and fertilizer may be applied hydraulically provided the seed and fertilizer incorporated into the soil in separate operations.
 - 4. Raking will not be required when seeding a previously seeded and mulched area.
 - 5. Seed and fertilizer, separately or in combination, shall be mixed with water and constantly agitated so that a uniform mixture can be applied hydraulically to the specified areas.
 - 6. The ratio of seed and fertilizer to water shall be calculated by determining the number of square feet covered by a given quantity of water.
 - 7. Seed shall not be added to the water more than four hours before application.
- H. Dry Seeding: Dry seeding shall be done mechanically with equipment designed for even distribution. The equipment may either be hand operated, such as knapsack seeder, or be tractor-drawn, such as seed drill. Tractor-drawn equipment will not be permitted on previously seeded and mulched area.
 - 1. Seed scattered on the surface shall be covered with approximately ¼" of soil by raking or other approved methods. Raking will not be required when seeding a previously seeded and mulched area.
 - 2. Seed placed in the soil shall be approximately ¼" below the surface.
 - 3. If the seedbed is loose or contains clods which would reduce the germination of the seed, the Contractor shall firm the area by rolling.
 - a. When rolling is required, a lawn-type roller shall be used and care shall be taken to avoid over-compaction of the soil.

3.03 TYPE 1 MULCHING

- A. Type 1 Mulch (vegetative) shall be applied at the rate of 2½ tons per acre.
- B. All mulch shall be distributed evenly over the area to be mulched within 24 hours following the seeding operation.
- C. Following the mulching operation, precautions shall be taken to prohibit foot or vehicular traffic over the mulched area.
- D. Displaced mulch shall be replaced at once.
 - 1. If the liming, fertilizing, or seedbed are damaged, repair prior to mulching.

3.04 NETTING

- A. The area to be covered shall be fertilized and seeded.
- B. Any areas disturbed by the installation of the netting shall be repaired at the Contractor's expense.
- C. Erosion Control Blanket:
 - 1. Blankets, such as North American Green SC150BN shall be installed in accordance with the manufacturer's instructions. Excelsior Blankets shall be installed as follows.
 - 2. The blanket shall be unrolled in the direction of water flow, with the netting on top and the fibers in contact with the soil.
 - 3. A longitudinal joint of adjoining blankets shall not be placed on the centerline of the ditch.
 - 4. The blanket shall not be stretched or pulled tight.
 - 5. Successive rolls shall be snugly butted at ends and edges.
 - 6. The blanket shall be stapled as follows:
 - a. Along each edge and along the center of each blanket with staples at 6' centers.
 - b. Across each end of each roll with four staples.
 - c. The center row of staples shall be staggered 3' from the edge staple spacing.
 - d. Place a row of staples, at 6" centers and right angles to the ditch line, across the blanket, at 50' centers on ditch grades of 4 percent or less. Place staple rows at 25' centers on ditch grades greater than 4 percent.

END OF SECTION 02921

**SECTION 02950
PAVEMENT RESTORATION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary and permanent restoration of paved and surfaced areas.

1.02 RELATED SECTIONS

- A. Section 02720 – Aggregate Base Course
- B. Section 02921 – Surface Restoration

1.03 JOB CONDITIONS

- A. Pavement Remnant Limit: Remove to edge or joint where dimension is less than 3'.
- B. Seasonal Limitations:
 - 1. Removal of Pavement: March 15 to October 15.
 - 2. Restoration of Pavement: April 15 to November 15.
 - 3. Gravel Surfaces: No seasonal limits.
- C. Scheduling:
 - 1. Restoration of Pavement: Within 30 days of the utility installation.
 - 2. Clean Up: Promptly following pavement restoration.
- D. Provide temporary surfaces (gravel) until permanent pavement is installed.
- E. Comply with permit requirements of other Jurisdictions.

1.04 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- A. Pavement Removal and Restoration will be measured along the utility centerline and paid for by the linear foot of the pavement classification vertically above.

PART 2 - PRODUCTS

2.01 CONCRETE PAVEMENT AND DRIVES

- A. Surface: Concrete pavement surfacing shall meet State Highway Department specifications for materials, aggregate, and mix proportions.
- B. Subbase: 6-in. layer of compacted gravel or crushed rock compacted to meet the requirements of Section 02720.
- C. Reinforcing Steel: 60-ksi yield grade, ASTM A615, plain grade.

2.02 ASPHALT PAVEMENT, SURFACES, AND DRIVES

- A. Subbase
 - 1. Concrete base: 4" of Type 1 Aggregate.
 - 2. Gravel or crushed rock base: Place on trench backfill or existing subgrade.
- B. Base
 - 1. Pavements with concrete base: 8-in. reinforced concrete. Reinforcement per drawing detail or #4 bars, 12" O.C. each way if not specified.

**SECTION 02950
PAVEMENT RESTORATION**

- 2. Pavements with gravel or crushed rock base: 8-in. Non Penetrated Macadam Base, choked with 3" of Type 1 Aggregate.
- 3. Drives with gravel or crushed rock base: 6-in. of Type 1 Aggregate.
- C. Tack Coat (P.C. Concrete Base): Asphalt primer MC-30 at 0.1 gallon per sq. yd. Air temperature, 55°F minimum.
- D. Prime Coat (Granular Base): Asphalt primer MC-30 at 0.4 gallon per sq. yd. Air temperature, 55°F minimum.
- E. Cover Coat: Hot-mix asphaltic concrete; equivalent in thickness and quality to existing pavement; place and compact in layers not more than 3-in. thick.

2.03 BRICK PAVEMENT

- A. Subbase: 4-in. of Type 1 Aggregate
- B. Base 8-in. reinforced concrete with roughened finish. Reinforcement per drawing detail or #4 bars, 12" O.C. each way if not specified.
 - 1. Tack and place 1" of asphaltic concrete over the portland cement concrete.
- C. Surface: Existing or new brick to match paving surface.

2.04 SEAL COAT OR GRAVEL STREETS OR DRIVES

- A. Base: 6-in. thickness of gravel or crushed rock.
 - 1. Gravel shall meet following gradation:

Passing 3/4-in Sieve	100%
Passing No. 4 Sieve	55% - 75%
Passing No. 8 Sieve	25% - 55%
 - 2. Crushed rock shall meet following gradation:

Passing 3/4-in Sieve	100%
Passing No. 4 Sieve	75%
Passing No. 8 Sieve	20% - 35%
- B. Seal coat streets and drives :
 - 1. Binder: CRS-2 or MC 800.
 - 2. Surface: 3/8-in. pea gravel, clean gravel, or trap rock to match existing surface material.

PART 3 - EXECUTION

3.01 GENERAL

- A. All obstructions removed to facilitate construction or excavate the trench shall be replaced with equal or better materials.
- B. Roadways, drives, walks, or parking surfaces, damaged by the Contractor's operations during construction, shall be replaced by the Contractor at his expense except for items specifically listed in the Contract.

**SECTION 02950
PAVEMENT RESTORATION**

- C. Contractor is responsible to correct, at no cost to Owner, all damage to items not shown for removal or demolition.

3.02 REMOVAL

- A. Remove pavement, curb, curb and gutter, gutters, sidewalks, and other similar improvements to an existing joint or to a joint sawed to a minimum depth of 1". Saw joint with a true line and a vertical face.

3.03 CONCRETE PAVEMENT REPLACEMENT

A. General

1. Joints shall match existing pavement and drives.
2. Finish to match existing work.
3. Base: Compact to 95% maximum density (ASTM D698).

B. Streets and Drives:

1. Streets: Thickness, 8" or 1" thicker than existing, which ever is greater. Reinforcing as shown on Drawings.
2. Drives: Minimum 6" or 1" thicker than existing, which ever is greater. Reinforcing as shown on Drawings.

- C. Sidewalks: Minimum 5" thickness of concrete. Finish to match existing surface. Install joints to match existing sidewalk.

- D. Curb and Gutter: Replace with section matching existing cross section. Finish to match existing work. Contraction joints at 10-foot maximum centers.

3.04 ASPHALT PAVEMENT AND DRIVES

- A. Subbase: Compact to 95% maximum density (ASTM D698).
- B. Base: Compact to 95% maximum density (ASTM D698).
- C. Prime granular base at 0.35 to 0.5 gal / sy. Tack concrete base at 0.1 gal / sy.
- D. Machine place cover. Compacted layers not to exceed 3-in. in thickness. Minimum total thickness 2-inches. Match existing surface grade.

3.05 BRICK PAVEMENT

- A. Lay existing or new brick to match existing pattern and surface.

3.06 SEAL AND CHIP SURFACE

- A. Compact 6-in. granular base to 95% maximum density (ASTM D698).
- B. Within 30 to 40 days after backfilling, shape and re-compact any disturbed surface.
- C. Apply asphaltic binder at a rate of 0.2 to 0.35 gallon per sq yd.
- D. Place Rock chips at 25 #/sy
- E. Roll wearing course with a pneumatic tired roller.
- F. Place second coat (steps C - F). Blot excess asphaltic materials with additional chips.

**SECTION 02950
PAVEMENT RESTORATION**

3.07 TEMPORARY SURFACE OVER TRENCH OR GRAVEL SURFACING

- A. Construct immediately following completion of backfill on traveled roadways and driveways.
- B. Material: Conform to gravel or crushed rock specification for "seal coat or gravel streets or drives".
- C. Thickness: Minimum 6-in. depth.
- D. Grade surface smooth to meet grade of adjacent undisturbed surface.

3.08 CLEAN-UP

- A. Clean up each portion of construction as completed.
- B. Clean up operations in public right of way within 400 ft. of construction operations.
- C. Clean up and remove all rubbish, debris, and surplus material.
- D. Leave site in neat condition acceptable to Owner and Owner's Representative.
- E. Reopen backfilled areas to traffic as soon as practicable.

END OF SECTION 02950

**SECTION 03100
CONCRETE FORMS AND ACCESSORIES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Form work for cast-in-place concrete shown on the drawings or required by other sections of these Specifications.

1.02 RELATED SECTIONS

- A. Section 03200 - Concrete Reinforcement.
- B. Section 03300 - Cast-in-Place Concrete.

1.03 QUALITY ASSURANCE

- A. Comply with all pertinent provisions of the following standards
 - 1. ACI 847 - Recommended Practice for Concrete Formwork.
 - 2. ACI 301 - Standard Specification for Structural Concrete for Building.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Forms
 - 1. Construct forms for exposed (painted or unpainted) concrete surfaces with smooth faced undamaged plywood to provide continuous, straight, and smooth as-cast surfaces.
 - 2. Construct forms for concrete concealed from view with rough-sawed boards of sound grade, plywood, or steel.
 - 3. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without excessive and objectionable bow or deflection.
- B. Form Ties
 - 1. Provide factory-fabricated, adjustable-length, removable or snap off metal form ties, designed to prevent form deflection and spalling concrete surfaces upon removal.
 - 2. Provide ties so that the portion remaining within the concrete after removal is at least 1-1/2" from the outer concrete surface.
 - 3. Provide ties that do not leave a hole larger than one inch in diameter in the concrete surface.
- C. Form Coatings
 - 1. Provide commercial formulation, form-coating compounds that do not bond with, stain, or adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

2.02 FABRICATION

- A. Design, erect, support, brace, and maintain forms that will safely support vertical and lateral loads until such loads can be supported by the concrete structure.
- B. Design forms to include assumed values of live and dead loads, weight of moving equipment operated on forms, concrete mix, height of concrete drop, vibrator frequency,

**SECTION 03100
CONCRETE FORMS AND ACCESSORIES**

ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

- C. Provide shoring and struts with positive means of adjustment capable of taking up form settlement during concrete placement.
- D. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
- E. Support form facing materials by structural members spaced sufficiently to prevent deflection.
- F. Fit forms placed in successive units for continuous surfaces to provide accurate alignment, free from irregularities, and within allowable tolerances.
- G. Provide camber in forms required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrata and conditions which work under section is to be performed.
- B. Correct conditions detrimental to the proper and timely completion of the work.
- C. Do not proceed until satisfactory conditions have been corrected.

3.02 ERECTION

A. General

- 1. Construct forms complying with ACI 347 to the size, shape, line, and dimensions shown, and required to obtain accurate alignment, location, grade, level, and plumb in finish structure.
- 2. Provide for features including openings, offsets, sinkages, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bullheads, anchorages, and inserts. Use selected materials to obtain required finish.
- 3. Provide openings in concrete forms to accommodate work of other trades after verifying size and location of openings with the trade requiring such items.

B. Fabrication

- 1. Forms shall be placed to protect previously installed structures.
- 2. Forms shall be fabricated for easy removal without hammering or prying against exposed concrete surfaces.
- 3. Where stripping may damage cast concrete surfaces, provide crush or wrecking plates.
- 4. Forms shall be sufficiently tight to prevent loss of mortar from the concrete.
- 5. Solidly butt joints and provide material at joints as needed.

3.03 PREPARATION

A. Cleaning

- 1. Thoroughly clean forms and adjacent surfaces of accumulated mortar, grout, wood chips, sawdust, dirt, or other foreign material before placing concrete.

**SECTION 03100
CONCRETE FORMS AND ACCESSORIES**

B. Form Coating

1. Coat form contact surfaces with an approved form coating material that will effectively prevent absorption of moisture and prevent bond with the concrete.
2. Do not allow excess form-coating material to accumulate or contact surfaces that will be bonded to fresh concrete.
3. Apply in accordance with manufacturers instructions.

3.04 INSTALLATION

- A. Set and build into the work anchorage and other embedded items required for other work to be attached or supported by cast-in-place concrete.
- B. Use supplier provided setting drawings, diagrams, instructions, and directions for embedded items.
- C. Forms not supporting concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F for 24 hours after placing, provided that:
 1. Concrete is sufficiently hard to not be damaged by form removal operations.
 2. Curing and protection operations are maintained.
- D. Backfilling on only one side of concrete walls shall not be permitted unless:
 1. The walls have attained the 28-day design compressive strength and have appropriate lateral bracing. The final concrete structure or sufficient temporary bracing may be used for the lateral support.
 2. Sufficient temporary bracing is installed to provide adequate lateral support of the entire wall surface until condition 1 above occurs.
- E. Forms supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements may not be removed in less than 14 days, and not until concrete has attained design minimum 28-day compressive strength. Determine the compressive strength of in-place concrete by testing field-cured specimens representative of the concrete locations or members.
- F. Forms supporting weight of concrete may be removed four days after concrete placement only if shores and other vertical supports have been arranged to adequately support the concrete until the concrete has attained the design minimum 28 -day compressive strength.

END OF SECTION 03100

**SECTION 03200
CONCRETE REINFORCEMENT**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.
- B. Support chairs, bolster, bar supports, and spacers for reinforcing.

1.02 RELATED SECTIONS

- A. Section 03100 - Concrete Forms and Accessories.
- B. Section 03300 - Cast-In-Place Concrete.

1.03 REFERENCE

- A. ACI 315 - American Concrete Institute - Manual of Standard Practice.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.'

1.04 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01320.
 - 1. Include diagram of bent bars and arrangement, bar schedules, and stirrup spacing.
 - 2. Make shop drawings in accordance with ACI 315.
- B. Submit steel producers certificates of mill analysis, tensile, and bend tests for reinforcing steel.

1.05 QUALITY ASSURANCE

- A. Perform concrete reinforcing work in accordance with CRSI and ACI Publications listed in reference standards unless specified otherwise in this section or on the drawings.
- B. CRSI - Manual of Standard Practice.
- C. CRSI - Recommended Practice for Placing Reinforcing Bars.
- D. CRSI - Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature.
- E. CRSI - Recommended Practice for Reinforcing Bar Splices.
- F. ASTM A82 - Standard Specifications for Cold-Drawn Steel Wire For Concrete Reinforcement.
- G. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- H. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- I. AWS D12.1 - Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Delivery
 - 1. Deliver reinforcement to the job site bundled, tagged, and marked.
 - 2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. Storage

**SECTION 03200
CONCRETE REINFORCEMENT**

1. Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

1.07 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- A. Work under this section is incidental to other sections.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Reinforcing steel: 60 ksi yield grade, ASTM A615, epoxy coated [or] plain finish.
- B. Tie rods, turn buckles, plates, and nuts: ASTM A36.
- C. Welded Steel Wire Fabric: ASTM A185; in flat sheets [or] coiled rolls, epoxy coated [or] plain finish; 12" maximum wire spacing. Use WWF 6x6-W10xW10 unless otherwise noted.
- D. Steel Wire: ASTM A82.

2.02 ACCESSORIES

- A. Chairs, Bolster, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcing during construction conditions.
- B. Tie Wire: Minimum 16.5 gauge, black annealed type, or patented system accepted by the Owner's Representative.
- C. Special Chairs, Bolsters, Bar Supports, Spacers where adjacent to exposed concrete surfaces: Plastic-coated or hot-dipped galvanized steel type, sized and shaped as required.

PART 3 - EXECUTION

3.01 FABRICATION

- A. General
 1. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI Manual of Standard Practices and ACI 315.
 2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
 3. Locate reinforcing splices, not indicated on drawings, at points of minimum stress. Location of splices subject to review of Owner's Representative.
 4. Where indicated, weld reinforcing bars in accordance with AWS D12.1.
- B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work.
 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
 2. Bends or kinks not indicated on drawings or final shop drawings.
 3. Bar with reduced cross-section due to excessive rusting or other cause.

3.02 PREPARATION

- A. Examine the substrate, forms, and the conditions under which concrete reinforcement is to be placed.

**SECTION 03200
CONCRETE REINFORCEMENT**

- B. Correct conditions detrimental to the proper and timely completion of the work.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Reinforcing shall be accurately placed and rigidly secured in position in accordance with the requirements of Recommended Practice for Placing Reinforcing Bars (CRSI), Recommended Practice for Placing Bar Supports (CRSI), and with further requirements specified herein and on the drawings.
- B. Tie reinforcing with black annealed (16.5 gauge min.) wire and bend all wire back beyond general plane of reinforcing.
- C. Welded wire fabric reinforcement in slabs shall be continuous, shall have joints lapped at least one full mesh, but not less than 8", and shall be supported at proper elevations by accessories. Stagger laps of sheets to avoid continuous lap in either direction. Provide support bars to maintain the fabric in its proper position during the placing of the concrete.
- D. Bending, tack welding, curing or substituting reinforcement in the field, other than shown on the contract drawings, in any manner is prohibited, unless specific approval for each case is given by the Engineer.
- E. At the time the concrete is placed, all reinforcement shall be free from excessive rust, scale, or other coatings that might destroy or reduce the bond.
- F. Prior to placing concrete, avoid reinforcement's exposure to the weather for any considerable length of time. Where this is unavoidable, paint reinforcement with a heavy coat of cement grout. The Contractor shall be responsible for protecting exposed concrete and any other materials against staining from exposed reinforcement.
- G. Before concrete is cast, check all reinforcement after placement to insure reinforcement conforms to contract drawings, approved shop detail drawings, and Specification requirements.
 - 1. Checking shall be done by qualified, experienced personnel.
 - 2. The Owner's Representative shall be notified at least 36 hours (excluding weekends and holidays) prior to concrete placement and given the opportunity to inspect the completed reinforcement and forms before concrete placement.
- H. Reinforcement shall be spliced in accordance with recommended practice for reinforcing bar splices (CRSI) unless shown otherwise on the drawings or approved by the Owner's Representative.
- I. The minimum cover of concrete for all reinforcement shall conform to the dimensions shown on the drawings, which indicate the clear distance from the edge of the reinforcement to the concrete surface. Where not otherwise specified or shown by written dimension, the minimum coverage of the concrete over the steel shall be as follows:
 - 1. Concrete cast against and permanently exposed to earth 3 inches.
 - 2. Formed concrete exposed to earth or weather 2 inches.
 - 3. Formed concrete not exposed to weather or in contact with ground.
 - a. Slabs and walls ¾ inch.
 - b. Beams and columns 1-½ inches.

**SECTION 03200
CONCRETE REINFORCEMENT**

- J. Splices shall be lapped as shown or called for on the drawings. Those not shown or called out shall have a minimum lap of 30 bar diameters.

END OF SECTION 03200

**SECTION 03300
CAST IN PLACE CONCRETE**

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Poured-in-place concrete floors, foundation walls, and supported slabs
- B. Floors and slabs on grade
- C. Poured-in-place equipment pads
- D. Surface finish of walls, beams, and other formed surfaces
- E. Grouting for base plates and bearing plates

1.02 RELATED SECTIONS

- A. Section 01320 - Submittals
- B. Section 03100 - Concrete Forms and Accessories
- C. Section 03200 - Concrete Reinforcement

1.03 REFERENCE STANDARDS

- A. Applicable standards listed in this section include, but are not necessarily limited to, the following:
 - 1. ACI 21 1.1 - Recommended Practice for Selecting Proportions for Normal Weight Concrete
 - 2. ACI 301 - Specification for Structural Concrete for Buildings
 - 3. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
 - 4. AC I 305 - Recommended Practice for Hot Weather Concreting
 - 5. ACI 306 - Recommended Practice for Cold Weather Concreting
 - 6. ACI 318 - Building Code Requirements for Reinforced Concrete
 - 7. ASTM C31 - Making and Curing Concrete Test Specimens
 - 8. ASTM C33 - Concrete Aggregates
 - 9. ASTM C94 - Ready-mixed Concrete
 - 10. ASTM C143 - Test for Slump of P.C. Concrete
 - 11. ASTM C150 - Portland Cement
 - 12. ASTM C171 - Sheet Materials for Curing Concrete
 - 13. ASTM C260 - Air Entraining Admixtures for Concrete
 - 14. ASTM C309 - Liquid Membrane - Forming Compound for Curing Concrete
 - 15. ASTM C494 - Chemical Admixtures for Concrete
 - 16. AASHTO M 182 - Specification for Burlap Cloth made from Jute or Kenaf

1.04 SUBMITTALS

- A. Manufacturer's Data in accordance with Section 01320.

**SECTION 03300
CAST IN PLACE CONCRETE**

1. Submit manufacturers data and instructions for proprietary materials and items, including reinforcement accessories, admixtures, patching compounds, joint systems, and others as requested.
- B. Ready-mixed concrete delivery tickets: Furnish duplicate delivery tickets with each load of concrete. Delivery tickets shall provide the following information:
 1. Date
 2. Name of supplier
 3. Job location
 4. Contractor
 5. Type and brand name of cement
 6. Class and specified cement content - bags per cu./yd.
 7. Truck number
 8. Time dispatched and time placed
 9. Amount of concrete in load
 10. Admixture, if any
 11. Maximum size aggregate
 12. Time water is added to dry cement and aggregate
- C. Certificates of Compliance: Certificates of material properties and compliance with specified requirements shall be submitted if requested by the Owner's Representative. Certificates of compliance must be signed by the material's producer and the Contractor.

1.05 QUALITY ASSURANCE

- A. Standards
 1. Comply with standards specified in this section.
 2. In case of conflict between the referenced standards, the more stringent requirements shall govern.
- B. Quality Control
 1. The Owner or his Representative will provide materials testing.
 2. Provide free access to work and cooperation.
 3. Three concrete test cylinders will be taken for every 75 or less cubic yards of concrete placed.
 4. One slump test will be taken for each set of test cylinders taken.
- C. Use necessary means to protect the materials before, during, and after installation. Protect the work and materials of all other trades.
- D. In cause of damage, immediately make repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

PART 2 - PRODUCTS

**SECTION 03300
CAST IN PLACE CONCRETE**

2.01 CONCRETE MATERIALS

A. Cement

1. Portland cement shall conform to the requirements of ASTM C 150, Type 1.
2. Use only one brand of cement for the entire work. Use in same sequence as received at the site.

B. Aggregates

1. Aggregates shall conform to requirements of ASTM C33.
2. Maximum aggregate size shall be not larger than 1/5th of the narrowest dimension between sides of form, 1/3rd of the depth of the slabs, or 3/4 of the minimum clear spacing between individual reinforcing bars.

C. Water

1. Water used as an ingredient in concrete shall be clean, potable, and free from injurious amounts of foreign matter.

2.02 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494, Type A, Water-reducing agents shall be applied at the dosage rates recommended by the manufacturer. Chlorides are not permitted.

2.03 CURING MATERIALS

A. Liquid curing and sealing compounds shall conform to ASTM C309, Type 1. Curing materials used with metallic toppings and hardeners shall be Masterseal, by Master Builders.

B. Sheet material shall conform to ASTM C171.

C. Burlap cloth made from jute or kenaf. Material shall weigh approximately 9 oz/sy, conform to AASHTO M 182 for moist curing, and shall be used in two layers.

2.04 JOINT MATERIALS

A. Performed joint filler shall be Sonoflex F by Sonnebom, or approved equal.

B. Backup rod shall be Ethafoam by Dow Chemical, or approved equal.

C. Joint filler for slabs shall be Dymeric sealant, by Tremco, or approved equal.

2.05 SURFACE HARDENERS

A. Surface hardener shall be MasterCron, by Master Builders, or approved equal.

2.06 RELATED MATERIALS

A. Concrete repair compound shall be Sonopatch, by Sonneborn Building Products Division, Embecco 411 Mortar, by Master Builders, or approved equal.

2.07 PROPORTIONING AND DESIGN OF MIXES

A. Proportion mixes by the Laboratory Trial Batch Method. Use the same materials to be employed on the project for each class of concrete required. Comply with ACI 211.

1. Required 28-day compressive strength of concrete: 4,000 psi.

**SECTION 03300
CAST IN PLACE CONCRETE**

2. Slump: 4-in. maximum, 2-in. minimum.
- B. Laboratory Trial Batches:
1. The Contractor shall retain an independent testing facility or concrete plant, acceptable to the Owner's Representative, to select concrete mix proportions.
 2. Test specimens shall be prepared in accordance with ASTM C192.
 3. Conduct strength tests in accordance with ASTM C39, specified in ACI 301.
- C. Submit written test reports, to the Owner's Representative, for each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been accepted by the Owner's Representative.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be proposed by the Contractor when characteristics of materials, job conditions, weather, test results or other circumstances, warrant. Test data for revised mix designs and strength results must be accepted by the Owner's Representative before using in the work.
- E. Use air-entraining admixture in exterior exposed concrete or structures and slabs exposed to freezing and thawing. Add air-entraining admixture at the manufacturers prescribed rate to result in concrete at the point of placement having air content within the following limits:
1. 1" Aggregate Concrete Mix: 4% to 5%
 2. ¾" Aggregate Concrete Mix: 6% to 7%
 3. ½" Aggregate Concrete Mix: 7% to 8%
- F. Water-reducing agents may be used as determined by the mix design organization subject to the approval of the Owner's Representative. Water-reducing agents are encouraged in conjunction with slabs to receive metallic hardeners or Anvil-Top.

2.08 CONCRETE MIXING

- A. Ready-Mix Concrete: Comply with the requirements of ASTM C94, and as herein specified. Addition of water to the batch will not be permitted.
- B. During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
- C. When the air temperature is between 85°F and 90°F, reduce the mixing and delivery time from 90 minutes to 75 minutes. When the air temperature is above 90°F, reduce the mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the area and condition that work under this section will be performed.
- B. Correct conditions detrimental to the proper and timely completion of the work.
- C. Do not proceed until satisfactory conditions have been achieved.

3.02 CONCRETE PLACEMENT

- A. Place concrete in accordance with ACI 304.

SECTION 03300
CAST IN PLACE CONCRETE

- B. Notify Owner's Representative 36 hours prior to commencement of concrete placing operations.
- C. Ensure anchors, seats, plates, and other items cast into concrete, are placed, held securely, and will not cause hardship in placing concrete.
- D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.
- E. Ensure concrete placement does not disturb reinforcement, inserts, embedded parts, formed expansion and contraction joints, and special form materials.
- F. Concrete shall be deposited continuously, in layers of such thickness that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If, due to emergency conditions, a section cannot be placed continuously between planned construction joints, a field joint and additional reinforcement shall be introduced to preserve the structural continuity. The Owner's Representative shall be notified immediately and his consent obtained.
- G. Construction Joints
 1. Construction joints in slabs and beams shall be placed at the center of spans.
 2. Secure full bond at construction joints. Prior to placement of new concrete, clean the surfaces of the concrete already placed, including vertical and inclined surfaces.
 - a. Thoroughly clean surface of foreign materials and laitance.
 - b. Roughen with suitable tools; chipping hammers, wire brushes, etc.
 - c. Re-clean with a stream of water or compressed air.
 3. The joints shall be dampened with water.
 4. Apply bonding compound: Euro Weld, by Euclid Chemical Company, or approved equal. New concrete shall be placed after the bonding compound has dried.
- H. Concrete shall be placed in a manner to prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the mass of concrete being placed. Use hoppers, spouts with restricted outlets, tremies, etc. as needed.
- I. Water shall not be added to concrete between the mixing and placing operation without approval of Owner's Representative. Under no circumstances shall added water cause concrete to slump greater than that established in the design of the mix.
- J. Cold joints are to be avoided. If a cold joint occurs, the Owner's Representative may require removal of all or parts of the concrete at the cold joint. Minimum requirement will be that a cold joint shall be treated as a bonded construction joint as specified above.
- K. Floor Slabs
 1. Pour floor slabs in checkerboard or saw cut pattern as indicated on Drawings. Saw cut control joints within 18 hours after finishing. Use 3/16-in. thick blade. Joint depth shall be 1/4 of slab thickness.
 2. Separate slabs-on-grade from vertical surfaces with 1/2" thick joint filler. Extend joint filler from bottom of slab to within 1/2" of finished slab surface.
- L. Footings: Footings and grade beams shall be poured on firm, undisturbed soil or engineered compacted backfill that has been well dampened, unless otherwise shown on the Drawings.

**SECTION 03300
CAST IN PLACE CONCRETE**

- M. In locations where new concrete is doweled to existing work, drill holes in existing concrete, inset steel dowels, and pack solidly with no shrink grout.
- N. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Owner's Representative upon discovery.
- O. Maintain minimum concrete cover around reinforcing as follows, unless noted otherwise:
 - 1. Beams 1-½ in.
 - 2. Supported slabs and joists ¾ in.
 - 3. Column ties 1-½ in.
 - 4. Walls (exposed to weather or backfill) 2 in.
 - 5. Walls (interior) ¾ in.
 - 6. Footings and concrete formed against earth 3 in.
 - 7. Slabs on fill 2 in.

3.03 HOT WEATHER PLACEMENT

- A. Hot weather concrete placement procedures shall be followed when the rate of evaporation is expected to approach 0.2-lb./sq. ft./hr., calculated from Figure 2.1.5, ACI 301, or when the maximum daytime temperature exceeds 85°F.
- B. Place and protect concrete in conformance with ACI 305 during hot weather. The critical air temperature decreases as relative humidity decreases, as concrete temperature as placed increases, and as wind increases.
- C. The temperature of the concrete as placed shall be kept below 80°F by one or more of the following:
 - 1. Sprinkle aggregate stockpiles to lower temperatures through evaporation.
 - 2. Chilling the mixing water.
 - 3. Replacing some of the mixing water with shaved ice.
- D. Forms shall be cooled by sprinkling, provided all excess water is removed before concrete is placed.
- E. Concrete shall be in the forms within 45 minutes after water is added to the dry ingredients.
- F. Curing procedures shall start as soon as the condition of the concrete surface permits.
- G. Windbreaks and sunshades shall be used to protect flat work from drying winds and direct sun.
- H. The use of admixtures to retard setting shall not be used without the authorization of the Owner's Representative.

3.04 COLD WEATHER PLACEMENT

- A. Cold weather concrete placement procedures shall be followed when the surrounding air temperature is below 40°F or if freezing temperatures are likely during the specified curing period.
- B. Place and protect concrete in accordance with ACI 306 during cold weather. Minimum temperature maintained during curing shall be as specified in Table 1.4.1, ACI 306.

**SECTION 03300
CAST IN PLACE CONCRETE**

- C. From November 1st to April 15th, concrete shall not be placed without materials for its protection readily available on the job site, in quantities sufficient to protect all concrete that has not cured for the specified curing time.
- D. The minimum amount of insulation shall be required by tables and graphs in Chapter 4, ACI 306.
- E. Frozen materials or materials containing ice shall not be used in the concrete.
- F. Forms, reinforcement, filler, etc. are to be free from frost and concrete is not to be placed over or in contact with frozen earth.
- G. Concrete placement with air temperature at or anticipated to fall below 40°F within the 24-hours of placement shall use heated mixing water and aggregate. Protect the concrete by adequate heating and/or covering.
- H. Heating: Within the enclosure, artificial heat shall be provided to maintain the temperatures specified, continuously, and with a reasonable degree of uniformity in all parts of the enclosure.
 - 1. All exposed concrete surfaces within the heated area shall be wet down with a hose stream at least once every 24 hours during the heating period.
 - 2. The Contractor shall provide' adequate fire protection at all times on each floor where heating is in progress.
 - 3. The Contractor shall maintain watchmen or other attendants to keep the heating units in continuous operation.
 - 4. Heating appliances shall not be placed in a manner to endanger formwork, expose any area of concrete to drying out, or other injury due to excessive temperatures.
 - 5. Heating units shall be vented and not permitted to heat or dry the concrete. Venting shall adequately exhaust carbon dioxide and carbon monoxide to prevent damage to the concrete and protect the workmen.
- I. Covering: Protect exposed surfaces of slabs on earth, frames, slabs, beams, girders, walls, etc., formed with 1 in. or less thick wood forms or all metal forms. Protect with 2-in. blanket insulation covered with polyethylene sheets, Sisalkraft, or tarpaulins. Protection is in addition to curing membrane.
- J. Placing concrete when outside temperature is below 40°F:
 - 1. Standard concrete mixes shall have a temperature of not less than 70°F or more than 80°F when placed in the forms.
 - 2. Standard concrete mixes shall be maintained at a temperature of not less than 70°F for three days or 50°F for five days.
 - 3. High strength concrete shall be maintained at a temperature of not less than 70°F for two days or 50°F for three days for.
 - 4. The method of protection and curing shall prevent evaporation of moisture from the concrete and injury to the surface.
- K. After heating is discontinued, temperatures are to be lowered gradually. Drop shall not exceed 1 degree per hour for the first 24 hours and 2 degrees per hour thereafter until outside temperature is reached.

**SECTION 03300
CAST IN PLACE CONCRETE**

- L. Use of salts or chemicals for protection from freezing will not be permitted.
- M. Concrete damaged by freezing shall be removed and replaced at the expense of the Contractor.

3.05 CONVEYING

- A. Conveying method shall insure a uniform concrete mixture at the forms faces with a minimum slump loss.
- B. Chutes shall be steep enough to permit concrete of design consistency to flow to point of deposit or other means of conveying shall be used.
- C. Placement in Deep, Narrow Forms
 1. If free fall exceeds 3-feet, discharge into a hopper feeding into a drop chute (tremie).
 2. Drop to vertical; bottom of chute is not to be pushed or pulled from the vertical position to distribute the concrete, move the chute.
 3. Place concrete of a drier consistency near top of lift to offset the tendency of the concrete to become wetter at top.
 4. Full height of each section shall be placed in one day.
- D. Allow six hours (minimum) after depositing concrete in columns or walls before depositing beams, girders, or slabs supported thereon.
- E. Unless otherwise permitted, the work shall so be executed that a section begun on any one day shall be completed in daylight on the same day.

3.06 PLACING CONCRETE BY PUMPING

- A. Contractor may place cast-in-place concrete by pumping in accordance with ACI 304.
- B. Design Mix
 1. Submit separate design mix for pumped concrete.
 2. Note fine aggregate gradation and water and cement content are more critical and different from the regular concrete mix.
 3. Slump may be increased by 1-in. for individual batches at point of discharge except 7-in. slump is permitted for flowable concrete.
- C. Pumping Equipment and Placement
 1. Do not convey concrete through aluminum or aluminum alloy pipes.
 2. The loss of slump in pumping equipment shall not exceed 2 inches.
 3. The mortar used for lubricating the pumping equipment shall not be discarded.
 4. Slump and air tests shall be taken at both points of delivery to pump equipment and at point of discharge from the line.
 5. Concrete cylinders shall be taken at the point of discharge from the line.

3.07 VIBRATION OF CONCRETE

- A. An internal type vibrator shall be inserted and withdrawn slowly.
- B. Insert vibrator vertically to full depth of layer being placed at regular intervals (18 to 30).

**SECTION 03300
CAST IN PLACE CONCRETE**

- C. All vibrators used for normal weight concrete shall operate at a speed of not less than 10,000 rpm and be of suitable capacity.
- D. For all surfaces exposed to view in the finished work, vibration shall be supplemented by proper wooden spade puddling to remove bubbles and honeycomb.
- E. For placements other than concealed massive foundations, etc., at least one vibrator shall be on hand for every 10 cubic yards of concrete placed per hour plus one spare. All vibrators shall be operable and on the site prior to starting equipment.
- F. Do not use vibrator to cause concrete to flow from one location to another.

3.08 SCREEDING

- A. Screed floors, slabs-on-fill, and concrete base for toppings level. Maintain surface flatness of maximum 1/8th in. in 10 ft. except where drains occur. Around drains, pitch floors in planes true to the same tolerance.

3.09 CONCRETE FINISHING

- A. Finish concrete surfaces to be left exposed without special finish as follows:
 - 1. Fill honeycomb, tie holes, and other depressions.
 - 2. Remove projecting fins.
 - 3. Leave surfaces as they come from forms, except as noted above.

3.10 FINISHING, HARDENING, AND CURING OF INTERIOR FLOOR SLABS

- A. Perform initial finishing operations including screeding, tapering, and floating until surface water glaze is disappearing. Use only wood floats.
- B. Apply floor hardener as recommended by the manufacturer.
- C. Steel trowel finish floor surfaces.
- D. Cure slab with hardener manufacturers recommended curing compound applied in accordance with manufacturers recommendations.

3.11 FINISHING AND CURING OF EXTERIOR SLABS

- A. Slabs and stoops shall be floated, troweled, and fiber broom finished. Tool edges.
- B. Concrete slab shall be sealed with a curing membrane as soon as finishing operation is completed. Apply in accordance with the manufacturer's recommendations.

3.12 CONCRETE CURING AND PROTECTION

- A. General
 - 1. Protect exposed, freshly placed concrete from drying and wash by rain, water leaks, falling objects, floor traffic, and other hazards that might mar the surface.
 - 2. Concrete shall be kept continually wet for seven days after placing, including weekends and holidays. Alternate cycle of wetting and drying will not be permitted. Particular care shall be taken when surrounding air is heated during cold weather operations. Provide uniform distribution of heat during cold weather, between 50°F and 60°F.
- B. The following are approved methods of curing:
 - 1. Horizontal Surfaces

**SECTION 03300
CAST IN PLACE CONCRETE**

- a. Cover with burlap, cotton, or other approved fabric mats. Keep mat wet during curing period.
- b. Cover with 0.004 thick Polyethylene sheets. Lap edges 4" (min.). Seal with adhesive tape.
- c. Apply one coat of concrete curing compound. Apply with lambs wool applicator paint brush or spray. Application may be made immediately after troweling or as soon as the concrete can be walked on (usually 1 to 8 hours). Apply in accordance with manufacturers specifications.
- d. Curing compound shall not be used when other hardeners and applications are specified which are not compatible with curing compounds, or on horizontal exposed surfaces on top of walls.

2. Vertical Surfaces

- a. Wood forms (kept wet), and metal forms provide satisfactory protection against loss of moisture; top surfaces are to be cured as specified above.
- b. After removal of forms, continue curing for specified period with one of the methods listed for horizontal surfaces. Do not use curing compound on exposed vertical surfaces.

3.13 GROUTING OF BASE PLATES AND BEARING PLATES

A. Grout Mixture

1. Grout shall consist of the approved package grout mixture and water. Use the minimum amount of water required to produce a flowable grout. Take care to avoid the use of excessive water which may cause segregation or bleeding.
2. Minimum ultimate compressive strength of grout shall be 5,000 psi at seven days and 7,500 psi at 28 days.

B. Mixing

1. Materials and water shall be mixed in a paddle type, mortar mixer for not less than three minutes.
2. Mix as close to the area to be grouted as possible. Provide adequate means to transport the mixed grout as quickly as possible, and in a manner to prevent segregation.
3. Place grout within a period of 15 minutes after mixing. After the grout has been mixed, do not re-temper by adding water.

C. Preparation

1. Remove all defective concrete, laitance, dirt, oil, grease, and loose material from the concrete foundation by bush hammering, chipping, or other approved means until sound, clean concrete is obtained.
2. Leave the surface of the concrete reasonably rough, but not so rough as to interfere with proper placing of the grout.
3. Cover the area as completely as possible with a waterproof paper to prevent contamination prior to grouting.

3.14 SLAB SURFACE TOLERANCES

**SECTION 03300
CAST IN PLACE CONCRETE**

- A. Interior floor slabs shall be level with the maximum deviation being 1/8th in. in 10 ft. The testing method shall be as follows:
 - 1. Set a 10 ft. long straightedge on 3/8-in. high shims at any location on the floor
 - 2. A 1/4-in. roller bar should pass anywhere under the straightedge
 - 3. A 1/2-in. roller bar should not be able to fit anywhere under the straightedge
- B. Exterior slabs shall be to the slopes shown on the Drawings and not deviate from uniform slopes more than 1/4-in. in any 10 ft. checked. Checking shall be similar to above utilities 1/2-in. high shims, a 1/4-in. small roller, and a 3/4-in. large roller.

3.15 PATCHING

- A. Surface defects, including tie holes and honeycomb, unless otherwise specified by the contract documents, shall be repaired immediately after form removal.
- B. All honeycomb and other defective concrete shall be removed down to sound concrete with edges perpendicular to the surface or slightly undercut. Feathered edges will not be permitted. The area to be patched and an area at least six wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1 part cement to 1 part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream, and then well brushed into the surface.
- C. The patching mixture shall be consist of the same materials and approximate the same proportions used for the concrete with the following changes:
 - 1. Omit the coarse aggregate
 - 2. The mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume
 - 3. White Portland cement shall be substituted for a part of the gray Portland cement on exposed concrete. Match color by a trial patch.
 - 4. Quantity of mixing water shall be no more than necessary for handling and placing.
 - 5. Patching mortar shall be mixed in advance. Allow mortar to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
- D. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off. Leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished. The patched area shall be kept damp for seven days. In a formed, exposed wall metal tools shall not be used in finishing a patch.
- E. After being cleaned and thoroughly dampened, tie holes shall be filled solid with patching mortar.
- F. Concrete slab surfaces containing defects that adversely affect durability, strength, or appearance, shall be repaired by a method approved by the Owners Representative or replaced.

3.16 DEFECTIVE CONCRETE

**SECTION 03300
CAST IN PLACE CONCRETE**

- A. Do not patch defective concrete until examined and approved by the Owner's Representative. Where so approved, make repairs using the following procedures:
 - 1. Clean surfaces to be patched of all loose particles, oils, grease, etc., and roughen surfaces as required.
 - 2. Pre-dampen surfaces before application of patching compound.
 - 3. Mix, apply, finish, and cure patching compound in strict compliance with the manufacturers instructions.
- B. Where concrete is to be exposed to view in the finished work, exercise care to avoid damaging virgin skin of surrounding parent concrete.

END OF SECTION 03300

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION



MATT BLUNT, Governor

Annual Wage Order No. 15

Section 032

DEKALB COUNTY

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

Original Signed by

Paul Buckley, Director
Division of Labor Standards

This Is A True And Accurate Copy Which Was Filed With The Secretary of State: March 10, 2008

Last Date Objections May Be Filed: April 9, 2008

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Effective Date of Increase	*	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits
Asbestos Worker			\$29.89	52	53	\$20.48
Boilermaker			\$31.00	57	7	\$18.75
Bricklayers-Stone Mason	5/08		\$29.32	54	1	\$11.98
Carpenter	5/08		\$27.95	8	1	\$11.23
Cement Mason	5/08		\$24.62	65	4	\$16.91
Electrician (Inside Wireman)	6/08		\$29.95	70	21	\$5.25 + 22%
Communication Technician			USE ELECTRICIAN (INSIDE WIREMAN) RATE			
Elevator Constructor		a	\$37.383	26	54	\$17.605
Operating Engineer						
Group I			\$29.66	85	4	\$12.40
Group II			\$28.85	85	4	\$12.40
Group III			\$23.30	85	4	\$12.40
Group III-A			\$27.51	85	4	\$12.40
Group IV						
Group V			\$24.90	85	4	\$12.40
Pipe Fitter	9/08		\$32.00	107	34	\$15.25
Glazier			\$26.36	88	32	\$12.57
Laborer (Building):						
General	5/08		\$22.06	115	1	\$9.50
First Semi-Skilled	5/08		\$22.26	115	1	\$9.50
Second Semi-Skilled	5/08		\$22.41	115	1	\$9.50
Lather			USE CARPENTER RATE			
Linoleum Layer & Cutter			\$30.00	41	11	\$10.05
Marble Mason			\$26.14	54	1	\$9.98
Millwright			USE CARPENTER RATE			
Iron Worker			\$23.75	50	4	\$20.35
Painter	5/08		\$23.70	34	13	\$9.90
Plasterer			\$24.15	68	4	\$16.40
Plumber	9/08		\$32.00	107	34	\$15.25
Pile Driver			USE CARPENTER RATE			
Roofer	6/08		\$25.50	96	4	\$10.41
Sheet Metal Worker	7/08		\$34.69	16	22	\$14.77
Sprinkler Fitter			\$30.59	33	19	\$14.30
Terrazzo Worker			\$26.14	54	1	\$9.98
Tile Setter			\$26.14	54	1	\$9.98
Truck Driver-Teamster						
Group I			\$20.03	99	59	\$4.25
Group II						
Group III			\$20.08	99	59	\$4.25
Group IV						
Traffic Control Service Driver						
Welders-Acetylene & Electric		*				

Fringe Benefit Percentage is of the Basic Hourly Rate

Attention Workers: If you are not being paid the appropriate wage rate and fringe benefits contact the Division of Labor Standards at (573) 751-3403.

**Annual Incremental Increase

**DEKALB COUNTY
OVERTIME SCHEDULE - BUILDING CONSTRUCTION**

FED: Minimum requirement per Fair Labor Standards Act means time and one-half (1 ½) shall be paid for all work in excess of forty (40) hours per work week.

NO. 8: Means eight (8) hours shall constitute the regular workday from 8:00 a.m. to 4:30 p.m. All time before 8:00 a.m. and after 4:30 p.m. will be paid at time and one-half (1½) the regular wages. Employer and employee may agree to advance or delay the regular starting time. All work between 4:30 p.m. Saturday and 8:00 a.m. Monday and recognized holidays shall be paid for at double (2) time. All other overtime shall be at time and one-half (1½).

NO. 16: Means the regular working day shall consist of eight (8) hours of labor between 7:00 a.m. and 3:30 p.m. and the regular working week shall consist of five (5) consecutive eight (8) hour days of labor, beginning with Monday and ending with Friday of each week. Start time may be varied by two (2) hours. All full time or part time labor performed during such hours shall be recognized as regular working hours and paid for at the regular hourly rate. All work performed outside the regular working hours and performed during the regular work week, shall be at one and one-half (1½) times the regular rate. Two (2) times the regular rate shall be paid for all hours over twelve (12) consecutive hours. When circumstances warrant and when it is mutually beneficial and agreed to by interested parties, the Employer may institute a work week consisting of four (4) consecutive ten (10) hour days, between the hours of five (5) a.m. and six (6) p.m., Monday through Thursday, with one-half (1/2) hour allowed for a lunch period each day. Friday may be used as a make-up day. The make-up day will be voluntary, and a decision not to work may not be held against the employee. When working four (4) ten (10) hour days, overtime will be paid at the time and one-half (1½) rate for the eleventh (11th) and twelfth (12th) hour, all other hours worked over twelve (12) in one day will be paid at the double (2) time rate of pay. All work performed on Saturday for the first eight (8) hours will be paid at one and one-half (1½) times the regular rate. Two (2) times the regular rate shall be paid for all hours over eight (8) consecutive hours. All work performed on recognized holidays, or days locally observed as such, and Sundays shall be paid at the double (2) time rate of pay.

NO. 26: Means that the regular working day shall consist of eight (8) hours worked between 6:00 a.m., and 5:00 p.m., five (5) days per week, Monday to Friday, inclusive. Hours of work at each jobsite shall be those established by the general contractor and worked by the majority of trades. (The above working hours may be changed by mutual agreement). Work performed on Construction Work on Saturdays, Sundays and before and after the regular working day on Monday to Friday, inclusive, shall be classified as overtime, and paid for at double (2) the rate of single time. The employer may establish hours worked on a jobsite for a four (4) ten (10) hour day work week at straight time pay for construction work; the regular working day shall consist of ten (10) hours worked consecutively, between 6:00 a.m. and 6:00 p.m., four (4) days per week, Monday to Thursday, inclusive. Any work performed on Friday, Saturday, Sunday and holidays, and before and after the regular working day on Monday to Thursday where a four (4) ten (10) hour day workweek has been established, will be paid at two times (2) the single time rate of pay. The rate of pay for all work performed on holidays shall be at two times (2) the single time rate of pay.

NO. 33: Means the standard work day and week shall be eight (8) consecutive hours of work between the hours of 6:00 a.m. and 6:00 p.m., excluding the lunch period Monday through Friday, or shall conform to the practice on the job site. Four (4) days at ten (10) hours a day may be worked at straight time, Monday through Friday and need not be consecutive. All overtime, except for Sundays and holidays shall be at the rate of time and one-half (1½). Overtime worked on Sundays and holidays shall be at double (2) time.

NO. 34: Means the Employer may choose, at his discretion, to work five eight-hour days or four ten-hour days with a Friday make-up day. Overtime shall be paid after eight hours when working "five eights" and after ten hours when working "four tens", and Saturdays at time and one-half (1 ½) the base rates. Any hours worked on Sunday and recognized Holidays shall be paid at two (2) times the base rate.

NO. 41: The regular work day shall be eight (8) hours from 6:00 a.m. to 6:30 p.m. Starting time may be between 6:00 a.m. and 10:00 a.m. The regular work week shall be forty (40) hours, beginning between 6:00 a.m. and 10:00 a.m. on Monday and ending between 2:30 p.m. and 6:30 p.m. on Friday. All hours in excess of the regular work day and work week, and all work outside of the regular work day or work week shall be considered overtime. Overtime on days recognized as regular work days and on Saturday shall be paid for at the rate of one and one-half (1½) times the regular rate. Overtime on Sundays and recognized Holidays shall be paid for at the rate of double (2) time.

**DEKALB COUNTY
OVERTIME SCHEDULE - BUILDING CONSTRUCTION**

NO. 50: Means eight (8) hours constitute a normal day's work Monday through Friday. Any time worked over eight (8) hours will normally be paid at time and one-half (1½) except for exclusions stated in some following additional sentences. The Employer, at his discretion, may start the work day between 6:00 a.m. and 9:00 a.m. Any schedule chosen shall be started at the beginning of the work week (Monday) and used for at least five days. Work may be scheduled on a four (4) days a week (Monday through Thursday) at ten (10) hours a day schedule. If such a schedule is employed, then Friday may be used as a make-up day when time is lost due to inclement weather. Time and one-half (1½) shall be paid for any work in excess of eight (8) hours in any regular work day Monday through Friday unless working 4-10's, then time and one-half (1½) after ten (10) hours. All work performed on Saturday will be time and one-half (1½). Double (2) time shall be paid for all work on Sundays and recognized holidays.

NO. 52: Means the regular workweek shall consist of five (5) eight (8) hour days, Monday through Friday. The regular workday shall consist of a eight (8) hour period, to be worked between the agreed upon starting time, and ending no later than 4:30 p.m. The agreed upon starting time shall be any time between the hours of 6:00 a.m. and 8:00 a.m. The option exists for the employer to use a four (4) day, ten (10) hour work week. Days worked shall be Monday through Thursday or Tuesday through Friday. If the job requires men on duty all five (5) days, then part of the crew may work the first four (4) days and the remainder of the crew may work the last four (4) days. Hours each day shall be from 7:00 a.m. to 5:30 p.m. Interested party's on the project must agree to this clause before it may be used. Once this clause has been put into effect, it shall remain as long as the majority of the Employees on the project and the Employer agree to keep it. The four (4) day clause shall not be used to circumvent a Holiday. Except as otherwise provided, all work performed outside the regular working hours and performed during the regular work week (Monday through Friday) shall be at the following rates of pay:

Holidays-New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, Christmas Day (or days observed as such) shall be recognized as Holidays that shall be paid at two (2) times the regular rate of pay.

Labor Day-No work shall be performed on Labor Day except in special cases of emergency. Rate of pay shall be at three (3) times the regular rate of pay.

Overtime-Work performed outside of the regular work day (the regular work day shall consist of an eight (8) hour period, to be worked between the agreed upon starting time, and ending not later than 4:30 p.m. The agreed upon starting time shall be any time between the hours of 6:00 a.m. and 8:00 a.m., by mutual consent of the interested party's.), shall be:

- A. Hours worked Monday through Friday, the first two (2) hours of overtime will be paid at time and one-half (1½). All other overtime will be paid at the double (2) time rate.
- B. The first ten (10) hours worked on Saturday will be paid at time and one-half (1½), with all other hours to be paid at the double (2) time rate.
- C. Sundays and Holidays (except Labor Day) shall be paid at the double (2) time rate.

NO. 54: Means overtime shall be time & one-half (1½) before 8:00 a.m. and after 4:30 p.m., Monday through Friday. Saturday shall be time & one-half (1½) unless this day is used as a make-up day. The option to use Saturday as a make-up day shall exist only from the 1st of November to the 31st of March and then used only as a make-up day for any time lost during the week due to inclement weather. Sundays and recognized holidays shall be paid at the double (2) time rate.

NO. 57: Means eight (8) hours per day shall constitute a day's work and forty (40) hours per week, Monday through Friday, shall constitute a week's work. The regular starting time shall be 8:00 a.m. The above may be changed by mutual consent of authorized personnel. When circumstances warrant, the Employer may change the regular workweek to four (4) ten-hour days at the regular time rate of pay. It being understood that all other pertinent information must be adjusted accordingly. All time worked before and after the established workday of eight (8) hours, Monday through Friday, all time worked on Saturday, shall be paid at the rate of time and one-half (1½) except in cases where work is part of an employee's regular Friday shift. All time worked on Sunday and recognized holidays shall be paid at the double (2) time rate of pay.

DEKALB COUNTY
OVERTIME SCHEDULE - BUILDING CONSTRUCTION

NO. 65: Means Monday through Sunday shall constitute the work week. Regular starting time shall be 8:00 a.m., with one half hour for lunch between three and one-half (3½) and five (5) hours after starting time. The starting time may be advanced by two (2) hours or delayed one (1) hour by the employer from the regular starting time. All work performed before the advanced starting time and during the half hour lunch shall be paid at the overtime rate of time and one-half (1½). Work performed outside these hours shall be paid at the overtime rate of time and one-half (1½), except as provided otherwise below. All work performed on Sundays or recognized holidays shall be paid at the double (2) time rate. When the start time is delayed past 9:00 a.m., the employee's pay shall start at 9:00 a.m. and all time, after the normal quitting time (5:30 p.m.), shall be paid at the overtime rate. Eight (8) hours shall constitute the work day. All work performed prior to or after the regular eight (8) hour work day, as described above, and all work performed on Saturday shall be paid at time and one-half (1½) the regular rate. In the event that a scheduled eight (8) hour work day is missed (not including recognized holidays) because of inclement weather, then that missed work day may be made up at straight time on the following Saturday. It is recognized that not all employees working on a Saturday make-up day will have worked the same number of hours during the regular work week. It is further recognized that any work after forty (40) hours must be paid at time and one-half (1½). The employer may establish a 4-10's schedule on projects (4 days with 10 hours per day at straight time). In order to use the 4-10's schedule, the employer must schedule the 4-10's for a minimum of one (1) week. If using a 4-10's schedule, a Friday make-up day is allowed.

NO. 68: Means Monday through Sunday shall constitute the work week. Regular starting time shall be 8:00 a.m., with one half hour for lunch between three and one-half and five hours after starting time. The starting time may be advanced or delayed by the employer up to one hour from the regular starting time. All work performed before the advance starting time and during the half hour lunch shall be paid at the overtime rate of time and one-half (1½). Work performed outside these hours shall be paid at the overtime rate of time and one-half (1½), except as provided otherwise below. All work performed on Sundays or holidays shall be paid at the double (2) time rate. Eight (8) hours shall constitute the work day. All work performed prior to or after the regular eight (8) hour work day, as described above, and all work performed on Saturday shall be paid at time and one-half (1½) the regular rate, except as hereinafter described. In the event that a scheduled eight (8) hour work day is missed (not including recognized holidays) because of inclement weather, then that missed work day may be made up at straight time on the Saturday in the week of the pay period. It is recognized that not all employees working on a Saturday make-up day will have worked the same number of hours during the regular work week. It is further recognized that any work after forty (40) hours must be paid at time and one-half (1½). The employer may establish a 4-10's schedule on projects (4 days with 10 hours per day at straight time). In order to use the 4-10's schedule, the employer must schedule the 4-10's for a minimum of one (1) week. If using a 4-10's schedule, a Friday make-up day is allowed.

NO. 70: Means eight (8) hours of work between the hours of 8:00 a.m. and 4:30 p.m. shall constitute a work day. Forty (40) hours within five (5) days, Monday through Friday inclusive, shall constitute a work week. The Employer may, at his discretion, vary the starting time by up to one (1) hour, either prior to or after the normal starting time. The Employer may work four (4) ten (10) hour days, either Monday through Thursday or Tuesday through Friday. Overtime will be paid for work outside of the established starting and quitting times. All overtime work between eight (8) hours and ten (10) hours on regular scheduled working days and the first ten (10) hours on Saturday, beginning at the regular starting time, will be paid at time and one-half (1½). All other overtime, on Saturday, Sunday and recognized holidays shall be paid for at double (2) the straight time rate of pay. If any of the recognized holidays fall on Friday, Saturday, Sunday or Monday, creating a three-day weekend, then the entire three (3) days (either Friday, Saturday and Sunday – if the holiday falls on Friday or Saturday; or Saturday, Sunday and Monday – if the holiday falls on Sunday or Monday) shall be paid for at double (2) the straight-time rate of pay. Shift work performed between the hours of 4:30 p.m. and 1:00 a.m. (second shift) shall receive eight (8) hours pay at the regular hourly rate of pay plus 17.3% for all hours worked. Shift work performed between the hours of 12:30 a.m. and 9:00 a.m. (third shift) shall receive eight (8) hours pay at the regular hourly rate of pay plus 31.4% for all hours worked. A lunch period of thirty (30) minutes shall be allowed on each shift. All overtime work required after the completion of a regular shift shall be paid at one and one-half (1½) times the shift hourly rate.

**DEKALB COUNTY
OVERTIME SCHEDULE - BUILDING CONSTRUCTION**

NO. 85: Means the work week shall be Monday through Sunday. Eight (8) hours shall constitute a day's work to begin between 6:00 a.m. and 9:00 a.m. and end between 2:30 p.m. to 5:30 p.m. Employees required to work during their lunch period shall receive the overtime rate. Employees shall receive time and one-half (1½) for all time they are required to work prior to their normal starting time or after eight (8) hours or normal quitting time Monday through Friday, or all day on Saturday. If an Employer has started the work week on a five day, eight hours a day schedule, and due to inclement weather misses any time, then he may switch to a nine or ten hours a day schedule, at straight time, for the remainder of that work week in order to make up for the lost time (10-hour make-up day). All work over ten (10) hours a day or over forty (40) hours a week must be paid at time & one-half (1½). Sundays and recognized holidays shall be paid at the double (2) time rate of pay. A contractor may alter the regular work week to four (4) ten (10) hour days at straight time rate of pay. To do this the scheduled 4-10's must be worked at least one full week and the regular workweek shall be Monday through Thursday with Friday being a make-up day at straight time for days missed in the regular workweek due to inclement weather. If 5-8's are being worked, Saturday may be used as a make-up day at straight time if inclement weather prevents work during the normal work week.

NO. 88: Means the regular work week shall consist of five (5) eight (8) hour days, 8:00 a.m. to 4:30 p.m., Monday through Friday, except when the work week is scheduled as a 4-10's week or as a week with start time advanced or delayed as described below. The starting time may be advanced or delayed by one hour on either side of 8:00 a.m. The advanced or delayed starting time must run for a period of at least five (5) days. The Employer may establish a work week consisting of four (4) days, during the regular work week, each day consisting of ten (10) hours at straight time. The 4-10's must run for a period of at least four (4) days. Time and one-half (1½) shall be paid for any work in excess of eight (8) hours in any regular work day Monday through Friday (or ten hours in a 4-10's week), the first eight (8) hours of a Saturday, and it shall be at time and one-half (1½) for the Friday and Saturday following Thanksgiving. Double (2) time shall be paid for the following time worked on Sunday, New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day, as well as any work in excess of eight (8) hours on a Saturday and the Saturday of a three-day weekend (except the Saturday following Thanksgiving).

NO. 96: A regular workday shall consist of eight (8) working hours. Any work performed over these eight (8) hours per day shall be paid at one and one-half (1½) time the straight time rate. A regular workday may be extended to ten (10) working hours. Any work performed over these ten (10) hours per day shall be paid at one and one-half (1½) times the straight time rate. The regular work week shall begin on Monday and shall continue through Friday. Saturday shall be considered as overtime, and shall be paid for at time and one-half; Sunday and Holidays shall be paid for at double (2) time.

NO. 99: Means the regular eight (8) hour work day shall be from 8:00 a.m. to 5:00 p.m., unless one-half (½) hour is taken for lunch, and in such case, the hours of work shall be from 8:00 a.m. to 4:30 p.m. The regular work days each week shall be from Monday through Friday. Time and one-half (1½) shall be paid for all work in excess of the regular eight (8) hour work day and regular forty (40) hour work week. Double (2) time shall be paid for all work performed on Sunday and recognized holidays.

NO. 107: Means the regular work day shall be eight (8) hours from 8:00 a.m. to 4:30 p.m. with one-half (1/2) hour lunch Monday through Friday. Starting time may be adjusted by half-hour increments. Employees shall receive time and one-half (1½) for the first two (2) hours of overtime if they immediately follow or precede the normal work day, Monday through Friday, and the first ten (10) hours on Saturday. An Employee receiving the double (2) time rate of pay shall continue to do so for all consecutively worked hours on that specific job, even if these hours overlap into the following work day. All other overtime is double (2) time, including holidays and Sundays.

NO. 115: Means eight (8) hours shall constitute a normal day's work as follows: 7:00 – 8:00 a.m. to 12:00 noon and from 12:30 p.m. to 3:30 – 4:30 p.m. Monday through Friday. The lunch break may be of sixty (60) minutes duration and quitting time delayed accordingly. Employees working before or after these specified hours shall be paid at the rate of time and one-half (1½) the regular rate of pay. Sunday and Holiday work shall be double (2) time. Employees failing to work a regular forty (40) hour week due to inclement weather may work on Saturday at the regular rate of pay. During periods of intemperate summer weather, the working day may begin at 6:00 a.m. and straight time shall be paid for eight (8) hours of work.

DEKALB COUNTY
HOLIDAY SCHEDULE – BUILDING CONSTRUCTION

NO. 1: All work done on New Year's Day, Decoration Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day shall be paid at the rate of double time. When one of the above holidays falls on Sunday, the following Monday shall be observed.

NO. 4: All work done on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas Day shall be paid at the double time rate of pay. If any of the above holidays fall on Sunday, Monday will be observed as the recognized holiday. If any of the above holidays fall on Saturday, Friday will be observed as the recognized holiday.

NO. 7: All work done on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day shall be paid at the double time rate of pay. If a holiday falls on a Sunday, it shall be observed on the following Monday. If a holiday falls on a Saturday, it shall be observed on the preceding Friday.

NO. 11: All work done on New Year's Day, Memorial Day, Christmas Day, Fourth of July, and Thanksgiving Day shall be paid for at the rate of double time. Positively no work shall be performed on Labor Day. Martin Luther King's Birthday, Veteran's Day and the day after Thanksgiving Day shall be considered optional holidays, and if the employer and employees agree that work will be performed on that day, no premium will be required. Should any of the above holidays fall on Saturday, the holiday will be observed on Friday. Should any of the above holidays fall on Sunday, the holiday will be observed on Monday.

NO. 13: Any hours worked on Sunday and on recognized holidays shall be paid at the rate of two (2) times the base rate. The recognized holidays are New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. In the event any of the above holidays fall on Saturday, then that holiday shall be observed on Friday. In the event any of the above holidays fall on Sunday, then that holiday shall be observed on Monday.

NO. 19: All work done on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day shall be paid at the double time rate of pay. The employee may take off Friday following Thanksgiving Day. However, the employee shall notify his or her Foreman, General Foreman or Superintendent on the Wednesday preceding Thanksgiving Day. When one of the above holidays falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double (2) time rate. When one of the holidays falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double (2) time rate.

NO. 21: All work performed on New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day shall be paid for at double (2) the straight-time rate of pay. Any of the above listed holidays falling on Sunday, shall be observed on the following Monday and paid for at double (2) the straight-time rate of pay. Any of the above listed holidays falling on Saturday shall be observed on the previous Friday, and paid for at double (2) the straight-time rate of pay. If any of the above listed holidays fall on Friday, Saturday, Sunday, or Monday, creating a three-day weekend, then the entire three (3) days (either Friday, Saturday, and Sunday – if the holiday falls on Friday or Saturday; or Saturday, Sunday, and Monday – if the holiday falls on Sunday or Monday) shall be paid for at double (2) the straight-time rate of pay.

NO. 22: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, or days locally observed as such, and Sunday shall be recognized as holidays. If a holiday falls on Saturday, Friday shall be observed; if it falls on Sunday, Monday shall be observed. All work performed on holidays shall be paid at the double (2) time rate of pay.

NO. 32: All work performed for the Friday and Saturday following Thanksgiving shall be paid at the time and one-half (1½) rate of pay. All work performed on Sundays, New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day shall be paid at the double (2) time rate of pay. When one of the above holidays falls on Sunday, the following Monday shall be observed and when one of the above holidays falls on Saturday, the preceding Friday shall be observed.

**DEKALB COUNTY
HOLIDAY SCHEDULE – BUILDING CONSTRUCTION**

NO. 34: All work performed on Sundays and recognized holidays shall be paid at the double (2) time rate of pay. The recognized holidays are as follows: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. The day separating one of the above holidays from the weekend, if worked, shall be paid double (2) time. Any holiday falling on Sunday, will be observed on the following Monday, and be paid accordingly. Any holiday falling on Saturday will be observed on the preceding Friday, and be paid accordingly. When one of the above holidays falls on Tuesday, the preceding Monday will be observed as a non-working holiday. When one of the above holidays falls on Thursday, such as Thanksgiving, the following Friday will be observed as a non-working holiday. When a holiday falls on Monday, Tuesday will be observed as a non-working holiday, and when a holiday falls on a Friday, then Thursday will be observed as a non-working holiday. No work will be allowed on Labor Day, except in case of an emergency.

NO. 53: All work done on New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, Christmas Day or days observed as such for these holidays shall be paid at the double (2) time rate of pay. No work shall be performed on Labor Day except in special cases of emergency, and then the rate of pay shall be at three (3) times the regular rate of pay. When a holiday falls on a Sunday, the following Monday shall be observed as the holiday. When a holiday falls on Saturday, the preceding Friday shall be observed as the holiday.

NO. 54: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day shall be paid at the double (2) time rate of pay. When a holiday falls on Saturday, it shall be observed on Friday. When a holiday falls on Sunday, it shall be observed on Monday.

NO. 59: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day or any days celebrated in lieu thereof when such holidays fall on Sunday, shall be paid at the double (2) time rate of pay.

OCCUPATIONAL TITLE	*Effective Date of Increase	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits
CARPENTER					
Journeymen	5/08	\$27.41	7	16	\$9.51
Millwright	5/08	\$27.41	7	16	\$9.51
Pile Driver Worker	5/08	\$27.41	7	16	\$9.51
OPERATING ENGINEER					
Group I	5/08	\$27.65	5	15	\$12.20
Group II	5/08	\$27.25	5	15	\$12.20
Group III	5/08	\$27.25	5	15	\$12.20
Group IV	5/08	\$25.25	5	15	\$12.20
Oiler-Driver	5/08	\$25.25	5	15	\$12.20
LABORER					
General Laborer	5/08	\$22.14	4	18	\$9.44
Skilled Laborer	5/08	\$22.49	4	18	\$9.44
TRUCK DRIVER-TEAMSTER					
Group I	5/08	\$25.52	12	3	\$8.65
Group II	5/08	\$25.68	12	3	\$8.65
Group III	5/08	\$25.67	12	3	\$8.65
Group IV	5/08	\$25.79	12	3	\$8.65

For the occupational titles not listed on the Heavy Construction Rate Sheet, use Rates shown on the Building Construction Rate Sheet.

**DEKALB COUNTY
OVERTIME SCHEDULE – HEAVY CONSTRUCTION**

NO. 4: Means a regular work week shall consist of not more than forty (40) hours of work, Monday through Saturday, and all work performed over and above ten (10) hours per day and forty (40) hours per week shall be paid at the rate of time & one-half (1½). Workers shall receive time and one-half (1½) for all work performed on Sundays and holidays. A work day is to begin between 6:00 a.m. and 9:00 a.m. at the option of the Employer except when inclement weather or other conditions beyond the reasonable control of the Employer prevent work, in which event, the starting time may be delayed, but not later than 12:00 noon. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward a forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid to the worker(s) unless worked.

NO. 5: Means a regular work week shall consist of not more than forty (40) hours work, Monday through Saturday, and all work performed over and above ten (10) hours per day and forty (40) hours per week shall be paid at the rate of time & one-half (1½). Workmen shall receive time and one-half (1½) for all work performed on Sundays and recognized holidays or days observed as such. Double (2) time shall be paid for work on Sunday or recognized holidays when and only if any other craft employees of the same employer at work on that same job site are receiving double (2) time pay for that Sunday or holiday. If a job can't work forty (40) hours, Monday through Saturday, because of inclement weather or other conditions beyond the control of the Employer, Friday and Saturday may be worked as make up days at straight time (if working 4-10's). Saturday may be worked as a make up day at straight time (if working 5-8's). Make up days shall not be utilized for days lost to holidays. A work day is to begin between 6:00 a.m. and 9:00 a.m. at the option of the Employer except when inclement weather or other conditions beyond the reasonable control of the Employer, including requirements of the owner, prevent work. In such event the starting time may be delayed but not later than 12:00 noon. Where one of the holidays falls or is observed during the work week, then all work performed over and above thirty-two (32) hours shall be paid at time & one-half (1½).

NO. 7: Means the regular work week shall start on Monday and end on Friday, except where the Employer elects to work Monday through Thursday, ten (10) hours per day. All work over ten (10) hours in a day or forty (40) hours in a week shall be at the overtime rate of one and one-half (1½) times the regular hourly rate. The regular work day shall be either eight (8) or ten (10) hours. If a job can't work forty (40) hours Monday through Friday because of inclement weather or other conditions beyond the control of the Employer, Friday or Saturday may be worked as a make-up day at straight time (if working 4-10's). Saturday may be worked as a make-up day at straight time (if working 5-8's). Make-up days shall not be utilized for days lost due to holidays. A workday is to begin at the option of the Employer but not later than 11:00 a.m. except when inclement weather, requirements of the owner or other conditions beyond the reasonable control of the Employer prevent work. Except as worked as a make-up day, time on Saturday shall be worked at one and one-half (1½) times the regular rate. Work performed on Sunday shall be paid at two (2) times the regular rate. Work performed on recognized holidays or days observed as such, shall also be paid at the double (2) time rate of pay.

NO. 12: Means a regular work week shall consist of not more than forty (40) hours of work and all work performed over and above ten (10) hours per day and forty (40) hours per week shall be paid at the rate of time & one-half (1½). A workday is to begin between 6:00 a.m. and 9:00 a.m. at the option of the Employer except when inclement weather or other conditions beyond the reasonable control of the Employer, in which event, the starting time may be advanced or delayed. Workers shall receive time and one-half (1½) for all work performed on recognized holidays or days observed as such.

**DEKALB COUNTY
HOLIDAY SCHEDULE – HEAVY CONSTRUCTION**

NO. 3: The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid to the workmen unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make up day when an observed holiday occurs during the work week. Employees have the option to work that make up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive time & one-half (1½) the regular rate of pay for such work.

NO. 15: The following days are recognized as holidays: New Year's Day, Memorial Day, July Fourth, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on Sunday, it shall be observed on the following Monday. If a holiday falls on Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. If workmen are required to work the above enumerated holidays or days observed as such, they shall receive time and one-half (1½) the regular rate of pay for such work. Where one of the holidays specified falls or is observed during the workweek, then all work performed over and above thirty-two (32) hours in that week shall be paid at the rate of time and one-half (1½). Workmen shall receive time and one-half (1 ½) for all work performed on Sundays. Double (2) time shall be paid for work on Sunday or recognized holidays when and only if any other craft employees of the same employer at work on that same job site are receiving double (2) time for that Sunday or holiday.

NO. 16: The following days are recognized as holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on Sunday, it shall be observed on the following Monday. If a holiday falls on Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid to the worker unless worked. If workers are required to work the above recognized holidays or days observed as such, they shall receive double (2) the regular rate of pay for such work.

NO. 18: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day shall be paid at the time and one-half (1½) rate of pay. If a holiday falls on Sunday, it shall be observed on the following Monday. If a holiday falls on Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward a forty (40) hour week; however no reimbursement for this eight (8) hours is to be paid to the working person(s) unless the holiday is worked.

REPLACEMENT PAGE

OUTSIDE ELECTRICIAN

These rates are to be used for the following counties:

Andrew, Atchison, Barry, Barton, Buchanan, Caldwell, Cedar, Christian, Clinton, Dade, Dallas, Daviess, DeKalb, Douglas, Gentry, Greene, Grundy, Harrison, Hickory, Holt, Jasper, Laclede, Lawrence, Livingston, McDonald, Mercer, Newton, Nodaway, Ozark, Polk, St. Clair, Stone, Taney, Vernon, Webster, Worth, and Wright

COMMERCIAL WORK

Occupational Title	Basic Hourly Rate	Total Fringe Benefits
*Journeyman Lineman	\$34.97	\$4.75 + 34%
*Lineman Operator	\$33.11	\$4.75 + 34%
*Groundman	\$22.60	\$4.75 + 34%

UTILITY WORK

Occupational Title	Basic Hourly Rate	Total Fringe Benefits
*Journeyman Lineman	\$33.45	\$4.75 + 34%
*Lineman Operator	\$30.92	\$4.75 + 34%
*Groundman	\$21.56	\$4.75 + 34%

OVERTIME RATE: Eight (8) hours of work between the hours of 8:00 a.m. and 4:30 p.m. shall constitute a work day. Forty (40) hours within the five (5) days, Monday through Friday inclusive, shall constitute the work week. Starting time may be adjusted not to exceed two (2) hours. Work performed outside of the aforementioned will be paid at the applicable overtime rate. When starting time has been adjusted, all other provisions concerning the work day shall be adjusted accordingly. The overtime rate of pay shall be one and one-half (1½) times the regular rate of wages, other than on Sundays, holidays and from Midnight until 6:00 a.m., which will be paid at double (2) the straight time rate.

HOLIDAY RATE: Work performed on New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day, or days celebrated as such, shall be paid at the double time rate of pay. If the holiday falls on Saturday, it will be observed on Friday; if the holiday falls on Sunday, it will be observed on Monday, and shall be paid for at double (2) the regular straight time rate of pay.

*Annual Incremental Increase