CITY OF MUSCLE SHOALS

CONSTRUCTION SPECIFICATIONS

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CITY OF MUSCLE SHOALS
CONSTRUCTION SPECIFICATION

1. DEFINITIONS

Whenever in the specifications or in any documents or instruments in construction operations where these specifications govern, the following terms, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

AASHTO	The American Association of State Highway and Transportation Officials
AGA	The American Gas Association
ALDOT	State of Alabama Highway Department Standard Specifications for Highway Construction, latest edition
A.N.S.I.	American National Standards Institute
API	The American Petroleum Institute
ASTM	American Society for Testing of Materials
Board	City of Muscle Shoals Water and Wastewater Board
CHIEF INSPECTOR	Chief Building Inspector of the City of Muscle Shoals
CITY ENGINEER	The duly designated engineer for the City of Muscle Shoals
CITY INSPECTOR	An authorized representative of the City of Muscle Shoals assigned to make detailed inspections of any portion of or all materials furnished or work performed by the contractor.
CIVIL ENGINEER	An engineer whose training or occupation is in the practice of civil engineering and who is a Registered Professional Engineer in the State of Alabama
CIVIL ENGINEERING	The application of the knowledge of the forces of nature, principles of mechanics and the properties of materials to the evaluation, design and construction of civil works for the beneficial use of mankind.
CONTRACT	The written agreement between the owner and the contractor, covering the performance of the work and

	the furnishing of the labor, equipment and materials in the construction.
CONTRACTOR	Any person, firm or corporation named as the party of the first part in the contract.
EASEMENT	A piece of land dedicated to the City for use as a corridor for utilities and/or drainage.
EMPLOYEE	Any person working on the project to which these specifications apply and who is under the direction or control of or receives compensation from the contractor or a subcontractor.
ENGINEER	Any person representing or being paid by the engineering firm that has been employed to design, supervise or inspect the construction of the project.
ENGINEER OF RECORD	The civil engineer registered and in good standing with the State of Alabama State Board of Registration for Professional Engineers and Land Surveyors and permitted to practice in the State of Alabama and who is responsible for the completeness and correctness of the information provided on the plans and specifications submitted for approval on behalf of the owners.
EQUIPMENT	All machinery, machines, and tools, together with the necessary supplies for upkeep, maintenance and protection, and all apparatus necessary for the proper construction and acceptable completion of the work.
EXTRA WORK	Work authorized in writing by the engineer and performed by the contractor in order to complete the job in an acceptable manner. Such work will be supported by a "Change Order" signed by the City Engineer and the Mayor.
FSS	Federal Specifications and Standards, General Services Administration
INSPECTOR	An authorized representative of the engineer assigned to make detailed inspection of any portion of or all materials furnished and work performed by the contractor.

OWNER	The public body, organization, board, district, corporation or individual having responsibility for the furtherance of the project.
PLANS	The drawings, or reproductions thereof, which show the location and general detailed design of the contemplated improvements.
PROJECT	One or any number of separate but correlated improvements covered by the work requirements.
STREET	Any or all portions of any street, avenue, alley, road or public highway which has been dedicated to the City and is accepted by the City for maintenance.
STRUCTURE	Any portion of the existing, completed, partially completed, or proposed construction. Buildings, piping, conduits, cables, wiring, utilities and any and all other man-made objects, whether above ground or underground, shall be considered as structure.
SUBCONTRACTOR	Any person, firm or corporation who has, with the approval of the engineer, contracted with the primary contractor to execute and perform in his stead any part of the project.
SUPERINTENDENT	The executive representative of the contractor, present on the project at all times, authorized to receive and fulfill instructions from the engineer and who is capable of efficiently superintending the work.
TYPICAL SECTION	That cross-section established by the plans which represents the lines to which the contractor shall work in the execution of the project.

2. GENERAL TERMS

AVOIDANCE OF REPETITION. Wherever the terms "contemplated", "required", "directed", "authorized", "considered necessary", "permitted", " approved", "suitable", "unacceptable", "designated", or terms of like import are used in these specifications, they shall be construed to mean "to" or "by the city engineer" or "building official" unless the context clearly indicates otherwise.

PARTS OF THE SPECIFICATIONS. The divisions, sections and articles, or sub-headings of the specifications are intended for convenience of reference only and shall not be considered as having any bearing on the interpretation thereof.

NOTIFICATION. The contractor shall notify the City of Muscle Shoals Building Department prior to beginning any work and, through the engineer of record, at the normal inspection points during work.

CONTROL OF WORK. The City engineer will decide all questions which may arise as to quality and acceptability of materials furnished and work performed. The City engineer shall have the authority to suspend the work wholly or in part due to failure of the contractor to correct unsafe conditions, for failure to carry out orders, for unsuitable weather, or for any other reason or condition he deems to be in the public interest.

PERMITS. It shall be the responsibility of any contractor, sub-contractor, public utility or City department to obtain permission from the Public Works Department prior to beginning any work on or affecting present or future streets, rights-of-way or easements. In an emergency, work may be performed outside of normal business hours and permission obtained at the beginning of business on the next business day.

APPLICABILITY. These specifications shall apply to all work performed in the City of Muscle Shoals, including work performed by City employees and contractors employed by the City. They shall apply to all work that is to be dedicated to the public or to any public entity.

3. SPECIFICATION

3.1 INTENT OF PLANS AND SPECIFICATIONS. The work to be done shall consist of the complete construction of each and every unit described in the plans, these Standard Specifications, the Supplemental Specifications, and the Special Provisions together with all authorized alterations.

3.2 SPECIAL WORK. Construction and conditions which have not been anticipated by the plans and these specifications, or changes, additions or amendments thereto, will be covered by special provisions, and shall be considered a part of the project.

3.3 ALTERATION OF PLANS AND CHARACTER OF WORK. The engineer may make alterations in the plans or in the nature of the work which he may consider necessary or desirable during the progress of the work to complete fully and acceptably the proposed construction. To accomplish such alterations, the engineer shall submit any such change as a CHANGE ORDER to the City Engineer and, upon approval by the City Engineer, may direct the contractor to proceed.

3.4 MAINTENANCE OF DETOURS. No highway, road or street or section thereof shall be closed to traffic except with the written permission of the City engineer and the owner or Agency governing or maintaining that road, street or highway.

3.5 DETOURS ALONG PROJECT. The contractor shall maintain all detours for traffic along or over the work. Unless otherwise provided, the road, street or highway upon which the improvement or installation is being made shall, except at times deemed impractical by the City engineer, be kept continuously open to public traffic and in passable and safe condition. All entrance trails, roads and highways intersecting it shall be kept open and passable. Temporary approaches and crossings, including crossings over surfacing and pavements, shall be provided and maintained in safe condition. It shall be the responsibility of the contractor to maintain all roads, streets and highways free of mud and in safe condition. Where the work to be constructed follows the general route of an existing road which is wholly or in part used by the traveling public the contractor shall repair and maintain in safe, passable and convenient condition all such part or parts of such existing roads as are being used between extreme limits of the work during the entire time from initiation of work until final acceptance of the work hereunder. He shall road-machine the traveled way as soon as possible after rains and at all other times when directed by the engineer and shall operate a drag over it whenever the City Engineer deems it necessary.

3.6 ROADS USED BY THE CONTRACTOR. The contractor shall, at his expense, repair any damage to existing streets which is caused by his equipment. Should the contractor wish to use a City street as a haul road, he shall meet with representatives of the City prior to starting. They shall review the condition of the street and reach an agreement as to the maintenance or restoration thereof. Roads used by the contractor for hauling materials and equipment shall be constructed and maintained by him. When the contractor hauls materials over any detour or public road, he shall so regulate his loads that the capacity of the road and its structures is not exceeded and he shall be responsible for any specific damage that may result to the road or its structures from failure to observe regulations governing traffic thereon. Resulting damage shall be repaired, without delay, by the contractor. It shall be the responsibility of the contractor to maintain all public streets and roads

adjoining the work in safe and passable condition and free of mud and debris.

3.7 CONVENIENCE OF TRAFFIC. The contractor will be required to carry traffic over the roads or streets with the least inconvenience to traffic within the limits of the right-of way and on detours for which he is responsible as hereinabove provided.

3.8 NO MUD TO BE DEPOSITED ON PUBLIC ROADS. The contractor shall not permit any mud from any construction site to be carried onto or deposited on any public road by construction vehicles or by any other means.

3.9 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS. The contractor shall remove any existing structure or part of structure, fence, building or other encumbrance or obstruction that interferes in any way with the new construction, but only with the written permission of the owner of the structure, and only after a demolition permit has been obtained from the City, if required.

3.10 PUBLICLY OWNED MATERIALS. Any publicly owned materials in structures removed shall be salvaged without damage if deemed proper by the City Engineer and shall be placed neatly and in an acceptable manner at accessible points. Any publicly owned property shall remain the property of the original owner. When publicly owned materials are stored on or beyond the right-of-way the contractor shall be held responsible for their care and preservation for a period of ten (10) days following the day the last or final increment of materials is placed thereon. The contractor shall remove all discarded material, rubbish or trash from the right-of-way and project site and shall dispose of it as approved or directed by the engineer.

3.11 LOCAL MATERIAL SOURCES. If the contractor elects or is required to excavate from pits, quarries or deposits beyond the project site or right-of-way he shall trim up such pit, quarry or deposit in a neat and workmanlike manner, remove debris and level surplus material, provide necessary drainage if feasible and perform other work necessary to prevent unsightly appearance. This work will be required as a condition to the use of local material and shall be done in an approved manner.

3.12 PERMITS.

3.12.1 It shall be the responsibility of the contractor to obtain any necessary grading permits from the Building Department prior to beginning any excavation or other earth-moving operation for which a grading permit is required.

3.12.2 NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES). The contractor and/or his engineer shall provide the City of Muscle Shoals Building Department copies of permit applications (except for disturbances of less than one acre of total land area which are not part of a larger common plan of development or sale), in compliance with 40 CFR Parts 122, 123, and 124, titled "NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT APPLICATION REGULATIONS FOR STORM WATER DISCHARGES, FINAL RULE". The failure of the contractor to adhere to limiting conditions in the NPDES permit, or in the City's NPDES Municipal Separate Stormwater System Permit, shall constitute cause for the City to stop work in progress and contact the Alabama Department of Environmental Management for technical assistance.

4. CONTROL OF WORK

4.1 AUTHORITY OF ENGINEER All of the work shall be done under the supervision of the engineer. To prevent misunderstandings, disputes and litigation, the engineer shall decide any and all questions which arise concerning the quality and acceptability of materials furnished and work performed, and interpretation of plans and specifications, subject to the approval of the City Engineer. Explanations concerning the meaning of the plans and specifications, all directions necessary to complete or make definite the plans and specifications and give them due effect will be given by the engineer and his findings shall be final and binding. The authority granted in this section shall not, however, be construed to permit the engineer to authorize work not permitted by this manual, or by construction plans approved by the City.

4.2 PLANS AND WORKING DRAWINGS

4.2.1 GENERAL Drawings, showing such details as are necessary to give a comprehensive idea of the construction contemplated will be included in the set of plans. The plans will be supplemented by such working drawings as are necessary adequately to control the work. All authorized alterations affecting the requirements and information given on the approved plans shall be in writing and signed by the City engineer.

4.2.2 ROADWAY PLANS Roadway plans will show title sheet, alignment, profile, typical cross-section of improvements, drainage and other information pertinent to the project.

4.2.3 STRUCTURE OR BRIDGE PLANS Structure or bridge plans will in general show the location of and dimensions of the work contemplated. When the structure plans do not show all dimensions in detail, they will

show the general features and such details as are necessary to give a comprehensive idea of the structure. The engineer shall submit to the City at least three (3) sets of such detailed working drawings as may be required for the construction of any part of the work. One set of these supplementary drawings shall be returned to the contractor, one set shall be provided to the City Inspector, and one shall be retained by the engineer of record, and the remaining set shall be maintained in the City files.

4.2.4 WORKING DRAWINGS FOR STEEL STRUCTURES Working drawings for steel structures shall consist of shop details, erection and other working plans showing details, dimensions, sizes of materials and other information necessary for the complete fabrication and erection of the metal work, including applicable welding, riveting or other fastening specifications. Working drawings for concrete structures shall consist of such detailed plans as may be reasonably required for the successful prosecution of the work and which are not included in the plans furnished by the engineer. These may include plans for false-work, bracing, cribs, cofferdams, centering and formwork, masonry layout and bending diagrams for reinforcement.

4.2.5 DRAWINGS FOR DRAINAGE STRUCTURES All drainage plans shall depict all drainage structures, the direction of water flows, the topography of the land, and the drainage basins within the plat. The drawings shall clearly depict the flow of water in each basin to a collection point, and the flow of water from each collection point to a point or points where water leaves the subdivision. Calculations and other information concerning the flow of water downstream from the subdivision, until said water reaches Waters of the United States, shall also be shown, and the impact of such increased flows as will result from the presence of the project shall be described mathematically. A grading plan will be prepared to demonstrate positive drainage off each individual lot, and all such grading shall be completed prior to final acceptance of the subdivision into the maintenance program.

4.2.6 FURNISHING WORKING DRAWINGS The Engineer shall furnish the City Inspector with such blueprints or similar copies of the working drawings as may be required for approval and construction purposes and upon completion of the work shall provide three (3) copies of "AS BUILT" drawings to the City Engineer.

4.2.7 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS Finished work in all cases shall conform with lines, grades, sections, details and dimensions of the work contemplated as shown on the approved plans except as modified by the written order of the engineer of record and approved by the City Engineer. Any deviation from the

approved plans and working drawings that may be required by the exigencies of the construction will be determined by the engineer and approved by the City Engineer.

4.2.8 COORDINATION OF PLANS AND SPECIFICATIONS
These specifications, the supplemental specifications, the plans and all supplementary documents are essential parts of the work contemplated and a requirement occurring in one is as binding as though occurring in all. In case of discrepancy, figured dimensions, unless obviously incorrect, shall govern over scaled dimensions.

4.2.9 ERRORS The contractor shall not take advantage of errors or omissions in the plans or discrepancies between the plans and the specifications. The engineer will make such corrections and rectify such omissions as may be necessary and his determination shall be reviewed by the City Engineer.

4.3 COOPERATION WITH UTILITIES The owners or operators of private or public utilities shall have access to the work for the installation, adjustment or repair of main line and service facilities.

4.4 COOPERATION OF THE CONTRACTOR

4.4.1 GENERAL The contractor shall have available on the work site at all times one copy each of the plans, specifications, and supplemental specifications. He shall give the work the constant attention necessary to facilitate the progress thereof and shall cooperate with the engineer, inspectors, and other contractors, if any, in every way possible.

4.4.2 CONTRACTORS REPRESENTATIVE The contractor shall have a competent representative available, capable of reading and thoroughly understanding the plans and specifications, as his agent on the work, with full authority to execute the orders or directions of the engineer, or the City engineer or his designated representative without delay. Such representative shall be available irrespective of the amount of work sublet and shall have full authority over all sub-contract work.

5. CLEARING AND GRUBBING

5.1 DESCRIPTION This item shall consist of clearing the entire area within the limits of the right-of-way and grubbing that portion of the right-of-way which will be occupied by the street, except as otherwise directed by the engineer. Clearing and grubbing shall consist of cutting, removing, burning and disposing of all trees, trash, stumps, limb wood, grass, weeds, roots, pole stubs, rubbish, old pavement and all other obstructions resting on or projecting through the surface of the original ground. All fill areas shall be

grubbed to a depth of at least one foot below the natural ground. Any required burn permits must be obtained by the contractor from the City Fire Department prior to initiating any burn activities. This item shall also include the removal and satisfactory disposal of all buildings, fences, structures, or other obstructions.

5.2 CONSTRUCTION METHODS All the area of the right-of-way or so much thereof as the engineer may direct shall be completely cleared of all trees, logs, brush, stumps, grass, weeds, roots, pole stubs, rubbish and other perishable or objectionable matters. Placing the material on abutting property, with or without the consent of the property owners, will not be considered satisfactory disposal. Burial, except in ADEM-approved landfills, is not considered satisfactory disposal. All clearing and grubbing shall be performed far enough in advance of the grading operations so as to avoid possible delay. Before grading operations start, the area cleared and grubbed must be approved by the contractor and the City engineer. Special care shall be taken to preserve and protect all trees and shrubs from injury or defacement that are designated to remain in place. Trees that are to be removed shall be felled within the right-of-way and in such manner as will not injure trees that are to remain. All trees cut shall be disposed of as directed by the contractor. Within the areas where excavation will be made, all logs, roots, stumps, et cetera, more than two inches in diameter shall be pulled or otherwise removed to a depth of not less than two (2) feet below the finished surface of the subgrade and the entire area grubbed free from heavy vegetation, grass, roots and other perishable matter. Trees and stumps outside the construction limits that are not to remain shall be cut off even with the ground surface. Branches of trees extending over the street shall be cut and trimmed as directed by the engineer. In areas where backfilling is required to bring property to a workable level, the engineer shall provide detailed information showing the impact on drainage and shall provide plans showing the proposed method of handling drainage and runoff. All cavities, stump holes and areas excavated below grade shall be refilled with suitable material sufficiently in advance of grading to provide ample time for settlement and shall be brought to the same degree of compaction as the surrounding area. If deemed necessary the engineer shall require that the backfill material be flooded or puddled. Timber, brush, et cetera shall not be burned except with permission of the engineer and after obtaining proper burn permits from the Fire Department.

6. SUPPLEMENTAL REGULATIONS FOR INSTALLATION OF SANITARY SEWERS AND POTABLE WATER TRANSMISSION LINES

The Regulations in this Chapter are supplemental to those enforced by the Water and Waste Water Board, City of Muscle Shoals.

6.1 PAVEMENT REPLACEMENT

6.1.1 Reserved

6.1.2 Where paved streets, sidewalks, curbs and/or gutters are damaged or removed, within or without the construction limits, they shall be replaced in accordance with these Specifications.

6.1.3 Where chert, gravel, slag, or other unpaved street or driveway surfaces are removed or damaged, they shall be replaced with the same type of materials as were removed.

6.1.4 In replacing pavements and unpaved surfaces, the materials used and the construction methods employed shall comply with these specifications.

6.1.5 Where shown on plans, service lines and small diameter pipe (eight inches in diameter or less) located across paved surfaces shall, where feasible, be installed by boring or other approved methods that will not require cutting or removing pavement.

6.1.6 All concrete pavement replaced shall not be less than four inches thick, or equal to the original if greater than four inches.

6.1.7 Pavements replaced shall be the same type of construction as was removed, except that no asphalt surface replaced shall be less than three inches thick and shall consist of two inches of binder and one inch of wearing surface. Wearing surfaces shall utilize siliceous aggregate.

6.1.8 All road cuts shall be permanently repaired within 30 days after the cut is first made.

6.2 TEMPORARY ROADWAY PAVING REPAIRS

6.2.1 Temporary cold or permanent hot asphalt patching will be required for both longitudinal and transverse roadway cuts upon completing backfilling requirements at the end of each day's work if the road is to be opened for local traffic while work has stopped, unless waived by the City engineer and the Board.

6.3 CONTROLLED TEMPORARY FLOW DIVERSION

6.3.1 During construction, flows in sections of the existing sewer being rehabilitated by removal and replacement shall be accommodated by temporary flow diversion.

6.3.2 The contractor shall use the construction easement for flow diversion if not otherwise shown on the plans. The contractor shall lay diversionary pipe in temporary trenches within the construction easement. The contractor shall use ingenuity and skill to develop a flow diversion program. The program must keep the sewer flowing without discharge or spills. The contractor will seek and obtain inspection of each section of newly laid sewer before taking the diversion out of service and placing the newly laid section in service. Each section of the new sewer shall be tested and accepted by the Board before being put into service.

6.3.3 The material used to construct the temporary line will be the choice of the contractor, subject, however, to Board approval. The material shall be such that no breaks, stream pollution or other nuisance conditions ensue. The temporary line shall be the responsibility of the contractor.

6.3.4 In sections of an existing trunk sewer being rehabilitated by laying a new line parallel to the existing trunk, the existing trunk shall be used to accommodate the existing flow, and no flow diversion will be necessary if the existing trunk is not damaged or its use restricted by the contractor's operations.

6.3.5 The contractor shall provide a temporary closure in all cases practical to insure that in the event of temporary line failure or, in the opinion of the Board, a high likelihood of failure, flows may be directed through the existing permanent line.

6.3.6 The contractor shall provide an approved system of shutoff gates on the temporary diversion line to insure that alternative flow routing is possible.

6.4 EXISTING UTILITIES

6.4.1 The contractor shall take every possible precaution to minimize the hazards of working in proximity to gas lines and shall be solely responsible for any damage to them or for any injury to persons or damage to property arising from or caused by his operations.

6.4.2 No excavation or other work shall be done by the contractor within ten feet of a gas transmission line until the owner of the gas pipeline has been notified not less than 48 hours in advance of such work and until the gas line has been exposed by the contractor sufficiently to determine its exact horizontal and vertical location. In addition, the owner of the gas line shall be allowed to keep a qualified representative present while any such construction which could damage such line is

being done. Methods of excavation specified by the owner of the utility must be adhered to by the contractor.

6.4.3 The same terms and conditions apply to medium and low pressure gas distribution systems.

6.4.4 Gas pipelines shall not pass through manholes or other sewer structures. When sanitary sewer lines cross over gas lines, the minimum cover shall be ten inches, or as specified by the owner of the gas line (Cover is the vertical distance between the outside top and outside bottom of the two pipelines). When sanitary sewer lines cross under or below gas lines, the minimum cover shall be four inches. In both cases the cover space shall be carefully backfilled with thoroughly compacted selected soil. Where gas lines cross pipe trenches, the excavated space below such gas lines shall also be carefully filled with thoroughly compacted selected soil.

6.4.5 In the event that interference with any existing utility is imminent, the contractor shall so notify the appropriate utility agency 72 hours in advance of any construction activities so that the service may be relocated or otherwise preserved and protected.

6.4.6 Should any utility be damaged during the construction work, the following minimum precautions shall be taken by the contractor:

1. Immediately notify the appropriate utility office of the utility of the nature and location of such damage.
2. Stop all construction work that could cause further damage to the utility or hazards to other persons or property.
3. Give adequate warning to any persons who could be injured or owners of any property which could be damaged.
4. Permanent repairs shall be made by the owners of the utility involved or, with their permission, by the contractor. Any repairs made by the contractor shall be made in accordance with the requirements of the utility owner.

6.4.7 Other utilities, such as steam lines, electrical lines, telephone lines, TV cable and telegraph lines, whether underground or overhead, shall be carefully preserved.

6.4.8 In the event that any interference with any existing utility is apparent, the contractor shall notify the utility seventy-two hours in advance of any construction activities so that service may be relocated or otherwise preserved and protected.

6.5 WORK WITHIN RIGHTS-OF-WAY OF HIGHWAYS, RAILWAYS OR STREETS

6.5.1 In the event that any proposed utility crosses, runs parallel to or alongside of any State highway, County road, City street or railroad right-of-way, necessary permits from the governing body affected shall be obtained.

6.6 SPECIAL CONSTRUCTION

6.6.1 Where the work requires special stream or railroad crossings or any other extraordinary conditions exist, or where alternate construction methods are used that are not covered by this specification, the materials and construction methods shall be as shown in the plans.

6.7 RIGHT-OF-WAY CLEAN UP

6.7.1 After the proposed utility is installed and backfilled and a sufficient amount of time has elapsed for backfill to settle, the disturbed area shall be graded to a smooth surface matching the adjacent or adjoining ground surfaces and ground profiles shown on the plans.

6.7.2 The contractor shall remove all stumps, fallen trees, uprooted trees, dead trees, trash and debris from the right-of-way caused by the utility construction.

6.7.3 The ground preparation before seeding shall consist of cultivation to a loose depth of approximately four inches minimum and the application of lime to the soil at a rate of two tons per acre. The plowing, harrowing, cultivating and all other operations shall be performed with proper equipment and in such a manner as to break up all clods, lumps or earth balls, and remove all boulders, stumps, large roots or other particles which would interfere with the work and which will result in a smooth, uniform, loose, well-broken and fine grained soil, thus providing a suitable bed for seed grass. The ground shall be plowed to the required depth, then cultivated with a rotary tiller and/or disc harrow in both directions, if feasible, until approved. In small or inaccessible areas, the use of hand tools will be permitted. The contractor shall add sufficient water to wet the soil in order to prepare the ground to be seeded. Nine hundred and twenty pounds of 13-13-13 commercial grade fertilizer per acre of ground shall be spread uniformly into the areas to be planted. The fertilizer shall be well pulverized and free of lumps when applied. In no case shall full strength fertilizer be permitted in direct contact with the seeds. When fertilizers are applied hydraulically they must be diluted sufficiently as directed so that no damage is done to either seed or established grasses or legumes.

6.7.4 Work area seeding mixtures shall be as follows:

SEPTEMBER THRU MARCH
Kentucky Blue Grass 6 lb/acre
Pensacola Bahia 20 lb/acre
Reseeding White Clover 30 lb/acre
Kentucky 31 Fescue 20 lb/acre

APRIL THRU JUNE
Pensacola Bahia 20 lb/acre
Kentucky 31 Fescue 20 lb/acre
Common Lespedeza (TN) 10 lb/acre
Bermuda Grass (H) 12 lb/acre

JULY THRU AUGUST
Bermuda Grass (H) 5 lb/acre
Pensacola Bahia 20 lb/acre
Reseeding White Clover 30 lb/acre
Kentucky 31 Fescue 20 lb/acre

6.7.5 Sowing of seed shall, in general, follow promptly after incorporation of fertilizer in a uniform manner at the rates specified for each seed specie. Sowing shall be done by approved mechanical seeders. No sowing shall be done during windy weather, when the prepared surface is crusted, or when the ground is frozen, wet, or otherwise in a non-tillable condition. Unless otherwise directed, after the seed has been sown the seedbed shall be compacted immediately by means of a cultipacker, light roller or approved drag. Rolling or covering of seed may be omitted when seeding is done hydraulically and mulched. Straw mulch shall be applied at the rate of two and one-half tons per acre within forty-eight hours after seed has been first applied.

6.7.6 Straw and hay mulch shall be applied with a mechanical mulch spreader designed to break up balls or clusters of mulch and apply it evenly over the surface so as to provide adequate shading from sunlight. If an asphalt adhesive is used on the mulch the mulch spreader shall be so designed and equipped to apply the asphalt adhesive effectively to the mulch and form a uniform porous and stable mulch blanket held in place by the adhesive over the designated area.

6.7.7 Hay or straw material which contains an excessive quantity of matured seeds or noxious weeds or a species which would constitute a menace to the planted species and to surrounding farmland will not be acceptable. Mulch which is too fresh or is excessively brittle or so decomposed as to retard growth of grass will not be acceptable.

6.7.8 The contractor may, at his option, employ additional measures other than those specified to prevent loss of or damage to the work resulting from the effects of wind and/or water. The erosion control work shall cover all disturbed areas within the right-of-way and/or easement along which the work has been completed. Erosion control work shall not be limited to the easement but shall include all disturbed areas as necessary to complete the grassing of the project.

6.7.9 Solid sod may be used if specified. The preparation of the ground will be the same as for seeding. The sod will be placed so as to give a smooth and uniform surface to the area.

6.7.10 Fescue may be substituted for Bahia in work areas adjacent to lawns.

6.7.11 The contractor shall remove all stumps, fallen trees, uprooted trees, dead trees and debris from the right- of- way. All right-of-way cleanup and grassing on property owned by the City, either in fee simple or easement interest shall be approved by the City engineer or the engineering inspector.

6.8 SPECIAL SLOPE PROTECTION

6.8.1 The work covered by this section consists of furnishing all materials, equipment and labor and performing all operations necessary in connection with the installation of rip- rap or other special slope protection.

6.8.2 Areas to receive rip-rap or special slope protection materials shall be graded to the lines and slopes shown on the plans. Any loose materials shall be compacted by the use of hand or mechanical tampers.

6.8.3 Stone for rip-rap shall be of the size and weight designated on the drawings. In addition, the stones shall be durable and of a suitable quality to insure permanence in the structure and in the climate in which it is to be used.

6.8.4 Just prior to placing rip-rap or other slope protection material, the contractor shall install a nonwoven plastic filter cloth. The filter cloth shall be approved by the Board and the City engineer and then shall be installed in strict accordance with the manufacturer's instructions for installation and use. Only then, and with the approval of the Board representative and the City engineer, shall the slope protection material be installed on the filter cloth. Where the engineer can demonstrate that conditions are appropriate, the filter cloth may be eliminated.

6.8.5 Precast concrete grids, "Monoslabs" or approved equals, may be used in lieu of rip-rap stone for slope protection, if approved in writing by the Board and the City engineer.

7. RESERVED

8. STORM SEWERS

8.1 Reserved

8.2 Reserved

8.3 TRENCH EXCAVATION. Trench excavation or excavation for pipe lines shall consist of the excavation necessary for the construction of storm sewers and other pipe lines and all other appurtenant facilities therefor, including manholes, saddles, sand or crushed stone cushion, boxes, and pipe protection as called for in the plans. It shall include clearing and grubbing where necessary, backfilling and tamping of pipe trenches and around structures, and the disposal of waste material.

8.4 UNSUITABLE MATERIAL. When muck, quicksand, soft clay, swampy or other material unsuitable for foundations or subgrade are encountered which extend below the limits of the excavation, such material shall be removed and replaced with suitable materials.

8.5 LIMIT OF EXCAVATION. Pipe trenches shall not be excavated more than 300 feet in advance of pipe laying. Temporary bridges or crosswalks shall be constructed where required to maintain vehicular and pedestrian traffic.

8.6 PROTECTION. In all cases where materials are deposited along open trenches shall be placed so that in the event of rain no damage will result to the work and/or adjacent property.

8.7 STORING EXCAVATED MATERIAL. Material excavated is to be laid compactly on the side of the trench and shall be kept trimmed up so as to occasion the least practicable inconvenience to the public traffic and to neighboring residents.

8.8 DRAINAGE. Every drain, gutter, culvert or sewer for surface drainage encountered is to be kept open for temporary and permanent flow, or, if necessarily closed, other adequate provision is to be made.

8.9 TUNNELING. Pipe trenches for storm systems may be constructed by tunneling methods for relatively short distances for crossing major streets or highways or railroads provided the manner of excavating, bracing, and backfilling are approved by the City engineer.

8.10 RESERVED

8.11 RESERVED

8.12 RESERVED

8.13 RESERVED

8.14 RESERVED

8.15 RESERVED

8.16 MATERIALS

8.16.1 ROADWAY PIPE

8.16.1.1 REINFORCED CONCRETE PIPE. Piper shall conform to ASTM Specifications Serial Designation C 76-57T, Class III

8.16.1.2 EXTRA STRENGTH REINFORCED PIPE. Extra strength reinforced concrete pipe shall conform to ASTM Specifications Serial Designation C 76-57T Class IV.

8.16.2 SIDE DRAIN PIPE

8.16.2.1 PLASTIC PIPE. The term "plastic pipe" shall cover polyethylene, polyvinyl chloride and acrylonitrile butadiene styrene. In addition, High Density Polyethylene pipe and installation, when permitted by the City Engineer, shall meet the requirements of AASHTO M 294, or the manufacturer's specifications (whichever is most restrictive), along with the following restrictions:

(a). The minimum parallel plate stiffness when tested in accordance with ASTM D2412 shall be as follows:

Diameter Minimum Stiffness
4" - 12" 50 psi
15" 42 psi
18" 40 psi
24" 34 psi
30" 28 psi
36" 22 psi
42" 19 psi
48" 17 psi

(b) Fill heights will be restricted to 20 feet maximum.

(c) Pipe cover shall be 12 inches minimum and shall be installed per ASTM D2321.

(d) Application and use of all plastic pipe shall be approved by the City Engineer.

(e) All joints shall be soil-tight as per the manufacturers recommendation.

(f) Pipe shall be used only in non-traffic areas as approved by the City Engineer.

(g) In addition to these general requirements, pipes shall meet the requirements listed hereinafter for the type plastic used: Polyvinyl Chloride (PVC) pipe shall meet one of the following specifications: ASTM D-2241, F-789, D-1785, D-2665, D- 3034, D-2680, F-794, F-949, or F-679. Polyethylene (PE) pipe shall meet the requirements of AASHTO M-294, Type C or S. When Type S pipe is used, the inner liner shall have a minimum thickness of 0.05 inches and be fused to the outer shell. Acrylonitrile Butadiene Styrene (ABS) pipe shall meet the requirements of ASTM D-2751 or D-2680.

8.16.3 CORRUGATED METAL PIPE. Corrugated metal pipe (CMP), must be a spiral flow pipe with a manning coefficent equal to .012. The material shall be aluminized steel type 2. It shall be installed according to the manufacturers recommendations for bedding and backfill. It may only be used in non-trafffic areas.

8.16.4 SIDE YARD DRAINAGE. Drainage conveyed within side yards in residential districts shall be confined to pipe systems or shallow swales. Open ditches will be discouraged except in cases with very small amounts of water. The City Building Department shall have the authority to grant exceptions to this policy in cases where large volumes of stormwater must be conveyed through a side yard.

8.17 TESTING. All storm sewer pipe and materials used in its manufacture shall be tested and inspected by an approved commercial testing laboratory prior to delivery to the site and all materials which fail to conform to these specifications shall be rejected. After delivery to the site any materials which have been damaged in transit or are otherwise unsuitable for use in the work shall be rejected and removed from the site. Certified copies in duplicate of the inspection and acceptance reports of the testing laboratory shall be supplied to the engineer prior to use of the materials. Each joint of pipe

delivered to the work shall be stamped or marked to indicate the testing laboratory's acceptance or approval.

8.18 PIPE LAYING

8.18.1 GENERAL. Before storm pipe is placed in position in the trench the bottom and sides of the trench shall be carefully prepared and the necessary bracing and sheeting installed. Each pipe shall be accurately placed to the exact line and grade called for in the plans. Each piece of pipe and special fitting shall be carefully inspected before it is placed and no defective pipe shall be laid in the trench. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells uphill. Trench bottoms found to be unsuitable for foundations after pipe laying operations have been started shall be corrected and brought to exact line and grade with compacted earth where necessary. When so directed by the engineer limestone aggregate or sand cushion shall be installed to provide a satisfactory bearing surface.

8.18.2 Reserved

8.18.3 JOINTS. Joints shall be prepared in the manner specified below. As the work progresses the interior of all pipe in place shall be thoroughly cleaned. After each line of pipe has been laid it shall be carefully inspected and all earth, trash, rags, and other foreign matter removed from the interior.

8.18.4 BACKFILLING. Backfilling of trenches shall be started immediately after the pipe is in place and the joints completed and inspected and approved.

8.19 JOINT CONSTRUCTION

8.19.1 CLEANING. The inside of all bells and the outside of all spigots shall be wiped to remove all dirt, water or other foreign matter so that their surfaces are clean and dry when the pipes are joined.

8.19.2 MORTAR JOINTS. Joints and lift holes in concrete pipe shall be filled with cement mortar. In all pipe sizes a bed of mortar shall be placed in the lower quadrant of the bell before the spigot is inserted.

8.19.3 PROTECTION. After the joints have been completed they shall be inspected by the engineer before they are covered up. Any leaks or defects discovered at any time after completion of the work shall be repaired immediately. All pipe in place shall be carefully protected from damage until the backfilling operations have been completed. Any pipe

which has been disturbed after the joint was completed shall be taken up, the joint cleaned and remade and the pipe relaid.

8.19.4 DEWATERING. Water shall not be allowed to run or stand in the trench while pipe laying is in progress or before the joints are completely set or before the trench has been backfilled. The contractor shall not open up at any time more trench than his available pumping facilities are able to handle.

8.19.5 Reserved

8.19.6 SPECIAL CONSTRUCTION. Where the work requires special railroad or roadway crossings or any other extraordinary conditions, or where alternate types of construction are used that are not covered by these specifications, the materials and methods shall be as shown on the plans.

9. CURB INLETS, DROP INLETS, HEADWALLS

9.1.1 GENERAL. This section shall cover the construction of curb inlets and drop inlets complete with the necessary metal frames and covers. Inlet walls may be "cast-in-place" concrete, brick masonry or, with the prior approval of the City engineer, hollow core blocks filled with concrete after laying. Drainage structures shall be constructed to the size, shape and dimensions and at the locations shown on the plans.

9.2 MATERIALS

(a) Concrete material shall conform to the requirements of Section 21.

(b) Reinforcing steel shall conform to the requirements of Section 21

(c) Brick masonry materials shall be as follows:

(1) Brick shall conform to ASTM Designation C 32 Grade MA.

(2) Cement shall meet the requirements of ASTM Designation C 150 for Portland Cement

(3) Sand for mortar shall consist of hard, strong, durable, uncoated mineral or rock particles, reasonably free from injurious amounts of organic or other deleterious substances. Gradation shall be as follows: Percentage passing No. 8 No.50 No.10 by weight 100 15-40 0-100

(4) Water for mortar shall be obtained from the City water system. Any other source of water shall be approved by the engineer.

(5) Curb inlet covers and frames and drop inlet gratings shall conform to the requirements of Section 10 of this Specification.

9.3 EXCAVATION AND BACKFILL. Excavation and backfill shall be performed in accordance with the appropriate requirements as set forth under Section 6.4 of this Specification.

9.4 CONCRETE MASONRY. All concrete masonry used in curb inlets and drop inlets shall be Class A and shall be constructed in accordance with the appropriate requirements set forth under section 21 of this Specification.

9.5 BRICK MASONRY. The foundation on which brick are to be laid shall be firm and dry. All brick shall be damp at the time of laying. Bricks shall be laid in courses in full, close joints of mortar. The courses shall be level in all places, except where otherwise directed. All exposed surfaces shall be smooth and clean. Broken or chipped bricks shall not be used in the exposed faces of the masonry. Joints shall be cleaned and pointed in a neat workmanlike manner before the mortar sets.

9.6 MORTAR. The mortar shall be composed of one part of cement and two parts of sand by volume, on the basis of dry sand, and sufficient water to make a mortar of such consistency that it can be easily spread and handled with a trowel. Mortar shall be mixed only in quantities required for immediate use. Unless an approved mortar mixing machine is used, the sand and cement shall be mixed dry in a tight box until the mixture assumes a uniform color, after which water shall be added as the mixing continues until the mortar attains the proper consistency. Mortar which is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar will not be permitted.

9.7 Reserved.

9.8 PLACING CASTINGS. Castings shall be set in full mortar beds or otherwise secured as shown on the plans. Castings shall be set to correct elevation. Castings set within the surface of paved streets or streets to be paved shall be set even with the paved surface. (Castings need not be set level but must be graded to fit paving grade.)

9.9 CLEANING. All inlets shall be cleaned of all form material, excess mortar, silt, debris or foreign matter of any kind.

9.10 HEADWALLS

9.10.1 All materials furnished shall conform to the requirements of Section 21.

9.10.2 The concrete mix used for headwalls shall be ALDOT Class "A", Type 2 unless otherwise authorized by the City engineer.

9.10.3 Foundation excavation shall be of the size and depth conforming to the outline of the structure. Unsuitable foundation material below the normal design elevation shall be removed as directed by the engineer. Where rock, gravelly soil, hardpan or other unsuitable material is encountered, it shall be removed as ordered by the engineer for a depth of at least 6 inches below the designated grade.

9.10.4 Foundation backfill shall be deposited uniformly for the full width of the excavation in layers not exceeding 6 inches in depth with each layer compacted.

9.10.5 Construction, forming, placing, etc. of headwalls shall be in accordance with the appropriate requirements of ALDOT 501.03.

9.10.6 All surfaces will receive a Class 1 surface finish and all exposed surfaces will receive a Class 2 surface finish. In order to permit proper surface finishing, forms may be removed as soon as the concrete has set sufficiently that form removal will not damage the green concrete, but in no case less than 12 hours after completion of the placing. Immediately after pouring is completed, surfaces not covered by forms shall be covered with one of the curing materials specified in ALDOT Section 830. Finishing shall begin immediately after removal of the forms, and curing continued for at least 72 hours after finishing.

9.10.7 The finished concrete shall be within reasonably close conformity to the line, grades and dimensions shown on the plans, and free from objectionable cavities or projections.

10. CURB INLET COVERS AND FRAMES

10.1 DESCRIPTION. Curb inlet covers and frames shall be gray iron castings. The castings shall be boldly filleted at angles. They shall be true to pattern in form and dimension and shall be free from cracks, pits, blowholes or other defects.

10.2 MATERIAL. All frames, covers and gratings shall conform to the requirements of Class No. 20 for Gray Iron Castings, ASTM Designation A 48.

10.3 CLEANING. All castings shall be sand blasted or otherwise effectively cleaned of scale and sand so as to present a smooth, clean and uniform surface.

10.4 IDENTIFICATION. All frames and covers shall be identified with the name of the foundry and the date of casting. Identification shall be in raised or indented letters in the surface of the casting. Identification on lids and frames shall be on the underside.

10.5 GUARANTEE. The manufacturer shall guarantee all castings against defects in material or workmanship for a period of 18 months after date of placement.

11. STREET AND DRAINAGE EXCAVATION

11.1 CONSTRUCTION METHODS

11.1.1 All necessary clearing and grubbing shall be done in proper sequence with excavation and construction. All excavation shall be conducted in such manner and by such methods and equipment as will insure against removing or loosening any material outside of the street right-of way.

11.1.1.1 Gutters, ditches, channels and channel changes shall be constructed only when and as shown on the plans or when and as directed by the engineer to lines, grades and cross- sections established by him, in proper sequence with other work and when and as he directs. Excavation for channels shall preferably be made before the excavation for structures is started. When necessary in order to provide proper gradient of flow line, the engineer may direct that channels be extended beyond the limits of the street.

11.1.1.2 Changes of direction in open channels shall have the channel protected from erosion on the bottom and both banks for a sufficient distance upstream and downstream of the directional change. The City Engineer may require calculations to verify the adequacy of channel protection in these areas.

11.1.1.3 Intersections of open channels shall be protected from erosion and scouring by placing concrete on the bottom and both banks of the channels upstream and downstream for a sufficient distance to ensure that the channel is protection from erosion.

11.1.1.4 Headwalls shall be constructed at all points where underground drain pipes exit into open channels and where open channels enter into sub-surface drains.

11.1.2 Intersecting ditches or dikes shall be constructed as soon as practicable after clearing and grubbing operations are completed and prior to excavating the cuts.

11.1.3 All suitable materials removed from the excavation shall be used as far as practicable in the formation of the embankment, subgrade, base course, shoulders, slopes, bedding and backfill or for such other purposes and at such other places as directed. No excavated material shall be discarded without written permission and when such material is to be discarded it shall be disposed of as prescribed in Section 6.8.1.

11.1.4 The materials excavated from channels, channel changes, waterways and ditches shall be utilized in the construction of embankments, the widening and sloping of embankment slopes, the backfilling of abandoned ditches and channels or otherwise disposed of as directed by the engineer. No excavated material shall be left in unsightly piles but shall be spread in uniform layers, neatly leveled and shaped. No waste or surplus excavation from a ditch or channel shall be deposited or left within 3 feet of the edge of the ditch or channel.

11.1.5 All rock or boulders encountered in the roadway shall be excavated to the lateral limits shown on the plans and to a depth of at least 9 inches below subgrade, and the resulting space backfilled to proper grade with suitable material as directed by the engineer. In blasting rock, a reasonably uniform face shall be left. The engineer, the City engineer or the City fire marshal shall have authority to require cessation of any method of blasting which leads to overshooting or is dangerous to the public or destructive to property or to natural features.

11.1.6 Attention is directed to the possible existence of pipe lines or other public utilities which may be buried within the limits of the work or adjacent thereto, and which may or may not be shown on the plans. The contractor shall be responsible for and take all necessary precautions to protect and preserve any and all existing drains, sewers, surface drains, pipes, conduits and other underground structure or parts thereof which may be affected by his operations on the work and which, in the opinion of the engineer, may properly be continued in use without any changes. The contractor shall assume full responsibility for reimbursing the owners for any damage or injury to property or interference with other services.

11.1.7 The contractor shall repair, replace, relocate, extend, reconstruct or make any other changes in any tile drain, sewer or other subsurface drain, or water, gas line, or other utility line encountered in the prosecution of the work.

11.1.8 Grading operations shall not be performed to the prejudice of the work of blading and maintaining the street bed and subgrade and base course. The engineer or the City engineer shall have full authority to order the suspension of other contract operations pending the adequate and proper performance of such maintenance work.

11.1.8.1 While the excavation is being done and until the work is finally accepted, the work shall be protected and the loss of material from the street by erosion shall be held to a minimum.

11.2 SOD. Where sod is disturbed in grading lawns between curb and walks, in terracing property, in setting or resetting curb, or in other work it shall be carefully removed, relaid and watered. New sod will be laid where the old sod dies before the acceptance of the work. Sod destroyed by piling of materials or tools shall be replaced with new sod.

11.3 PIPES. The City and those under contract with or having franchise rights from the City shall be permitted to construct or lay sewers, water or gas pipes, and other conduits in those portions of the street or easements where there is a fill before the filling is commenced. The remainder of the street shall be brought to subgrade as soon as possible and the above mentioned parties given an opportunity to lay such pipes or other conduits before the base course is laid. On completion of the laying of pipes in any block or part of a block the grading shall be completed as soon as possible. All parties excavating in streets shall backfill cuts in accordance with Paragraph 6.6.2 of this Specification.

11.3.1 Utilities under streets or in easements adjoining streets shall be installed in strict accordance with Section 18 of this Specification.

11.4 SIDEWALK AND LAWN. The sidewalk and lawn space shall be graded to the lines given by the engineer. Where dirt is removed for curb and gutter and is thrown in the street or in the sidewalk space or on the sidewalk, the contractor will remove it therefrom prior to the close of work that day.

11.5 MONUMENTS. Engineer's monuments, bench marks, stakes and all meter boxes, manhole rims and covers and other castings will be preserved.

12. EMBANKMENT

12.1 DESCRIPTION. This section shall cover the placing in embankments suitable material excavated under other sections of this Specification in conformity with the lines, grades and cross- sections shown on the plans. Embankment construction shall include the preparation of the area upon which the embankment is to be constructed, the preparation and selection of materials, the formation, compaction and stability of the embankment and the disposal of surplus and unsuitable material.

12.2 MATERIALS. Only suitable materials shall be used in the construction of embankments and backfills. No brush, roots (larger than 1" in diameter), rubbish, limbs, logs, stumps, heavy vegetation or other unsuitable material shall be incorporated or placed in the embankments or backfill. All unsuitable material shall be disposed of. Grading operations in street and drainage excavation shall be so conducted that all suitable material shall be used where required for the formation of embankments, subgrade, shoulders, approaches, intersections, and for backfilling around structures. The work shall be done in such a manner and sequence that the most suitable soil shall be reserved for topping as far as practicable.

12.3 EQUIPMENT

12.3.1 The rolling equipment shall consist of adequate sheepsfoot tamping rollers or other mechanical compacting equipment and, if required, pneumatic tired rollers of an approved design.

12.3.2 A blade grader and/or bulldozer shall be kept on the work and shall be used to keep each lift of the fill machined at all times while the embankment is being constructed and tamped.

12.4 PREPARATION

12.4.1 Before beginning embankment construction, clearing and grubbing shall be performed as provided in Section 5 of this Specification.

12.4.2 Natural Ground Slopes and Old Embankments

12.4.2.1 Where embankments occur adjacent to natural ground which slopes more than 20 degrees from horizontal, such slopes shall be: (a) removed of all topsoil (b) plowed or loosened to a depth of at least 6 inches before backfilling is commenced and (c) the topsoil removed, stored onsite or placed under embankment slopes

12.4.2.2 In cases where widening of embankments is necessary, the slope of the old embankment shall be stepped and plowed before placing

additional material. The embankment shall be placed to a sufficient height and width so that after full shrinkage, settlement and subsidence, and sloughing of the side slopes, the fills will be at the required grade and have the specified cross-section at all points. When the widening on either side of the center line is less than 6 feet measured horizontally by cross-sections, stepping, parallel layer construction and density as specified herein will be required only in the next 2 feet below subgrade elevation.

12.4.2.3 When the embankment is to be superimposed on old pavements or pavements having concrete bases, (so-called rigid types), the procedure shall be as follows:

(a) If the depth of new embankment (exclusive of new paving material and base course) is less than 1 foot, the old pavement shall be removed and disposed of.

(b) If the depth of the new embankment (exclusive of new material and base course) exceeds 1 foot but is less than 3 feet, the old pavement shall be broken with a drop hammer of suitable weight into pieces less than 2 square feet in area, at the same time pounding or forcing such pieces into the subgrade. Broken pieces shall be subsequently covered with sand in an amount sufficient to fill all cracks

(c) If the depth of embankment (exclusive of new paving material and base course) is 3 feet or over, the old pavement shall not be disturbed.

(d) When embankment is to be superimposed upon any other type of pavement or surface the existing pavement or roadway surface shall, (regardless of the depth of the embankment to be placed thereon), be scarified to such a degree as will provide ample bond between old and new material.

12.5 FORMATION

12.5.1 The material shall be deposited and spread in successive uniform layers of not more than 8 inches in depth loose measurement for the full width of the required cross- section, and shall be kept level or parallel to the finished subgrade by the use of blade graders, except that around bridge ends and structures, leveling shall be done with bulldozers and hand methods. Each layer of embankment shall be rolled and compacted to specified density hereinafter provided. Embankments and slopes shall be finished true and straight, in conformity with the lines

and grades of slope set by the engineer, and all slopes, whether old or new, shall be maintained with true and even surfaces.

12.5.2 Unless specific preparatory treatment is provided, where low swampy ground will not support the vehicles, the thickness of the bottom layer may be increased to a depth not greater than that required to support the said vehicles while placing subsequent layers. Subsequent layers shall be constructed and compacted as provided above.

12.5.3 Where embankments are being constructed predominantly of rock, the stones, broken rock and boulders shall be placed in layers and all voids shall be completely filled with suitable earthy materials and thoroughly compacted. No layer of such rocky material shall be placed within 9 inches of the subgrade or finished earth shoulders. Where rock excavation is used in embankments, all excavation, of whatever class in the vicinity, shall be managed so that all coarse rock will be placed and embedded in the embankment before any fine rock and earth shall be used.

12.5.4 Over, under and around pipes, culverts, arches, bridges and other structures shall be of selected embankment materials placed and tamped and compacted in a manner and by methods that will avoid unbalanced loading, and that will not cause movement or place undue strain on any structure. The embankments that are placed against or immediately adjacent to bridge abutments, retaining or wing walls, open end bents and culverts shall be built in horizontal layers not exceeding 6 inches loose and must be compacted by mechanical tamping and/or rolling. This method of building embankments will be required for such distance from these structures until rollers can effectively tamp embankments.

12.5.5 Suitable coarse rock will be used in constructing the stream side of all embankments which are adjacent to or parallel to streams. Materials deposited in any stream channel that in any way whatsoever obstructs or impairs the flow of the stream or endangers a roadway or stream bank shall be removed as directed by the engineer or the City engineer. Side ditches or gutters emptying from cuts to embankments or otherwise shall be so constructed as to avoid damage to embankments by erosion.

12.6 EMBANKMENT COMPACTION

12.6.1 Embankments shall be rolled as stipulated herein unless otherwise specified by the engineer. The density of each layer (except the top 6" or subgrade layer) shall be not less than 95% of the relative maximum density as determined by AASHTO compaction test T99. The top 6" or

subgrade layer shall be as provided by Section 13 of this Specification. Each layer of embankment material which does not contain sufficient moisture to compact thoroughly shall be sprinkled and mixed with water as directed by the engineer. Watering may also be done before material is removed from cuts or pits. Material containing excess moisture shall be allowed to dry out to the proper consistency before compacting is attempted. Successive layers shall not be placed until the layer under construction has been compacted.

12.6.2 Very Sandy Material When the embankment material is of a very sandy nature and it is impractical to compact it with rollers, the material shall be spread in 6" maximum loose layers and each layer watered, then rolled with the tracks or treads of a 10-ton tractor which shall cover the entire surface of the layer.

12.7 SPECIAL SLOPE PROTECTION

12.7.1 The work covered by this section consists of furnishing all materials, equipment and labor and performing all necessary operations in connection with the installation of rip-rap or other special slope protection, as called for in the plans.

12.7.2 Areas to receive rip-rap or special slope protection materials shall be graded to the lines and slopes shown on the plans, or as directed by the City engineer. Any loose material shall be compacted by the use of hand or mechanical tampers.

12.7.3 Stone for rip-rap shall be of the size and weight designated on the plans. In addition, the stone shall be durable and of a suitable quality to insure permanence in the structure in which it is to be used.

12.7.4 Just prior to placing rip-rap or other slope protection material, the contractor shall install a nonwoven plastic filter fabric. The filter fabric shall be approved by the City engineer for installation and shall then be installed in strict accordance with the manufacturer's specifications for installation and use. Only then, and after approval by the City engineer, shall the slope protection material be installed on the filter fabric. Attention is called to the standards contained in Section 6.8.4 above.

13. SUBGRADE

13.1 DESCRIPTION The subgrade shall be considered as that portion of the street bed on which the base course or curb and gutter is to be placed. After the earth work is substantially completed and after all drains have been laid and after all utilities under the pavement are in place, the subgrade shall be brought to the lines, grades and cross-sections shown on the plans, and

finished in accordance with the plans. Subgrade material shall meet the requirements of Soil Classifications A-1, A-2, A-3, or A-4 as determined by AASHTO specification M-145 within the following limitations:

A. materials in the A- I or A-3 classification will not require consideration of a CBR value.

B. materials in the A-2 or A-4 classification shall have a CBR value of not less than 10.

C. Materials of the cherty or float gravel type which have a minimum 500/o metal retained on the number 8 sieve, 100% passing the 4" sieve, and CBR value of at least 25 will not be required to conform to the soil classification noted above. Certification by the developers geotechnical engineer shall be submitted to the City addressing the subgrade material.

D. Where materials do not meet the above requirements a geotechnical report should be submitted by the developer's geotechnical engineer as to the proposed subgrade design.

13.2 PREPARING SUBGRADE

13.2.1 The subgrade shall be so constructed that it will have, as nearly as practicable, uniform density throughout. No base course, surfacing or pavement shall be placed on the subgrade until specified density is obtained, and until the subgrade conforms to the grade and cross-section shown on the plans and until the subgrade has been checked and approved.

13.2.2 Before placing any material on a subgrade, it shall be firm and compacted and shall have passed an inspection for compaction in accordance with Section 13.2.4 of this Specification. When necessary, the subgrade shall be sprinkled. The subgrade shall be constructed so that it will be uniform in texture and have as nearly as possible uniform density throughout. Subgrade material shall be placed in maximum 8" lifts. No base course or sub-base course shall be placed on the subgrade until the specified density is obtained, and until the subgrade conforms to the lines, grades and cross-sections shown on the plans. The density of the top 6 inches of subgrade shall be not less than 100% of the maximum density as determined by AASHTO Compaction test T-99. In no case shall any roadbed material, base course, pavement or surface course be placed on a frozen, muddy or excessively dirty subgrade. Storing or stockpiling of material on the subgrade will not be permitted.

13.2.3 All boulders, brick, concrete or similar solid items or ledge rock appearing in the earth excavation shall be removed or broken off to a depth of not less than 9 inches below the subgrade. The depressions left by such excavation shall be filled with suitable material. All soft and unstable material and other portions of the subgrade that will not compact readily or serve the intended purpose shall be removed. The resulting areas and all other low sections, holes or depressions shall be brought to profile grade with satisfactory selected material and the entire subgrade shaped to line, grade and cross-section. The entire subgrade, both in cut and in fill, shall be compacted to a density of not less than I 00% of the maximum density in the top 6" layer as required in section 13.2.2 above and 95% of the maximum density below 6" in depth as determined by AASHTO Compaction Test T-99. Moisture content at the time of the in-place density test shall be within + *or* - 2% *of* the optimum moisture content established during the control density test.

13.2.4 Density test shall be performed at a minimum of 300' intervals or at least once on short streets less than 300' in length. Developer shall provide the City with results of in-place density test. Also the subgrade shall be proof rolled with a double axle truck with a minimum net load of not less than 20 tons to check for unstable areas. Any areas found to be unstable will be repaired prior to the placement of curbs or base.

13.2.5 Particular attention shall be paid to compaction around manholes, over sewer lines and laterals, and over other utility and drainage crossings. Where deemed necessary by the engineer or the City engineer or his representative, hand tamping shall be required.

13.2.6 Where the plans indicate that a base course, surface course or pavement is to be placed, any requirements as to subgrade contained in the specifications for such base course, surface course or pavement shall be performed accordingly. Subgrade proof rolling shall be performed with a double axle truck with a minimum net load of 20 tons.

13.2.7 After proof rolling, the subgrade shall be checked and all portions not at true elevation shall be corrected and compacted to correct elevation. The subgrade shall be tested after rolling and sufficient material shall be added or removed to bring all portions of the subgrade to proper elevation.

13.2.8 All intersecting public streets or highways shall be graded as shown on the plans, and acceptable materials used on the surface so that a commodious, smooth riding and satisfactory intersection shall be produced. Grading of the subgrade shall be conducted so that berms of

earth or other material do not prevent immediate drainage of water to the side ditches or gutters. Gutters, ditches and drains along subgrade shall be so maintained at all times as to drain effectively. When hauling results in ruts or other objectionable irregularities, the subgrade shall be compacted to required density before the surfacing is placed.

13.3 PROTECTION AND MAINTENANCE OF SUBGRADE. The subgrade shall be maintained free from ruts and other depressions, in a smooth and compacted condition true to lines and grades and to density requirements until the base, surfacing or pavement is placed.

14. 14 DENSE GRADED AGGREGATE BASE COURSE

14.1 DESCRIPTION. This item shall consist of dense graded crushed limestone base course composed of one or more well controlled aggregate sizes, water mixed with and without calcium chloride, as directed, placed and compacted in accordance with these Specifications and in conformity with lines, grades and cross- sections shown on the plans. All material shall conform to the requirements set forth in Section 14.1.2 of this Specification.

14.1.1 Coarse Aggregate.

14.1.1.1 Coarse aggregate shall consist of crushed limestone, free from adherent coatings and conforming to the requirements of this Specification.

14.1.1.2 Deleterious Substances in coarse aggregates shall not exceed the following limits:

1. Soft fragments 6.0%
2. Coal and lignite 0.25%
3 Clay lumps 0.25%
4. Material passing a #200 sieve 2.0%
5. Thin or elongated pieces (Length greater than 5 times average thickness) 10.0%
6. Other local deleterious substances 2.0%
7. Total of Nos. 1, 2, 3, and 6 above..... 8.25%

14.1.2 Crushed Stone.

14.1.2.1 Crushed stone shall consist of clean, tough, durable fragments of rock conforming to the class and gradation specified.

14.1.2.2 Crushed stone shall meet the following requirements for the respective physical tests:

TEST	LIMITS FOR TYPE CONSTRUCTION		
	Concrete	Bituminous	Other
Percent wear, Los Angeles Test (AASHTO T-96)	50 Max	48 Max	60 Max
Percent sound, Soundness Test (AASHTO T-104)	90 Min	90 Min	90 Min

14.2 Gradation.

14.2.1 Coarse aggregate shall be graded within the limits specified and the size or sizes designated shall conform to the limits shown in the Coarse Aggregate Gradation Table provided in ALDOT Section 801 Subarticle 801.11(d).

14.2.2 The dense graded mixture as processed shall contain moisture within 2% of the optimum moisture content of the aggregates, and the aggregates shall be blended together in such a manner that if sampled and tested, it shall meet the following gradation without abrupt variation:

TOTAL PASSING PERCENTAGE BY WEIGHT
2" sieve 100
1.5” sieve. 90-100
1" sieve 75-98
1/2" sieve 60-85
No. 4 sieve 40-65
No. 8 sieve 28-54
No. 16 sieve 19-42
No. 50 sieve 9-27
No. 200 sieve 4-18

14.3 CONSTRUCTION METHODS.

14.3.1 The roadbed must be in an approved condition before placement of any base or subase will be permitted. Approval shall be based on satisfactorily completion of the roadbed in accordance with the requirements of Section 13.

14.3.2 In general, it shall be the Contractor's responsibility to select and furnish the proper size and amount of equipment that will produce and deliver to the roadbed, mix, spread, shape and compact the base

material.

14.4 MIXING BASE COURSE AGGREGATES. Premixing of the materials for the base course will be required. They shall be mixed by approved pug mix equipment, either at point of use or at a central mixing plant. Water shall be added during the mixing operation in an amount to make the total moisture content of the mixture not less than 5% by weight, and sufficient to make a workable mixture. At no time during the mixing operation shall the moisture content exceed the designated optimum by more than 2%. In case the material becomes too dry before compaction, water shall be added. For the top layer only, calcium chloride may be added during the mixing operation at the rate of 10 pounds of flakes per loose cubic yard of mixture.

14.5 PLACING MATERIAL. In mixing, handling and placing the base material, care shall be taken to prevent segregation. The base course material shall be placed in not more than 6 inch compacted layers on an accepted subbase or subgrade. The minimum nominal thickness of the base material in place shall be 5", unless otherwise approved by the City Engineer. Reference is made to the typical sections for local and minor collector streets in the Appendix.

14.6 COMPACTING AND MACHINING. The surface of the base course material shall be immediately and continuously machined with motor graders, maintaining the required section and compacted with steel wheel rollers. The base course shall be compacted until it reaches 100% proctor density. Steel wheel rolling shall extend beyond the curb line where curb and gutter is to be placed on the base material, and to the curb and gutter where the curb is placed on subgrade. When compaction is complete, the base course shall be smooth, hard, dense, unyielding and well bonded.

14.7 INSPECTION. Density test shall be performed at a minimum of 300' intervals or at least once on short streets less than 300' in length. Developer shall provide the City with results of in-place density test. Also the subgrade shall be proof rolled with a double axle truck with a minimum net load of not less than 20 tons to check for unstable areas. Any areas found to be unstable will be repaired prior to the placement of curbs or base.

14.8 MAINTENANCE. The entire roadway shall be maintained, and areas found defective shall be corrected and, if necessary, the subgrade and base shall be replaced. Maintenance shall include maintaining the shoulders (where they exist) to a uniform grade and slope, keeping all drainage ditches free from loose earth or other objectionable material, and keeping the roadbed drained at all times until the surface coat is applied. The base shall be machined as often as necessary to maintain it smooth and to grade and cross-section until the wearing surface is applied. The maximum speed of trucks when hauling or traveling any part of the base course under

construction shall be 20 miles per hour.

15. CURB AND GUTTER

15.1 GENERAL. This section shall cover the work of constructing portland cement concrete combination curb and gutter.

15.2 MATERIALS. All materials shall conform to the requirements of ALDOT Specifications Section 623.02. Concrete shall conform to the requirements of Section 21 of this Specification.

15.3 CONSTRUCTION REQUIREMENTS

15.3.1 Concrete mixes shall be as provided by Section 21 of this Specification, with a Class A mix being used with standard forms and a Class A mix, modified as deemed necessary by the engineer to fit the type curbing machine being used.

15.3.2 Foundation shall be constructed or excavated to the required depth below the finished surface in accordance with the cross-section shown on the plans. All soft or other unsuitable material shall be removed and replaced with suitable material in layers not to exceed 4 inches compacted. The foundation shall be proof rolled with a two-axle truck with a minimum 20 ton net load.

15.4 FORMS

15.4.1 The contractor shall use standard type metal forms as noted hereinafter or an approved automatic extrusion type curb-and-gutter machine.

15.4.2 At each street or driveway crossing where there is to be sidewalk, the curb shall be modified to provide a ramp from the sidewalk to the street.

15.4.3 Combination curb and gutter shall be 30 inches wide at the base. The Planning Commission may allow other sizes an types of curbs based on the individual situations.

15.4.4 Standard forms shall be metal, except for radial sections. They shall be straight and free from warps and of sufficient strength, when staked, to hold the concrete true to line and grade without distortion. They shall provide the approved typical section and depth of the section shown on the plans. Radial or curved forms may be of flexible metal, or a wood

form of approved design may be used. Bent or damaged forms shall not be used. All forms shall be securely staked, braced and held together to the line and grade established and shall be kept sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled with a suitable oil immediately before concrete is placed against them.

15.4.5 Machine formed Any automatic extrusion type curb-and-gutter machine must produce a section conforming to the dimensions, cross-section, lines and grades shown on the plans within the tolerances provided in Paragraph 15.8(b) of this Specification for formed curb and gutter. All curb and gutter shall be placed in one operation to the depth of cross-section shown on the plans. The use of a two stage operation will not be permitted.

15.5 SECTIONS. Combination curb and gutter shall be constructed in sections of the lengths shown on the plans. The length of sections may be reduced when necessary to form closure. Sections shall be formed with expansion joints not more than 60 feet apart, and with contraction joints spaced at 10 foot intervals.

15.6 MATERIAL HANDLING, PROPORTIONING AND MIXING. The handling, storing, proportioning and mixing of concrete shall conform to the requirements of Section 21.

15.7 JOINTS.

15.7.1 All expansion, contraction and construction joints shall be constructed as shown on the plans and in accordance with the requirements of Section 21 of this Specification. If not shown on the plans, joints shall be placed as follows:

15.7.2 Expansion joints shall be placed in curb and gutter to match those in concrete pavement where the two are adjacent, but in no instance shall there be more than 60 feet between expansion joints.

15.7.3 Expansion joints 3/4 inch wide shall be placed where curb and gutter terminates against rigid objects.

15.7.4 Expansion joint filler and sealer shall meet the requirements of Section 21 of this Specification. Expansion joint filler shall extend from the bottom of the curb and gutter to within 1 inch of the top and the sealer shall be 3/4 inch thick and shall be recessed 1/4 inch from the top.

15.7.5 Contraction joints shall be placed in curb- and-gutter to match those in concrete paving where the two are adjacent, but in no instance shall there be more than 10 feet between joints. Contraction joints shall be sawed or otherwise cut 2 inches deep by 1/8 inch wide and shall extend 2 inches below the pavement surface.

15.8 PLACING AND FINISHING - STANDARD METHOD

15.8.1 The subgrade and forms shall be checked and approved just prior to placing concrete against them. All debris or other foreign material shall have been removed from the space to be occupied by the concrete. The subgrade shall be moist but not wet or muddy. The concrete shall be placed in the forms and shall be tamped, spaded or vibrated sufficiently to produce a dense homogeneous mass and to bring the mortar to the surface. Particular attention shall be given to spading and placing the concrete along and against the surface of the forms to prevent honeycombing and to secure a smooth, uniform surface.

15.8.2 When the forms are filled, the concrete shall be struck off with a template cut to the curb edge design. The exposed concrete surface shall then be finished smooth with a wooden float in a manner that will compact the mass and produce a true, even top surface. Plastering with mortar to build up or finish will not be permitted. The surface of the gutter and the top and face of the curb will be checked with a 10 foot straightedge and any irregularities more than 1/4 inch in 10 feet shall be corrected. The alignment and grade shall not at any point vary more than 1/2 inch from that established by the elevation control stakes. Excessive troweling with a steel trowel will not be permitted. A textured finish shall be provided on the exposed surface just before the concrete becomes non-plastic by the use of a burlap or cotton fabric drag, brush or broom which will produce a uniform gritty texture along the length of the curb and gutter. The upper edges of curb shall be rounded with an edging tool to the radius shown on the plans. Joint templates shall be set during the placing of the concrete and allowed to remain in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place. The forms shall be left in place until concrete has set sufficiently so that they can be removed without damage to the work but, unless otherwise directed, they shall be removed within 24 hours after the concrete has been placed. Immediately after removal of the forms, any minor defects shall be repaired.

15.9 PLACING AND FINISHING- MACHINE METHOD. Placing and finishing machine laid curb and gutter shall be in accordance with Paragraph 15.4 of this Specification except that fixed forms are not required.

15.10 CURING AND PROTECTION. Immediately after the finishing operation is completed, the concrete shall be cured as provided in Section 21.

15.11 BACKFILLING. After the concrete has set sufficiently, spaces along the front and back sides of the curb and gutter shall be backfilled to the required elevation with suitable material which shall be compacted by tamping with approved metal tamps or mechanical tamps in layers not more than 4 inches thick until firm and solid.

16. ASPHALT BITUMINOUS MATERIAL PLANT MIX

16.1 DESCRIPTION. This Section pertains to a two step plant mix bituminous application with the mix prepared at a stationary plant.

16.2 BITUMINOUS CONCRETE BINDER LAYER

16.2.1 The work covered by this Section shall consist of a hot bituminous plant mixed binder layer placed on a prepared surface and to be covered by a bituminous wearing surface in accordance with these Specifications and in reasonable close conformity with the lines, grades, and typical cross-section shown on the plans and required by these Specifications.

16.2.2 The materials furnished shall conform to the requirements of ALDOT Section 429.

16.2.3 For a Local Street, the binder shall consist of a 2” compacted hot bituminous plant mix binder layer, according to ALDOT Section 429. Binder layer shall be installed according to ALDOT Section 410 and shall meet the density requirements of ALDOT Section 306. For a Minor Collector Street, the binder shall consist of a 2.5" compacted hot bituminous plant mix binder layer, according to ALDOT Section 429. Binder layer shall be installed according to ALDOT Section 410 and shall meet the density requirements of ALDOT Section 306.

16.3 BITUMINOUS CONCRETE WEARING SURFACE.

16.3.1 The work covered by this Section shall consist of constructing a hot bituminous concrete wearing surface on a prepared surface in reasonable close conformity with the lines, grades, and typical cross-section shown on the plans and required by these Specifications.

16.3.2 The materials furnished shall conform to the requirements of ALDOT Section 410 and 429.

16.3.3 All mixes in this Section, regardless of the type aggregate used, will require the use of an anti-strip agent. All gravel aggregates shall be washed prior to crushing. All mixes in this Section shall be designed on the fine side of the Maximum Density Curve.

16.3.4 Aggregates shall meet the requirements of ALDOT Sections 801 and 802, with particular attention directed to Article 802.04 and the following:

16.3.5 Coarse aggregates for an actual wearing surface shall be limited to siliceous aggregates such as gravel, granite, slag, sandstone, or a combination of the proper sizes of these materials that will produce a mix within the required gradation limits. Carbonate stone, such as limestone, dolomite or aggregates which tend to polish under traffic will be permitted only in underlying layers, shoulder paving, or widening.

16.3.6 All coarse aggregate shall be crushed aggregate meeting the requirements of ALDOT Section 801.

16.3.7 For a Local Street, the wearing surface shall consist of a 1.0" compacted hot bituminous concrete wearing surface according to ALDOT Section 429. The wearing surface course shall be installed according to ALDOT Section 410 and shall meet the density requirements of ALDOT Section 306. For Minor Collector Street, the wearing surface shall consist of a 1. 5" compacted hot bituminous concrete wearing surface according to ALDOT Section 429.

16.3.8 Construction requirements shall be as specified in ALDOT Articles 410.03 through 410.07. In the event the subgrade material and compaction standards cannot meet the standards specified, the design engineer shall present an alternate design for the road section. This design shall meet the following minimum traffic requirements of Local Street: 2000 vpd Minor Collector Street: 2500 vpd The design shall be in accordance with the AASHTO Method of Flexible Pavement Design, Caltrans Method of Flexible Pavement Design, or a method approved by the City Engineer. In no case, however, shall the pavement section used be less than that required in these specifications.

17. CONCRETE SIDEWALKS

17.1 RAMPS. Where sidewalks intersect cross streets or driveways, ramps shall be constructed from the sidewalk to the street or driveway. Ramps shall

meet ADA standards for maximum slope.

17.2 MATERIALS. All materials furnished for use shall comply with the requirements of ALDOT Section 618.02 and the following: Concrete shall meet the requirements for a Class A, Type 2 mix as provided in Section 21 of this Specification. Reinforcing steel, if required, shall meet the requirements of Section 21 of this Specification

17.3 CONSTRUCTION REQUIREMENTS.

17.3.1 The contractor may use forms or, upon approval of the engineer, an approved automatic extrusion type paving machine.

17.3.2 Forms shall be of wood or metal and shall be sufficiently staked to hold them true to line and grade while concrete is being deposited against them. The depth of the forms shall equal the depth of the sidewalk. Adequate means shall be provided for securely fastening the ends of forms together.

17.3.3 Any automatic extrusion machine considered must be demonstrated to produce a consolidated concrete section conforming to the dimensions, cross-section, line and grades shown on the plans.

17.4 SUBGRADE. All soft or otherwise unsuitable material in the subgrade shall be removed and replaced with suitable material. All fills and filling material shall be placed and compacted with an approved roller or hand tamped in layers not exceeding 6 inches in thickness.

17.5 FOUNDATION BACKFILL. Where provided by the plans, foundation backfill shall be placed and constructed as provided in ALDOT Section 214.

17.6 SETTING FORMS. Forms shall be set to true line and grade and rigidly held in place by stakes or braces. Ends of adjoining form sections shall be flush. Forms and division plates shall be cleaned and oiled before placing concrete against them. Unless otherwise shown on the plans, the finished surface of the sidewalk shall slope toward the roadway pavement at the rate of 1/4 inch per foot.

17.7 PLACING CONCRETE. A template resting upon the side forms and having its lower edge at the exact elevation of the subgrade shall be drawn along the forms and the subgrade shaped true before any concrete is deposited. The subgrade shall be moist and shall be free of debris and all foreign material when concrete is deposited upon it. The freshly mixed concrete shall be placed promptly on the prepared subgrade to the depth required to complete the sidewalk in one course. It shall then be vibrated

and/or tamped and struck off with an approved straightedge resting on the side forms and drawn forward with a sawing motion. The concrete shall then be floated with a wooden float until the surface is true. Concrete laid during cold weather shall conform to the requirements of ALDOT Section 501.03(d).

17.8 JOINTS. Unless otherwise shown by plan details, the surface of sidewalks shall be marked in squares or rectangles not exceeding 36 square feet in area by using an approved marking tool. The marking tool shall provide a groove approximately 1/2 inch in depth and with rounded edges.

17.8.1 Expansion joints a minimum of 3/8 inch wide shall be placed as follows:

(a) where the walks join other concrete units

(b) to line up with expansion joints of adjacent curbs, drives, etc., but in no instance more than 80 feet between joints.

(c) where continuous runs of walks or drives are 80 feet or longer, transverse expansion joints shall be provided; one joint for each 80 feet or fraction thereof of length.

(d) where walks are confined longitudinally by other concrete units and the width of the walk is in excess of 15 feet, one longitudinal expansion joint shall be required for each additional 15 feet or fraction thereof of width.

(e) expansion joints shall be formed using a filler and sealer specified in Section 21.

(f) Unless shown otherwise by plan details, the joint filler shall be from the bottom of the walk to within 1 inch from the top. The sealer shall be 3/4 inch thick and shall be recessed 1/4 inch from the top.

17.9 CURING AND PROTECTING. Immediately after the finishing operations have been completed, the entire surface of the newly laid concrete shall be protected against rapid drying out. No vehicles shall be permitted on the new concrete for 7 days or until required break strength is achieved, and pedestrians shall not be permitted thereon for at least 72 hours.

17.10 BACKFILLING. After the concrete has set sufficiently, the side forms shall be removed and the spaces on both sides shall be backfilled with suitable material. This backfill shall be compacted to a level one inch below the walk and left in a neat and workmanlike condition.

18. UTILITIES

18.1 LOCATION. All utilities shall be installed within the right- of-way or designated easements unless prior written authorization of the engineer and the City engineer is obtained.

18.2 ORDER OF CONSTRUCTION. In general, the deepest utilities should be installed first to minimize any possible interference with laterals or service lines.

18.3 CUL-DE-SACS. In cul-de-sacs the dimensions from the back of curb may vary.

18.4 EXISTING UTILITY LOCATIONS. Anyone digging in the right-of-way shall call the appropriate utility to have utilities located.

18.5 DAMAGE. Each utility shall be responsible for repair of any damage they create to other utility lines or to the street improvements within the right-of-way.

18.6 STREETS UNDER CONSTRUCTION. Once the road base has been placed, all further installation of utilities under the roadway shall be bored or otherwise shall comply with the street cut requirements of the subdivision regulations.

19. OMITTED

20. ENFORCEMENT, ADMINISTRATION, APPEALS

20.1 VIOLATION. Violation of this ordinance shall be punishable according to the terms and provisions of Section 1-7, Muscle Shoals Code of Ordinances, as may be amended from time to time.

20.2 STOP WORK. The City Building Department, or their authorized designees, may impose a “STOP WORK” order whenever they find that any facility under construction and subject to these regulations is unsafe, and must be corrected promptly to ensure the public safety, or any work subject to these regulations is being performed in a manner that may reasonably be expected to create harm to the public (e.g., inadequate or unsafe traffic control, improper diversion of sewer flow, etc.) Upon imposition of a “STOP WORK” order, all work on the site will stop and all workers leave the site, except for those workers necessary to correct the condition giving rise to the order. The individual issuing the STOP WORK order, shall rescind the order when he/she finds that conditions on the site warrant such rescission. Appeal of a “STOP WORK” order shall be administered according to Section 20.3

below.

No “STOP WORK” order or citation shall be issued for a violation of this Section unless a written notice of the violation has been provided to the project engineer, the contractor, or the authorized representative of one of these, with a 24-hour period given to cure the violation.

20.3 APPEALS. Appeals from the administrative rulings of the City Building Department or their designees shall be to the Planning Commission, which shall make the final administrative determination concerning those matters controlled by this Ordinance.

21. MATERIALS OF CONSTRUCTION

21.1 TIMBER AND LUMBER

21.1.1 All lumber shall conform to the American Lumber Standards Simplified Practice Recommendation, R-16, latest edition. Grades shall conform to the grading rules of the manufacturers association under whose rules the lumber is produced. Lumber shall bear the grade and trademark of the association under whose rules it is produced and a mark of mill identification. All lumber shall be air-dried and well seasoned.

21.1.2 All sheathing shall be No. 2 Common Yellow Pine. All framing and structural members shall be No. 1 structural fir or pine, or structural redwood if called for on the Plans.

21.1.3 Form lumber for exposed surfaces of concrete shall be Southern pine, plywood, or steel forms acceptable to the Engineer.

21.1.4 Creosoted wood shall be used where required and where indicated on the Plans. Creosote shall conform to A.S.T.M. Designation D-390-36 for creosote applied by the pressure process, American Wood Preservers Association (A.W.P.A.) C-12 Specification. All timber piles shall be treated to a minimum retention of twelve (12) pounds per cubic foot, unless noted otherwise. All treatment shall be in accordance with the recommended practices of the American Wood Preservers Association, and shall be done by the full cell process.

21.1.5 Timber piles shall conform to A.S.T.M. D-25 for "Round Timber Piles," class A, B, and C. Care of piling shall conform to A.W.P.A. Standard M-4. Timber poles shall conform to American Standards Specifications and Dimensions for Wood Poles, U.S.A.S.I. 05.1-63.

21.2 RESERVED

21.3 CONSTRUCTION OF FORMS AND FALSEWORK

21.3.1 All falsework shall be constructed true and rigid, thoroughly braced both laterally and diagonally, and sufficiently strong to carry the load imposed thereon without excessive settlement or deformation.

21.3.2 All timber used in falsework or centering shall be sound, in good condition, and free from defects which will impair its strength.

21.3.3 Forms shall be built mortar tight, plumb, true, and of material sufficiently rigid to prevent bulging between supports and shall be set and maintained to the lines designated until the concrete is sufficiently hardened to permit form removal. During the elapsed time between the building of the forms and pouring the concrete, the forms shall be maintained in a manner to prevent warping or shrinking.

21.3.4 If the forms bulge or sag at any point when the concrete is placed in them, that portion of the concrete causing distortion shall be removed immediately and the forms properly repaired and strengthened before continuing work. No forming material shall be left in place upon completion of the work.

21.3.5 Forms shall be designed for the pressure exerted by a liquid weighing one hundred fifty (150) pounds per cubic foot for vertical loads and not less than eight-five (85) pounds per cubic foot for horizontal pressure. The rate of placing the concrete shall be taken into consideration in determining the depth of the equivalent liquid for horizontal loads. An additional live load of fifty (50) pounds per square foot shall be allowed on horizontal surfaces.

21.3.6 All forms shall be so constructed as to permit removal without damage of the concrete.

21.3.7 All anchor bolts, pipe wall casing, conduit, etc., shall be installed prior to the placement of concrete.

21.3.8 Metal or wooden spreaders, which are separated from the forms, shall be entirely removed as the concrete is being placed. Pipe spreaders will not be permitted.

21.3.9 Internal wall ties shall be of a type such that when forms are removed, the metal remaining in the wall will be at least one inch (1") back from exposed surfaces of wall. Holes left by removal of the ties shall be pointed flush to the satisfaction of the Engineer.

21.3.10 Forms and form lumber to be re-used shall be maintained clean and in good condition as to accuracy, shape, strength, rigidity, tightness, and smoothness of surface. Any lumber which is split, warped, bulged, marred, or has defects that may produce work inferior to that resulting from using new materials will not be re-used.

21.3.11 Suitable mouldings or bevels shall be placed in all angles of forms to round or bevel the edges of the concrete unless otherwise specified.

21.3.12 When concrete is placed, the forms shall be clean and entirely free from all chips, dirt, sawdust, and other extraneous matter. This shall be accomplished by sweeping washing with water, or blowing with compressed air.

21.3.13 A man shall be engaged at all times to watch the centering while concrete is being placed and to see that the centering is strengthened where necessary.

21.4 REMOVAL OF FORMS

21.4.1 Concrete forms and falsework shall not be removed until the concrete has attained sufficient strength in the opinion of the Engineer, to support its own weight, construction live loads, and any other loads to which it is subject after removal of forms.

21.4.2 The Contractor shall leave for a longer period of time at least one line of shoring under the centers of beams.

21.4.3 Where required by the Engineer, the Contractor shall move or change any shoring plates, the existing shores not being removed until the new shoring is set in place.

21.4.4 No patching of concrete work shall be done until concrete has been examined by the Engineer.

21.5 CONCRETE

21.5.1 General

21.5.2 The Contractor shall provide all labor, materials, and equipment necessary for plain and reinforced concrete work as shown on the Plans and as hereinafter specified.

21.5.3 To insure the inclusion of all wall castings, conduits, anchor bolts, etc., the Contractor shall notify all other Contractors, Sub-Contractors, Manufacturers' representatives and the Resident Inspector in advance

of his intentions to pour any particular portion of the concrete work. He shall further cooperate with them in the coordination of the various phases of the work.

21.5.4 The mixing, placing and curing of all concrete shall be executed under the supervision of an experienced foreman. The Contractor shall have at least one (1) foreman to each location where concrete is being poured to assure placement, puddling, and spading, or vibrating of the concrete in a manner as hereinafter specified.

21.6 MATERIALS

21.6.1 Cement - All cement hauled to the job, bags or sacks, shall be in original unopened containers, showing brand and name of manufacturer. Cement shall be Portland Cement of American manufacture, conforming to the "Standard Specifications for Portland Cement," Types 1 and 3, A.S.T.M. Serial Designation C150, latest revision. Cement shall be tested in accordance with the "Standard Method of Sampling and Physical Testing of Portland Cement," A.S.T.M. Serial Designation C77-40. Bags containing cement lumped, caked, or otherwise deteriorated will be rejected. Bulk cement or cement salvaged from discarded or used sacks will not be permitted.

21.6.2 Fine Aggregates: Fine aggregates shall conform to the "Standard Specifications for Concrete Aggregate," A.S.T.M. Serial Designation C33. Variations in graduation for available aggregates shall be approved by the Engineer prior to use.

21.6.3 Coarse Aggregate: Coarse aggregate shall conform to the "Standard Specifications for Concrete Aggregate," A.S.T.M. Serial Designation C33, for one and one-half inch (1 1/2") to No. 4 size.

21.6.4 Mixing Water: Water used in making mortar or concrete shall be clean and free from oil, alkali, acids, organic materials, or other deleterious substances.

21.6.5 Admixtures: Concrete admixtures shall consist of an air-entrained admixture and a water reducing-densifier-plasticizer admixture. These shall be packaged and dispensed in a liquid form, either separately or together, provided they are blended on the site, in the correct proportions and solution strength in accordance with the manufacturer's instructions, immediately prior to use.

21.6.6 When the atmospheric temperature in the shade and away from artificial heat falls below 50 degrees F. the water reducing admixture may be of the non-retarding or accelerating type. Above 70 degrees F.

they must be of the retarding type.

21.6.7 Concrete admixtures shall be added to produce the following results:

Entrained Air (Percent)	3 to 6
Water Reduction (Percent Minimum)	10

Approved Admixtures are as follows:

21.6.7.1 Air Entraining

Sika-AER Manufactured by Sika Chemical Corporation
Aerolith Manufactured by L. Sonneborn Sons, Inc.
Protex Air Entraining Solution Manufactured by Autolene Lubricants Company
Daravair or Darex Manufactured by Dewey and Almy Chemical Company
M.B.V.R. Manufactured by Master Builders Company

21.6.7.2 Water Reducing

Plastiment or Plastiment and Sikacrete Manufactured by Sika Chemical Corporation
Sonotard Liquid Manufactured by L. Sonneborn Sons, Inc.
Protex Dispersing Agency (normal or set-retarding) Manufactured by Autolene Lubricants Company
Daratard or W.R.D.A. Manufactured by Dewey and Almy Chemical Corporation.
Pozzolith "3 Series" Manufactured by Master Builders Company

21.7 TESTING MATERIALS AND CONCRETE

21.7.1 The Contractor shall furnish without additional compensation samples of the various materials and the proposed concrete mix for laboratory mix design and testing as required by the plans.

21.8 PROPORTIONING CONCRETE

21.8.1 The mix shall be proportioned by the testing laboratory based on the following: unless shown otherwise on the plans.

Max. Gal. Per Sack of Cement Compressive Strength
(Including Free Moisture in Aggregates)

Type of Concrete Structure	Minimum P.S.I. at 28 days	Water Content %

Structures which are continuously submerged, intermittently submerged or alternately wetted and dried such as wet wells, basins, tanks and culverts.	4500	5 1/2 (4 1/2)
Pavement Slabs on Ground	3500	5 1/2 (4 1/2)

NOTE: Figures shown in parenthesis are for use with air-entraining and water reducing admixtures.

21.8.2 The Contractor shall be responsible for assuring that concrete strengths are in accordance with the above table, and shall make necessary minor field adjustments in the design mix. Workability of the mix shall generally be within the range of (see plans) inches slump and contain no excess water.

21.8.3 In no case shall the concrete contain less than 5.0 sacks of cement per cubic yard.

21.8.4 The mix shall be proportioned by the testing laboratory based on the

21.9 SAMPLING AND TESTING OF CONCRETE

21.9.1 Each class of concrete shall be represented by at least a set of 4 cylinders for each pour. Four specimens shall be made for each test; one specimen shall be tested at seven (7) days, one at fourteen (14) days, and one at twenty-eight (28) days and one in reserve. One test shall be made for each 25 cubic yards of concrete, but there shall be at least one test for each day's pour.

21.9.2 Failure of concrete to meet specified tests will result in: (1) removal and replacement of the structure at the discretion of the Engineer; or (2) negotiation of the value and corresponding price paid for the structure between the Engineer, Owner, and Contractor.

21.9.3 Samples shall be made in accordance with "Method of Sampling Fresh Concrete," A.S.T.M. C172, and testing shall be done in accordance with "Method of Testing for Compressive Strength of Concrete Cylinders," A.S.T.M. C39.

21.10 MIXING AT SITE

21.10.1 Unless specifically authorized by the Engineer, all concrete mixing shall be done in a batch mixer approved by the Engineer, of a type which will insure uniform distribution of the materials throughout the mix and which will insure a uniformly colored and homogeneous product. Concrete shall be mixed for not less than 1 1/2 to 3 minutes in quantities required for immediate use and any concrete not in place within thirty (30) minutes after being discharged from the mixer or within sixty (60) minutes after the addition of water or wet aggregate and cement, whichever occurs first, shall not be used. Retempering of concrete will not be permitted. The Contractor shall maintain at least one-half of the capacity of the principal mixer. This shall not in any case be less than one-half (1/2) yard.

21.11 READY MIXED CONCRETE

21.11.1 Ready mixed concrete will be used unless specified otherwise on the plans. The schedule of deliveries of concrete to the job, and the method of distribution in the forms, shall be approved by the Resident Inspector.

21.11.2 Ready mixed concrete shall conform to the "Specifications for Ready Mix Concrete," A.S.T.M. C94-61, with the exceptions that: (1) discharge from the hauling containers shall be completed within sixty (60) minutes after the addition of water or aggregates containing more than 2% moisture by weight, and (2) proportioning concrete and sampling and testing be as set forth hereinbefore. All other requirements for proportioning, aggregates, mixing, and testing shall be complied with the same as if concrete were mixed at the site.

21.12 PLACING CONCRETE

21.12.1 Before any concrete is deposited, all debris shall be removed from the space to be occupied by the concrete; all metal reinforcement shall be placed in its proper location; all inserts, hangers, metal ties, anchor bolts, slates, etc. shall be properly located in cooperation with other trades, and secured in position before concrete is poured; and all forms shall be thoroughly wetted. Form work and reinforcement shall be inspected and approved by the Engineer immediately before placing concrete.

21.12.2 Concrete shall be handled from the mixer to the place of deposit as rapidly as possible without segregation or separation of the materials or displacement of the reinforcement. It shall be deposited as near as possible to its final position in the forms, and shall be so deposited as to maintain, until completion of the unit, as plastic surface approximately horizontal. When placing operations would involve dropping the concrete more than five feet, approved chutes, troughs, or pipes shall be used to prevent segregation and to avoid the accumulation of concrete on the forms or metal reinforcement. Under no circumstances shall partially hardened concrete be deposited in the work. Chutes, if used, shall be subject to the approval of the Engineer.

21.12.3 Concrete shall be deposited continuously as rapidly as practicable, until the operation between construction joints is completed. Concrete shall be delivered at such rate that the interval between batches will not exceed twenty minutes.

21.13 JOINTS IN CONCRETE

21.13.1 Except where construction joints are detailed differently on Plans, they shall be square and normal to the forms.

21.13.2 All construction joints below water level or as shown on the Plans shall be provided with waterstops as follows:

Thickness of Concrete Section	8" or Less	More than 8"
Thickness of Waterstop	3/16"	3/8"
Width of Waterstop	6"	9"
type	Flat,Multi-ribbed	Flat,Multiribbed
Material	Poly-Vinyl-Chloride	Poly-Vinyl-Chloride

21.13.3 Waterstops shall be manufactured by Electrovert, Inc., or approved equal. Intersections and splices shall be in strict accordance with the manufacturer's instructions.

21.13.4 Before joining plastic concrete to concrete that has already set, the surface of the concrete in place shall be free from all loose material, laitance, dirt, or foreign material; shall be washed and scrubbed clean with stiff brooms; shall be thoroughly drenched with water until saturated; and shall be kept wet until the plastic concrete has been placed.

21.13.5 Immediately prior to the placing of additional concrete all forms shall be drawn tight against the concrete in place and the surface of the

concrete in place shall be flushed with a coating of grout, mixed in the proportions of one (1) part cement to two (2) parts sand.

21.13.6 The forms shall provide a perfect alignment for exposed surfaces between the previously placed concrete and the new placement. They shall be tight enough to prevent mortar from streaking the exposed surfaces of previously placed concrete.

21.14 COMPACTION OF CONCRETE

21.14.1 All concrete shall be thoroughly compacted during and immediately after depositing, thoroughly worked around reinforcement, embedded fixtures, and into corners of forms, and the mortar flushed to the surface by continuous working with concrete spading implements or high frequency mechanical vibrators of an approved type.

21.14.2 If vibrators are used, the consistency of the mixture and the period of vibration shall be such that the resulting concrete is free from segregation, honeycomb, accumulation of water, and laitance.

21.15 CONCRETING IN INCLEMENT WEATHER

21.15.1 In threatening weather which may result in conditions adversely affecting the quality of the concrete to be placed the Engineer may order the postponement of the concreting operations. Where work has been started and changes in weather conditions require protective measures, the Contractor shall furnish adequate measures to protect the concrete from rainfall or freezing temperatures.

21.15.2 Concrete, when deposited, shall have a temperature not below fifty (50) degrees F., nor above one hundred twenty (120) degrees F. In freezing weather, suitable means shall be provided for maintaining the concrete at not lower than fifty (50) degrees F., for not less than seventy-two (72) hours after placing or until the concrete has thoroughly hardened. Methods of heating the materials and protecting the concrete shall be approved by the Engineer.

21.15.3 The Contractor is responsible for the protection of concrete placed under all weather conditions. Permission given by the Engineer to place concrete during rain or freezing weather will not relieve the Contractor of the responsibility for satisfactory results. Concrete placed under such conditions proving unsatisfactory shall be removed and replaced.

21.16 PROTECTION AND CURING

21.16.1 All exposed concrete surfaces shall be protected from premature drying, and freshly placed concrete shall be protected against washing by rain. All concrete surfaces shall be kept wet continuously for seven (7) days after placing. This shall be accomplished by flooding or covering with burlap, sand, waterproof paper, or satisfactory cover so that the concrete can be kept continuously wet by sprinkling at frequent intervals.

21.16.2 When wet curing is impractical, curing compound may be used upon the Engineer's written permission. Curing compound one gallon per 150 square feet. The treated area shall be protected and compound reapplied if necessary. After curing is complete, the curing compound shall be thoroughly removed from all areas to be painted.

21.17 REMOVAL OF FORMS AND FALSEWORK

21.17.1 Except as hereafter provided, forms for surfaces required to be finished shall be carefully removed when the concrete has aged not less than 1 nor more than 2 curing days. The term "curing day" is interpreted as any calendar day on which the temperature is above 50 degrees F. for at least 19 hours. Colder days may be counted if the air temperature adjacent to the concrete is maintained artificially above 50 degrees F. throughout the day. If continued cold weather persists, when artificial heat is not provided, the Engineer may permit the removal of forms and falsework at the end of a period of calendar days equal to twice the number of days stated below.

21.17.2 Forms and falsework may be removed when the concrete has aged for the minimum number of curing days as follows:

Slabs or girders having span length of 10 feet or less	7 days
Slabs or girders having span length of 10 feet and less than 17 feet for each foot of span over 10 feet	7 days plus 1 day
Slabs and girders having span length over 17 feet	14 days
Walls, columns, sides of beams and under-slabs that cantilever one foot or less	2 days
Slabs that cantilever more than	

one foot	4 days

21.18 CONCRETE FINISHING

21.18.1 All concrete shall be given ordinary finish and such additional finish as follows:

AREA	TYPE FINISH
Interior Walls, Ceilings, and Exposed Exterior Walls	Rubbed Finish
Interior Floors Finish (At Resident Inspector's Direction)	Float or Trowell
Exterior Floors	Float Finish
Roadways and Sidewalks	Float Finish and Edged

21.18.2 Ordinary surface finish shall proceed immediately after form removal and shall consist of removal of fins and irregular projections and filling of cavities resulting from ties, minor honeycombs, and broken corners or edges. Cavities shall be thoroughly cleaned and wetted prior to pointing with mortar which shall be mixed to the color and in proportions used in the concrete being finished.

21.18.3 Rubbed finish shall be done on thoroughly wetted surfaces with a carborundum stone to a smooth, even finish of uniform appearance without applying any cement or other coating. No plastering will be permitted.

21.18.4 Other finishes shall conform to normal good practice.

21.18.5 During the process of conditioning the completed structure for final acceptance, all exposed concrete surfaces shall be cleaned from drip marks and discoloration, washed down and broomed so that the structure has a clean, uniform finish and color.

21.19 RESERVED

21.20 DEFECTIVE WORK

21.20.1 Any defective work shall be removed immediately and renewed. If the surface of concrete is bulged, uneven, or shows excessive honeycombs, or form joint marks which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and renewed at no additional compensation.

21.21 GROUT

21.21.1 Grout, where required on the Plans, shall be a metallic non-shrinking type such as "Ferrolith G," as manufactured by Master Builders or equal. Grout shall be mixed and applied in strict accordance with the manufacturer's instructions.

21.22 REINFORCING STEEL AND ACCESSORIES

21.22.1 Materials

21.22.2 Reinforcing bars shall be intermediate grade steel conforming to the "Standard Specifications for Billet Steel Bars for Concrete Reinforcement," A.S.T.M. A15-58T, with deformation in accordance with A.S.T.M. A305-50T.

21.23 RESERVED

21.24 CLEANING

21.24.1 Metal reinforcement, before being placed, shall be thoroughly cleaned of mill and rust scale and of coatings that will destroy or reduce the bond. Reinforcement appreciably reduced in section shall be rejected. Where there is delay in depositing concrete, reinforcement shall be reinspected and cleaned when necessary.

21.25 BENDING AND STRAIGHTENING

21.25.1 Reinforcement shall be carefully formed by cold bending to the dimensions indicated on the Plans. Bends shall be made around a pin having a diameter of six (6) or more times the bar diameter.

21.25.2 Reinforcements shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the Plans shall not be used. Hot bending (heating steel bar) steel bars will not be permitted and will cause complete rejection of the steel bar heated.

21.26 PLACING REINFORCING

21.26.1 Metal reinforcements shall be accurately positioned as indicated on the Plans, and secured against displacement while concrete is being poured. Placing and fastening of the reinforcing in each section shall be approved by the Engineer before any concrete is deposited in that section.

21.27 SPLICING STEEL REINFORCEMENT

21.27.1 Splicing of bars will not be permitted without the approval of the Engineer except where shown on the Plans. Splices which are permitted shall have a length of not less than thirty (30) times the nominal diameter of the bar or twelve inches (12") minimum. They shall not occur at points of maximum stress, and shall be staggered where possible.

21.27.2 Adjacent sheets of mesh reinforcement shall be spliced by lapping not less than one (1) mesh or six inches (6") minimum. The lapped ends shall be securely wired together.

21.28 ANCHORAGE

21.28.1 For top bars in beams framing into reinforced concrete walls or girders, an extension of thirty (30) bar diameters shall be provided where ninety degree (90) bends are used.

21.28.2 Top steel in slabs that frame into beams or reinforced concrete walls shall be extended not less than 20 bar diameters for anchorage when ninety degree (90) bends are used.

21.29 MASONRY

21.29.1 General

21.29.2 Masonry shall include the furnishing and installing complete of all brick and/or concrete block as specified or required by the Plans and/or Specifications.

21.29.3 Regardless of ownership or responsibility the Contractor shall build in all materials that form an integral part of the masonry, consult and cooperate with other trades in the installation of structural steel, anchors, bucks, nailing blocks, grounds, lugs, waterproofing membrane, flashing, pipe sleeves, conduit, etc. These shall be carefully fitted and built in masonry work. For all work coming in contact with or passing through masonry work provide openings, chases, or passing through masonry work provide openings, chases, etc., for proper sizes and in their proper locations.

21.30 CONCRETE BLOCKS

21.30.1 Portland cement used for manufacture of units shall conform to A.S.T.M. Specifications, C150, or C175, Type 1 or 1A, or U.S. Government Specifications SS-C-192, Types 1, III, or IIIA

21.30.2 Units shall be made of expanded clay aggregate Gravelite as produced by Big River Industries, Inc., or approved equal, meeting A.S.T.M. Specifications for Lightweight Aggregate for Concrete Masonry Units, C133, latest revision.

21.30.3 Lightweight Masonry Units shall be manufactured on a machine employing compaction and vibration method of production, and shall comply with one or more of the following specifications:

A.S.T.M. C90-52 ----- Hollow Load-Bearing Masonry Units, Grade A

A.S.T.M. C145-52 ----- Solid Load-Bearing Masonry Units

A.S.T.M. C129-52 ----- Hollow Non-Load-Bearing Masonry Units

A.S.T.M. C55-52 ----- Concrete Building Brick

U.S. Government SS-C-621 ----- Concrete Masonry Units

U.S. Government SS-B-663 ----- Concrete Building Brick

and with the following requirements:

21.30.4 The units shall be properly cured. If air cured, they shall be protected from the sun and wind and frequently sprinkled for a period of at least seven (7) days. They shall be held in storage for a minimum of twenty-eight (28) days providing proper steam curing is accomplished. Units so cured shall be held in storage ten (10) days after manufactured. In all cases units shall be so cured that they meet the moisture content requirements of the following paragraph at the time of delivery at the job. Absorption of units shall not exceed fifteen pounds (15#) per cubic foot. Certified commercial test report showing compliance with applicable specifications shall be provided in all cases by the manufacturer of the units. Sampling and testing shall comply with A.S.T.M. Specifications C140-52, "Sampling and Testing Concrete Masonry Units." In addition, units shall have the following dimension tolerances. A variation of one-eighth inch (1/8") shall be allowed in length, height, and width dimensions.

21.31 BRICK

21.31.1 Face brick shall conform to A.S.T.M. C216-60, and all other brick shall conform to A.S.T.M. C-62, latest edition. Brick shall be Grade MW, Type FBX, for facing and Grade NW for interior walls and other uses.

21.31.2 All brick for manholes and cleanouts shall conform to the Standard Specifications for Sewer Brick, A.S.T.M. C32-58, Grade MA.

21.32 MORTAR

21.32.1 Mortar shall comply with the latest revision of Standard Specifications for Mortar for Unit Masonry, A.S.T.M. C-270, Grades M, N, or S (A-1, A-2, or B).

21.33 BRICK MASONRY

21.33.1 All brickwork shall be laid true to dimensions, plumb, square, and in bond or properly anchored. All courses shall be level with joints of uniform width. Brick shall be wet, except brick having absorption less than 5% before laying. No brick shall be laid in freezing weather.

21.33.2 Face brick shall be laid in a full mortar bed with a shoved joint. All joints shall be completely filled with mortar. Proper space shall be left for caulking joint at all door and window frames. Structural steel in interior walls and the back of all exterior stone work will be pargeted with pargeting mortar before laying brick, which shall be bricked up tightly against the steel or stone. Face brick shall be laid in running bond courses with 3/8" joints. Joints shall be cleaned and washed with a dilute solution (5%) of muriatic acid applied with a wire brush and thoroughly washed off with clean water upon completion of structure or unit.

21.33.3 When laying veneered walls, veneer shall be tied into the masonry backing, either by a header for every 100 square inches of wall surface or by substantial non-corroding metal ties spaced not farther than sixteen inches (16") apart vertically, and twenty-four inches (24") horizontally. Headers shall project at least 3 - 3/4" into backing. Special care shall be taken to fill all joints flush with mortar around the openings.

21.34 CONCRETE BLOCK MASONRY

21.34.1 All concrete block shall be laid true to dimensions, plumb, square, and in bond or properly anchored.

21.34.2 All wall openings shall have lintels.

21.34.3 All joints on the exterior face of the wall and all interior exposed masonry shall be tooled to give a concave finish, using a round tool slightly larger than the joint, before the mortar hardens and with sufficient force to press the mortar tight against the block on both sides of the mortar joint. Joints on all other surfaces shall be cut flush.

21.35 MASONRY REINFORCEMENT

21.35.1 All masonry walls, both brick and concrete block, interior and exterior, shall be reinforced with No. 9 gage galvanized truss type reinforcement equal to Dur-or Wall, Blok-Lox, or Lok-all.

21.35.2 Spacing shall be 16" vertically for walls without openings and 8" vertically at the top of the wall and above and below openings with a two foot (2') projection beyond the openings. Laps in reinforcing and at intersecting walls and corner walls shall be a minimum of 6". A minimum of 5/8" mortar cover shall be provided on all reinforcement at the face of walls.

21.36 PROTECTION

21.36.1 Surfaces not being worked on shall be protected from frost, rain, or other damage. Cover the tops of all walls with heavy waterproof paper well secured in place at the close of the day's work or when rain is imminent.

21.37 GROUTING

21.37.1 All spaces between masonry work and metal doors and window frames shall be filled solid with masonry cement grout.

21.38 WATERPROOFING AND DAMP-PROOFING

21.38.1 Flashing

21.38.2 General: All flashing shall be installed in strict accordance with manufacturer's instructions. Concealed flashing shall be turned up 4" at top end. Laps shall be a minimum of 4". Cementing shall be done around all openings in flashing and joints made in accordance with manufacturer's recommendations.

21.38.3 Exposed: Exposed flashing, unless shown otherwise on the Plans, shall be either 16 ounce copper, 0.015: soft tempered stainless steel (type 304) suitable for hand forming, or plastic which is heavy (0.045" reinforced or 0.062" thick non-reinforced) non-combustible, impermeable, chemical

resistant, and resistant to weather, exposure to sunlight, temperature ranges from -20 degrees to +175 degrees F., and aging.

21.38.4 Concealed: Concealed flashing may either be two ounce copper covered on both sides by asphalt bonded cotton fabric or kraft paper, or 0.20" thick flexible plastic which is non-combustible, impermeable, chemical resistant, and resistant to weather, exposure to sunlight, temperature ranges from -20 degrees to +175 degrees F., and aging.

21.38.5 Caulking

21.38.6 All caulking shall be done with elastic non-staining caulking compound, approved by the Engineer. Compound shall be applied with a gun especially designed for that purpose.

21.38.7 Carefully caulk around all exterior window frames, all wall vents, and all doors as called for in masonry. Caulk behind staff moulds of all wood frames. Caulk pipe going through masonry.

21.39 STRUCTURAL STEEL

21.39.1 General

21.39.2 The Contractor shall provide, fabricate, and install all structural steel complete as indicated on the Plans, and as hereinafter specified.

21.40 MATERIALS

21.40.1 All steel shapes and plates required in this work shall conform to the "Standard Specifications for Steel for Bridges and Buildings," or "Standard Specifications for Structural Steel," A.S.T.M. A36, latest revision.

21.41 FABRICATION DETAILS

21.41.1 Prior to fabrication the Contractor or the manufacturer shall submit to the Engineer for approval, detailed shop drawings showing the layout, sizes, connections, and arrangements of all structural steel proposed for installation. Drawings shall be submitted in four (4) copies.

21.42 STORAGE OF MATERIALS

21.42.1 Structural material, either plain or fabricated, shall be stored at the shop above ground upon platforms, skids, or other supports. It shall be kept free from dirt, grease, and other foreign matter, and shall be protected as far as practicable from corrosion.

21.43 STRAIGHTENING AND FINISHING MATERIALS

21.43.1 Rolled material, before being laid off or worked, must be straight. If straightening is necessary, it shall be done by methods that will not injure the metal. Sharp kinks and bends shall be cause for rejection of the material. Portions of the work exposed to view shall be finished neatly. Shearing, flame cutting, and chipping shall be done carefully and accurately.

21.44 FLAME CUTTING

21.44.1 Steel may be flame cut, providing a smooth surface is secured by the use of a mechanical guide.

21.44.2 Flame cutting by hand shall be done only where approved by the Engineer, and the surface shall be made smooth by planing, chipping, or grinding. Re-entrant cuts shall be filleted to a radius of not less than one-half inch (1/2").

21.45 FINISHED MEMBERS

21.45.1 Finished members shall be true to line and free from twists, bends, and open joints.

21.46 WELDS

21.46.1 Welding shall conform to specifications for building construction of the American Welding Society in accordance with the requirements of the "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," latest edition of the American Institute of Steel Construction.

21.47 SHOP PAINTING

21.47.1 All steel, before leaving the shop, shall be given one (1) shop coat of primer. See Painting Specifications.

21.48 MISCELLANEOUS MATERIALS

21.48.1 GENERAL

21.48.2 This Section of the Specification covers miscellaneous items of equipment and materials used in this project. The materials and articles covered by the requirements of this Section are, in general, standard

commercial products available from the stock of two or more reputable manufacturers.

21.49 IRON CASTINGS

21.49.1 Unless otherwise specified, iron castings shall conform to the standard specifications for "Gray Iron Casting," A.S.T.M. A48, for Class 30 Gray Iron. All iron castings shall be asphalt or tar dipped.

21.50 SHEET METAL (GALVANIZED)

21.50.1 Sheet metal shall conform to the specifications for zinc-coated iron or steel sheets, A.S.T.M. A93-46.

21.51 COLD-ROLLED STEEL

21.51.1 Cold-rolled steel shall conform to A.S.T.M. A1-8046 for "Commercial Cold-Finished Shafting," Grade 3.

21.52 STEEL FORGINGS

21.52.1 Steel forgings shall conform to A.S.T.M. A-235-46 for "Carbon Steel," and A.S.T.M. A-237-47 for "Alloy Steel Forgings," class most suitable for the particular application.

21.53 MANHOLE COVERS AND FRAMES

21.53.1 Castings shall be of design and dimensions as indicated on the Plans. All castings shall be accurately made to dimensions required, and shall be planed where marked or where otherwise necessary to secure perfectly flat and true surfaces. Allowance shall be made in the patterns so that thicknesses required will not be reduced by the planing. Covers shall fit the frames in any position. Vent holed shall be provided in conformance with the Plans and as directed by the Resident inspector.

21.54 MANHOLE STEPS

21.54.1 Manhole Steps shall be made accurately to the dimensions shown on the Plans, and shall conform to the standard specifications for "Gray Iron Castings," A.S.T.M. A48, Class 30. See Sanitary Sewer Specifications for alternate.

21.55 PIPE HANGERS

21.55.1 Where necessary to support piping in buildings or where specified on the Plans, pipe hangers shall be furnished and installed by the

Contractor. All hangers shall be of a type approved by the Engineer. Embedded inserts for pipe supports shall be for threaded rods, and shall be similar and equal to those manufactured by Grinnel Company. Expansion shields and sleeves for pipe supports shall be for threaded rods and of a type approved by the Engineer.

21.56 STANDARD BOLTS, SCREWS, AND NAILS

21.56.1 Bolts, nuts and studs shall conform to Federal Specifications FF-B-561A. Unless otherwise specified, bolts shall be type B-2 and nuts type A-2, Class C steel, Class 3 fit. Zinc or cadmium coated bolts shall be furnished where specified, indicated, or required.

21.56.2 Machine and set screws shall conform to Federal Specifications FF-S-92, unless otherwise specified.

21.56.3 Lag screws shall conform to Federal Specifications FF-B-575.

21.56.4 Nails shall conform to Federal Specifications FF-N-103 and shall be of type specified or required. Nails for use on exterior woodwork shall be zinc or dadmium coated unless otherwise specified.

21.57 PIPE SLEEVES AND WALL PIPE

21.57.1 Pipe sleeves and wall pipe through walls shall be of cast iron, of standard weight, and of size shown on drawings, specified, or required. All pipes through concrete or masonry walls must utilize pipe sleeves or wall pipe, unless otherwise specified or authorized by the Engineer.

21.58 METAL GRATINGS

21.58.1 Gratings shall be of the size and type shown on the Plans, and shall be manufactured by Borden Metal Products Company, or approved equal.

21.59 RESERVE

21.60 ALUMINUM

21.60.1 Aluminum frames, grating ladders, and miscellaneous materials shall be in accordance with the following alloys of Aluminum Association:

Structural shapes, plates, railings, bars, and rods	6061-T6
Screws, bolts, and nuts	2024-T4

21.60.2 Aluminum work to have mill finish. Aluminum to be bonded to concrete to be painted with zinc chromate and allowed to dry before installation. Aluminum in contact with concrete shall be thoroughly coated with approved aluminum impregnated caulking compound. Protective coating during construction and erection shall be two (2) coats of clean methacrilate lacquer.

21.61 WROUGHT IRON

21.61.1 Wrought iron pipe shall conform to the requirements of the latest revisions of A.S.T.M. A-72, and wrought iron plate shall conform to A-42.

22. CHAIN LINK FENCES

22.1 MATERIALS

22.2 CHAIN LINK FABRIC

22.2.1 All chain link fence fabric shall consist of woven wire in the form of approximately 2-inch uniform square mesh, having parallel sides with horizontal and vertical diagonals of approximately uniform dimensions in accordance with the provisions of ASTM A-392. The wire shall not be less than 9 gauge (coated). The fabric shall be 8 feet wide. The base metal of the fabric shall be a good commercial quality of steel wire coated with prime western spelter or equal (AASHTO M-120) in accordance with the provisions of ASTM A-392 for a Class 2 coating weight. The zinc coating shall be applied after weaving. The wire after treatment shall have a minimum breaking load of 1290 pounds.

22.2.2 When a chain link fence is installed around a detention or retention basin it shall include 3 strands of barbwire for a total fence height of 7.0 feet.

22.2.3 MISCELLANEOUS WIRE Wire used for bracing or as tension wires shall be No. 9 gauge minimum. Wire used for tying and other purposes shall be No. 11 gauge minimum. The wires may be steel or aluminum of not less than 25,000 psi tensile strength All miscellaneous steel wire shall have 0.7 oz zinc per square foot of uncoated wire.

22.2.4 FENCE SUPPORTS GENERAL The frame, including posts, rails, braces, fittings, etc. shall include an acceptable expansion joint. Fittings and connections may, in general, be of the fabricator's design, provided posts,

caps, tops, etc. shall be of the heavy duty cast metal design of either malleable steel or aluminum consistent with other parts of the material; line post caps shall be of such design that the addition of barbed wire arms can be accomplished, if necessary, by a standard arm which is capable of being set at either a vertical position or at a 45 degree angle from the vertical on either side of the fence, all of which can be accomplished without dismantling or removing the post cap. Straps, bands or similar type connections, unless otherwise noted, shall be fabricated from material of not less than 0.125 inches thick. STEEL

(a) General All steel elements used as fence supports shall be classified as Type A or Type B according to the following requirements. Unless specified on the plans, the contractor shall have the option to use either type.

(1) Type A All steel elements used in the framework shall be of a good commercial grade steel, hot-dipped, galvanized in 7 accordance with the following: Tubular posts, braces, etc. -- ASTM A-120; Castings and miscellaneous hardware -- ASTM A-153. Minimum sizes and weights of posts, rails and framing shall be as follows:

Line posts 2.375" O.D. pipe @ 3.65 #/ft.
Corner and pull posts 2.875" O.D. pipe @ 5.79 #/ft.
Gate posts 4.0" O.D pipe @ 9.10 #/ft.
Top & middle rail 1.625" O.D. pipe @ 2.27 #/ft.
Gate frames 1.625" O.D. pipe at 2.27 #/ft.

Tolerances for steel tubing shall be +/- 1% of dimension and +/- 5% of weight.

(2) Type B All steel elements of this type shall be produced from a lightweight high tensile/high yield strength steel. The steel shall possess a minimum yield strength which when multiplied by the section modulus of a particular pipe size shall equal or exceed the minimum elastic bending moment of the same outside diameter Type A steel pipe. Type B steel pipe shall meet either or both of the following bending tests with a maximum permanent deflection of not more than 0.25 inches: O.D. PIPE SIZE ACTUAL MIN.LOAD BEARING CAPACITY (LBS) 10' free supported 4' cantilever 8 1 5/8" 327 204 2" 468 293 2 1/2" 814 508 The exterior surface of the pipe shall have a hotdipped galvanized coating, minimum 0.9 oz/sq. ft., followed by a chromate conversion coating. The interior surface of the pipe shall have either these same coatings or a zinc rich based coating having a minimum zinc powder content of 80% by weight. These coatings shall be capable of withstanding weathering in accordance with ASTM A-623 for 250 hours, and humidity in accordance with ASTM D-1735 for 500 hours. In lieu of the galvanized coatings specified

elsewhere in this item, the coating on all surfaces of the fence supports and framing shall be a hot-dipped aluminized coating. The minimum weight of coating shall be 0.75 ounces per square foot, triple spot test, 0.70 ounces per square foot, single spot test, as measured in accordance with ASTM A-428. The external and internal aluminum coating surface shall have a chromate chemical treatment and a thin resin film to minimize galling and provide wet storage stain resistance during storage and shipment. Miscellaneous steel fittings and hardware shall be of a good grade commercial steel, meeting the general requirements noted for chain link fence, hot-dipped galvanized after fabrication in accordance with ASTM A-153 or hot dipped 9 aluminized in accordance with this specification.

22.3 GATES Gates shall be swing gates as detailed or specified on the plans. The gate frames shall be the height of the top of the posts and covered with the same wire and fabric used on the fence. The frames shall be formed from the tubular shapes noted in this Addendum, with all joints welded or otherwise constructed to form a rigid, tamper-proof unit. All gates shall be furnished complete with approved tamper-proof hinges, latches, auxiliary braces, and all other necessary fittings. Gate openings shall have a width of 12 feet. Gates shall be 2-panel, side hinged, with one side fastened in the closed position by a drop pin in the center of the opening. Locks shall be the responsibility of the City of Muscle Shoals Water And Wastewater Board.

22.4 CONCRETE FOR SETTING POSTS Concrete for bedding posts, etc., shall be Class A, complying with the requirements of Addendum I, except the concrete may be dry batched at a central mixing plant and delivered to the project. Before the concrete is placed, water shall be added. This may be done in small amounts as needed and mixed on a mixing board or mortar box. After water is added, the mix shall be used within sixty minutes or shall be wasted. Posts, 0 braces and brace struts shall be held in proper position until the concrete hardens. The concrete for all corner, brace and line posts shall have cured for 72 hours before any strain is placed upon them.

22.5 CONSTRUCTION REQUIREMENTS

22.5.1 GENERAL All construction methods and equipment employed in the setting of fence shall be in accordance with the requirements of the specifications of the manufacturer of the fence being used and shall be such that the resulting structure will provide the expected service and be durable and complete in every detail.

22.5.2 CLEARING FENCE LINE All brush, stumps, logs, large roots, humps of earth, boulders or debris which would interfere with proper construction of the fence in the required location shall be removed before starting fencing

operations. Sound standing trees inside the perimeter of the fence shall be removed before starting fencing operations. The clearing and/or grading of the area inside the fence shall be accomplished prior to starting fencing. The clearing and/or grading of the area outside the perimeter and the disposal of all material removed shall be accomplished in such manner that minimum damage will be done.

22.5.3 SETTING POSTS 1 Posts and anchorages shall be set at intervals shown on the plans. The posts shall be set plumb and true in alignment on the side to which the fabric is to be attached. All posts (end and corner posts, brace posts, pull posts, line and gate posts) shall be set in concrete. Where unstable soil is encountered, the use of longer posts, concrete anchorage or other approved post stabilization methods shall be required.

22.5.4 CONSTRUCTING FENCE Chain link fence shall be stretched taut and securely fastened to each post by means of approved metal bands or No. 9 gauge wire spaced not more than 12 inches apart on posts and not more than 15 inches apart on the rail. The method of attaching at end posts, gates and corner posts shall be as shown on the plans If barbed wire is called for, the barbed wire, barbed wire arms and methods of attachment shall be shown on the plans. Wire shall be stretched taut and spaced as specified by the engineer.

23. WOOD FENCE

23.1 MATERIALS

23.2 GENERAL All wood shall be treated . Treated wood shall mean wood of the species called for by the plans, treated by a pressure 2 method to retain 8 pounds of No. 1 creosote oil with 2% by weight of pentachlorophenol, empty cell treatment. In the event that this treatment is not approved by local or federal authorities, an equivalent pressure treated wood, as approved by one of the wood grading authorities recognized by the Standard Building Code, will be accepted. IV-4.1.2 POSTS Corner posts and line posts shall be 4x4 rough cut timber extending 8 feet above ground. Gate posts shall be 6x6 rough cut timber extending 8 feet above ground. Top and bottom stringers shall be 2x4, either rough cut or smooth. Palings shall be either 1x6 or 1x8 rough cut lumber, at the option of the contractor. Gate frames and cross-bucks shall be 2x4, either rough cut or smooth. Gate hinges and latches shall be heavy duty steel, industrial type, galvanized after fabrication in accordance with ASTM A-153. Gate hinge and latch fastenings shall be galvanized or chrome plated 3/8 inch minimum diameter carriage bolts of sufficient length that the nut will be backed with a galvanized steel flat washer. Gate center pin and accessory hardware shall be galvanized steel. 3 Nails shall be hot dip

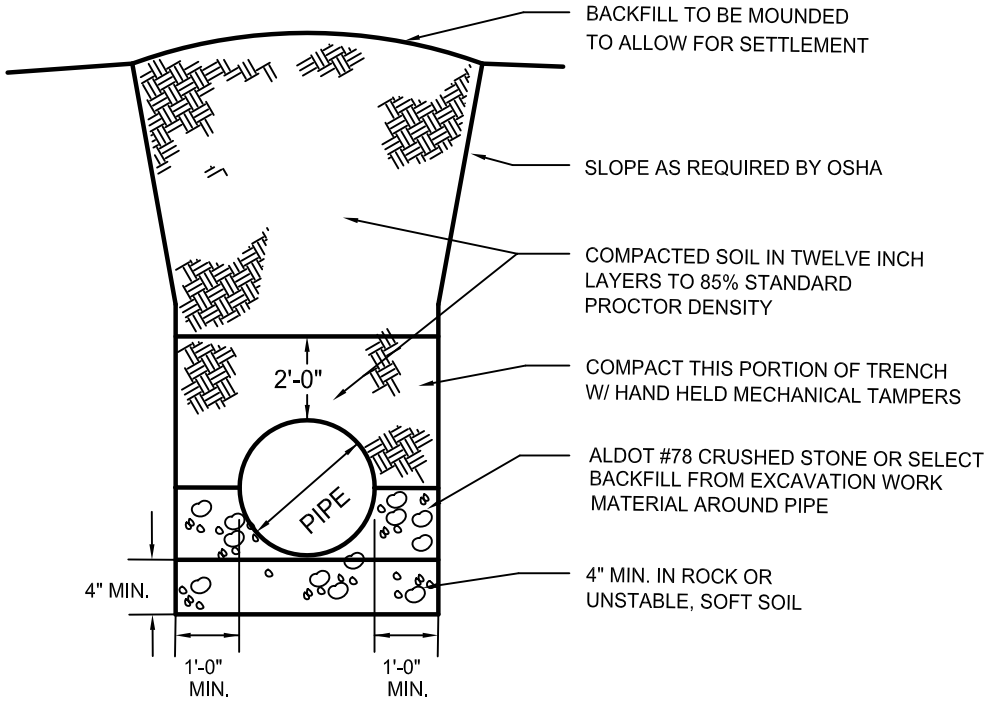
galvanized 8d or 10d, as appropriate. Concrete for bedding posts shall be Class A type, complying with applicable sections of Addendum I. The contractor may use ready-mix or concrete may be dry batched at a central mixing plant and delivered to the project. Before the concrete is placed, water shall be added. This may be done in small amounts as needed and mixed in a mortar box. After water is added, the mix shall be used within 60 minutes. Posts shall be held in proper position until the concrete hardens. The concrete shall have cured for 72 hours before any strain is put on the posts.

23.3 CLEARING FENCE LINE Clearing fence line shall be as delineated under 22.5.2.

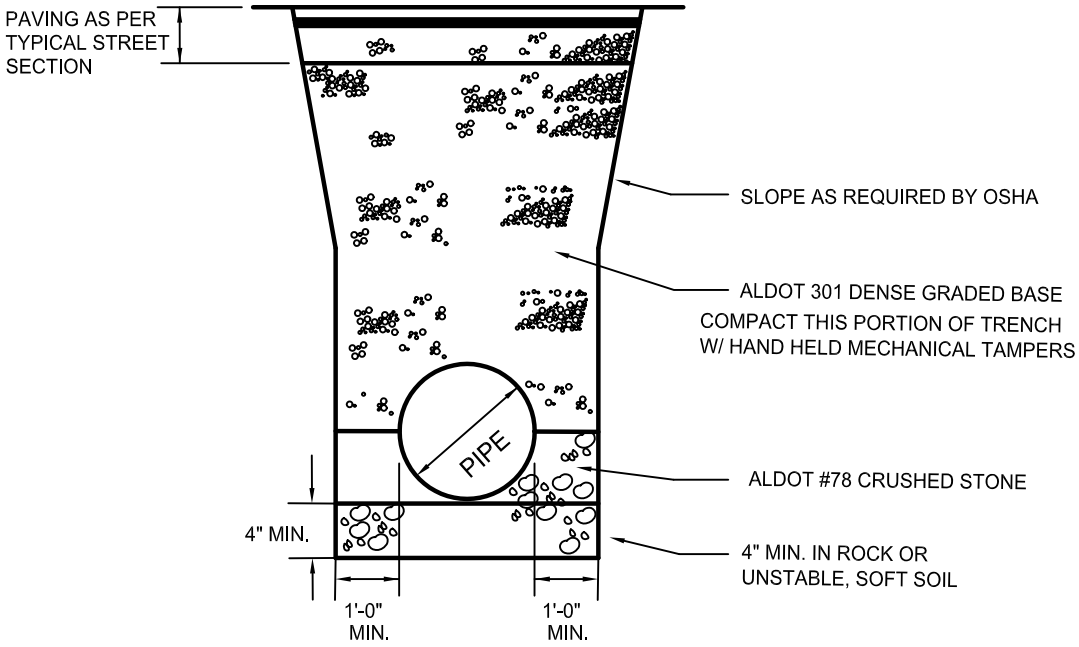
23.4 SETTING POSTS Posts shall be set at intervals shown on the plans or as directed by the engineer. The posts shall be set plumb and true in alignment on the side to which the palings are to be attached. All posts shall be set in concrete in accordance with plan details.

23.5 CONSTRUCTING FENCE The fence shall be constructed in accordance with the plan details, except that alternate palings on gates shall be 4 omitted. Particular care shall be paid to placing a diagonal 2x4 from the upper corner of the opening side of the gate frame to the lower corner of the hinge side of the gate frame.

APPENDIX “A”



NON-TRAFFIC AREAS



TRAFFIC AREAS

STORM PIPE BEDDING DETAIL

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
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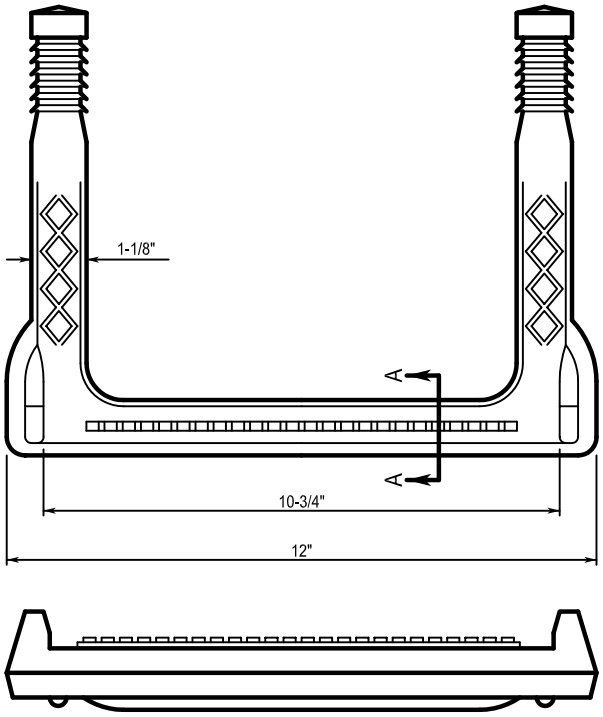
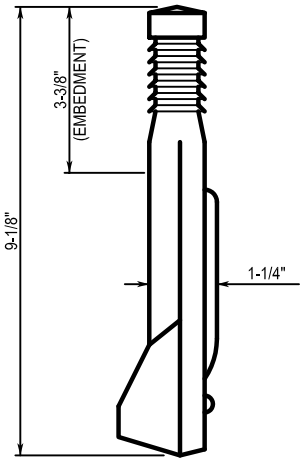
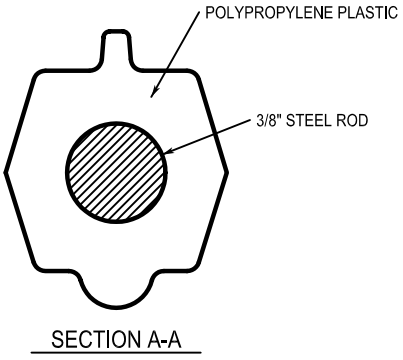
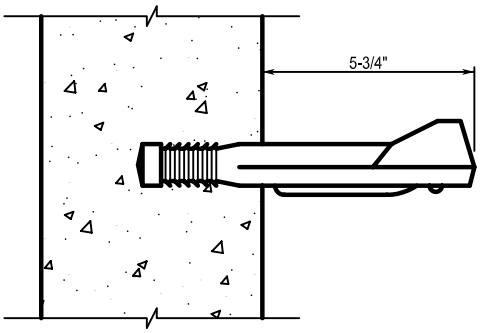








(DIMENSIONS SHOWN ARE MINIMUM REQUIREMENTS)

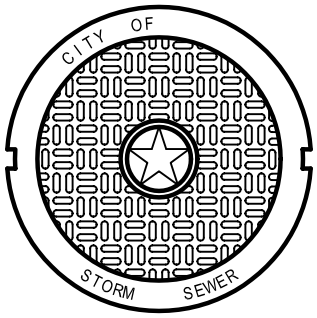
NOTE:

MANHOLE STEPS SHALL BE MANUFACTURED FROM ALUMINUM OR POLYPROPYLENE PLACTIC REINFORCED WITH A 3/8" OR LARGER STEEL ROD. STEPS SHALL BE EMBEDDED IN THE BASE, RISER AND TOP SECTIONS A MINIMUM OF THREE INCHES AT THE TIME OF CONSTRUCTION. MANHOLE STEPS SHALL BE A MINIMUM OF 10-3/4" WIDE AND EXTEND FROM THE MANHOLE A MINIMUM OF 5-3/4".

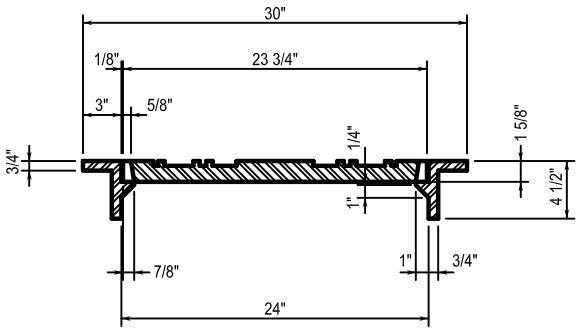
STORM SEWER MANHOLE STEP DETAIL

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 2
REV.	



COVER DETAIL



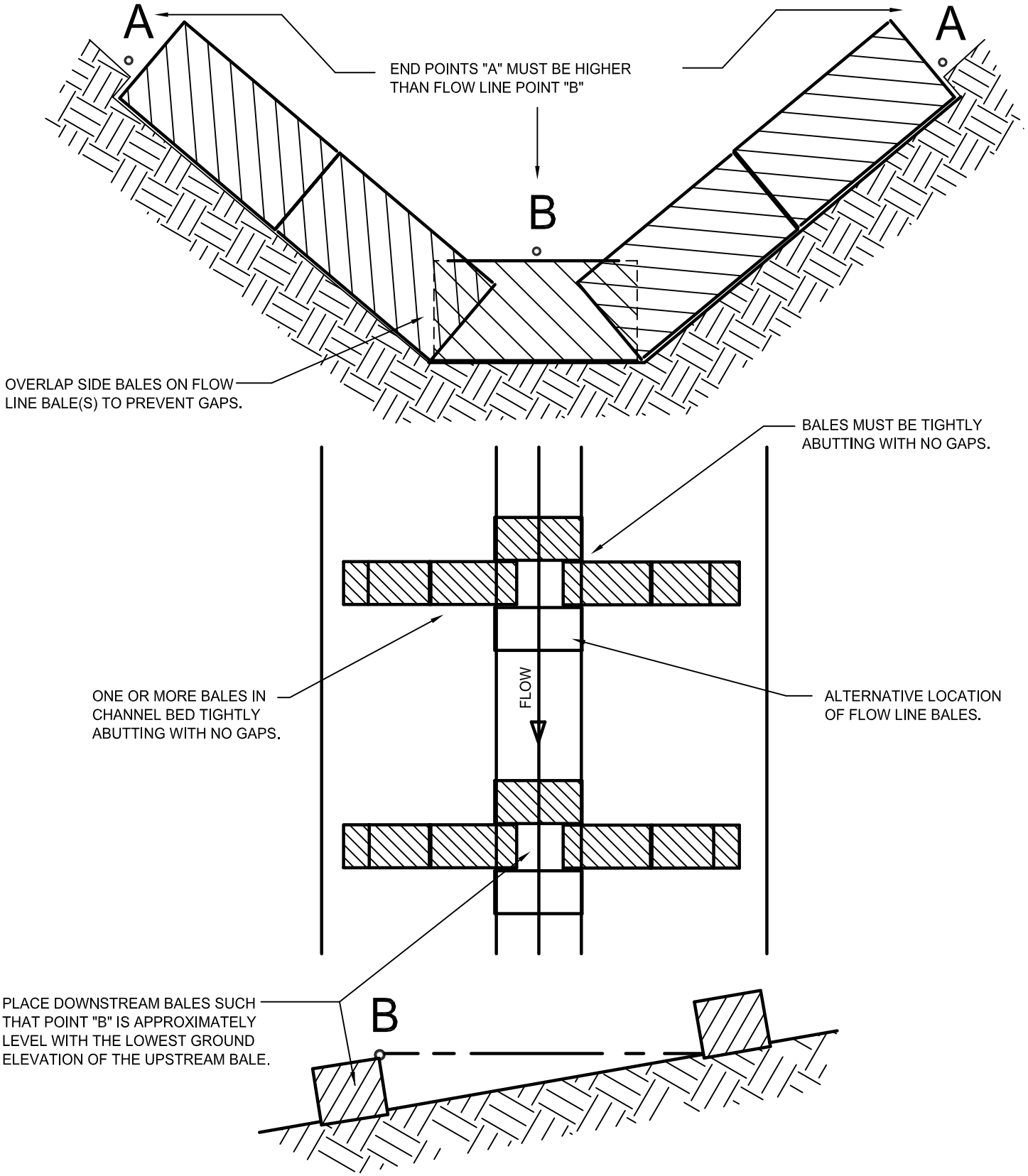
SECTION

NOTE: COVER AND FRAME SHALL CONFORM TO THE REQUIREMENTS OF CLASS 30 FOR GRAY IRON CASTING, ASTM (A 48). FRAME AND COVER SHALL BE TRAFFIC BEARING WHEN APPLICABLE.

RING AND COVER DETAIL

NOT TO SCALE

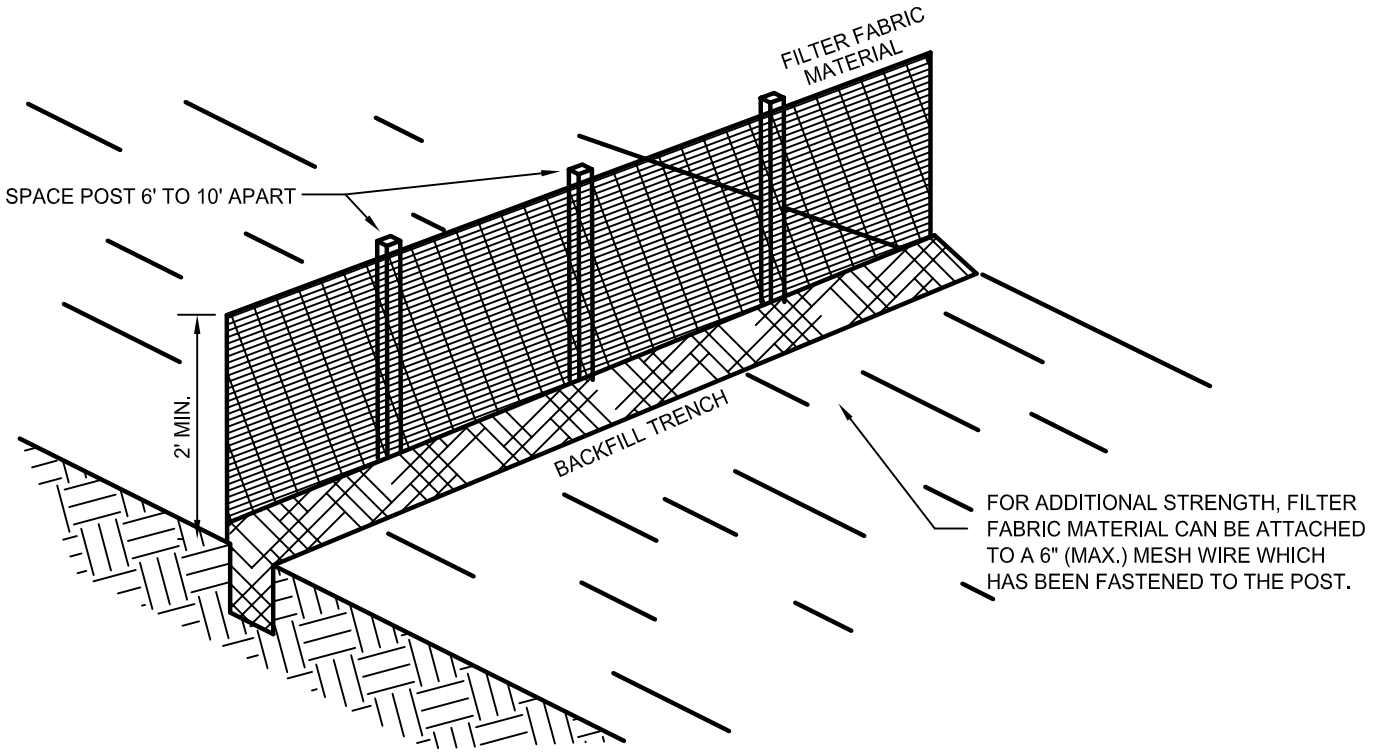
CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 3
REV.	

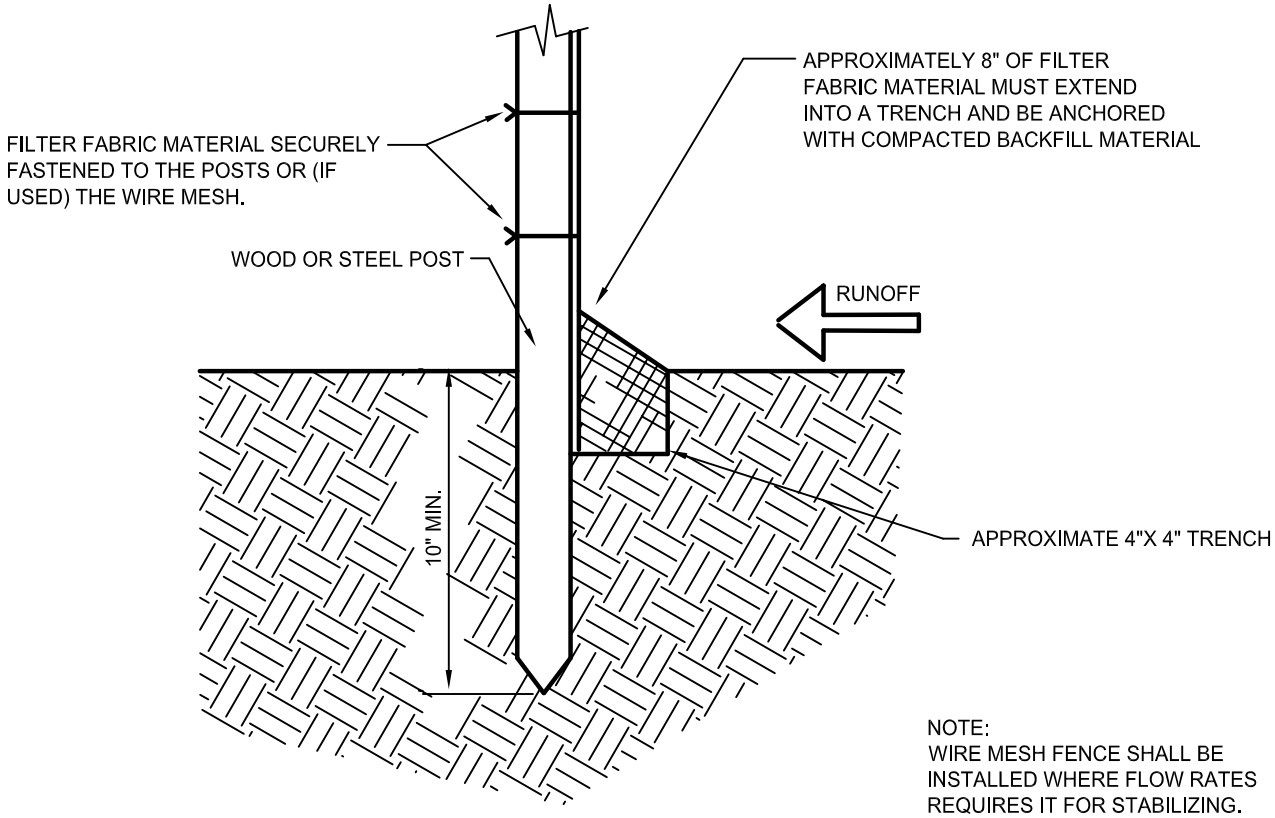


STRAW BALE DAM

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 4
REV.	

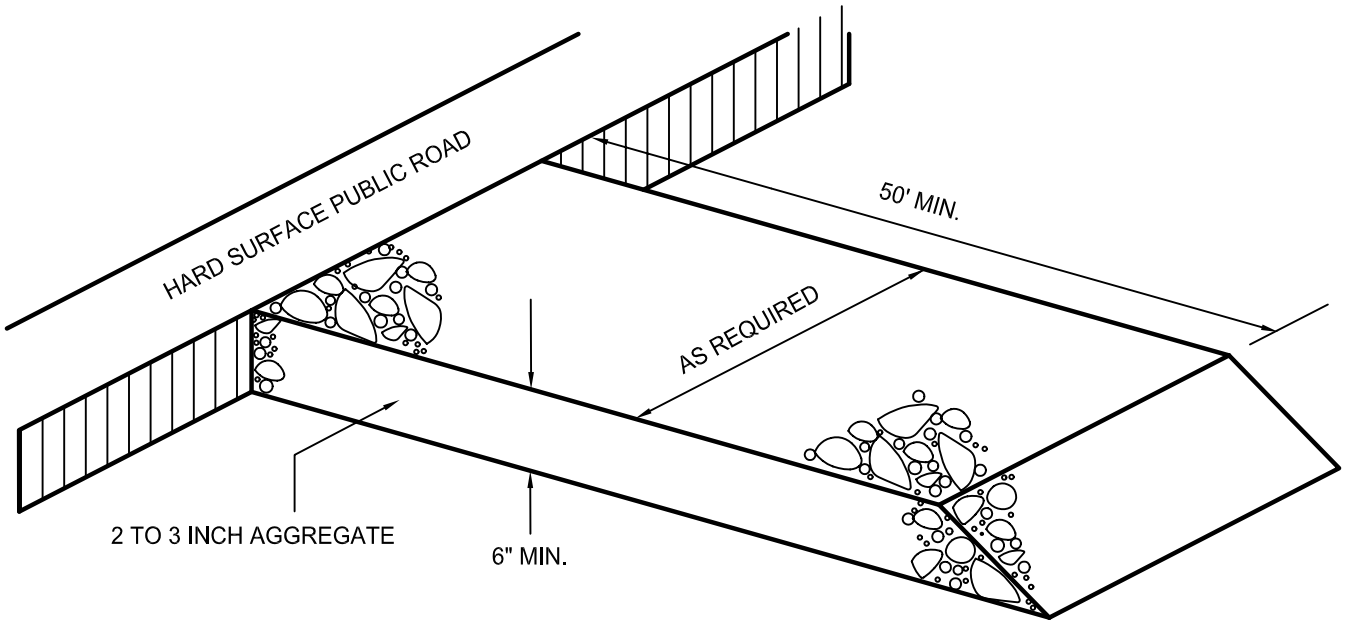




NOTE:
WIRE MESH FENCE SHALL BE INSTALLED WHERE FLOW RATES REQUIRES IT FOR STABILIZING.

SILT FENCE

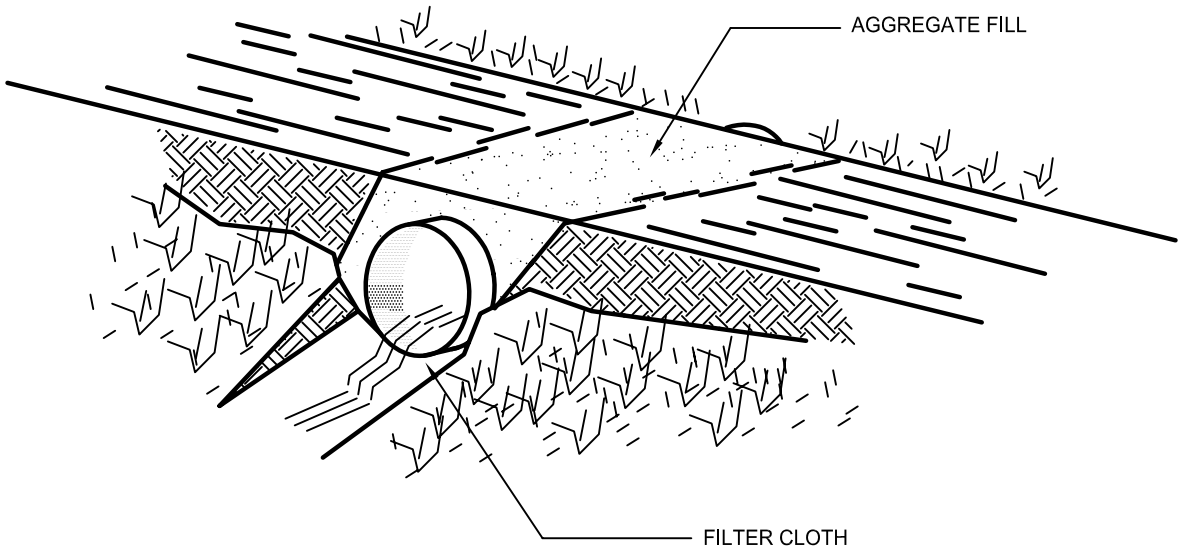
CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 5
REV.	

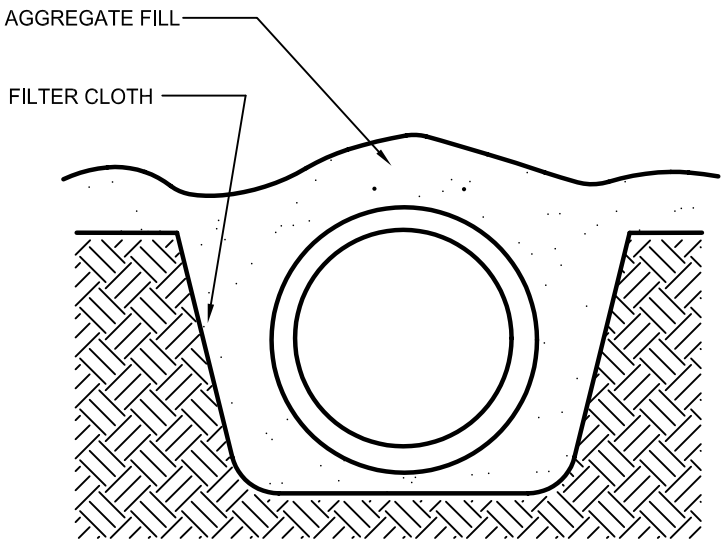


GRAVEL CONSTRUCTION ENTRANCE

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 6
REV.	

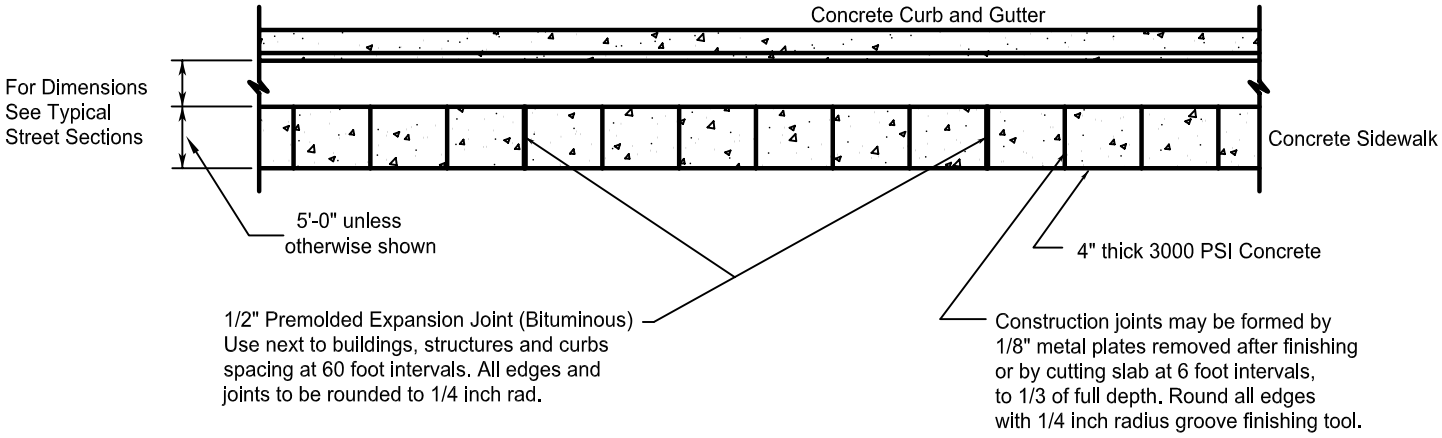




TEMPORARY DRAINAGE CROSSING

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 7
REV.	



STANDARD CONCRETE SIDEWALK

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 8
REV.	

EROSION AND SEDIMENT CONTROL CONSTRUCTION SEQUENCE

(This construction sequence is based on the engineer's opinion and not intended to be a comprehensive list of events and the contractor should use his/her discretion to determine the best sequence of construction. However, all erosion and sedimentation control measures must be installed in a timely fashion to perform properly.)

1. Install construction entrance with crushed aggregate base course. Entrance should be periodically cleaned to keep debris and mud from being carried onto _____. The existing drainageways should remain open until proposed storm system is functioning properly.

2. Grade the property according to the grading plan, but leave all existing drainageways in place.

3.Contractor should utilize water trucks, etc. to keep moisture content of subgrade at optimum level to reduce dust from construction traffic and improve compaction results.

4. Install all sanitary and storm sewer systems. Once the proposed drainage system is installed, grade the right-of-way as shown on the grading plan and repair temporary construction entrance. Place gravel bag filters around all curb inlets to reduce sediment from being transported offsite.

5. Maintain all erosion and sediment control measures, such that they are performing their function properly; clean out sediment build-up when facilities reach 50% capacity; wash down construction entrance periodically and make sure that adequate drainage is provided to reduce runoff onto _____.

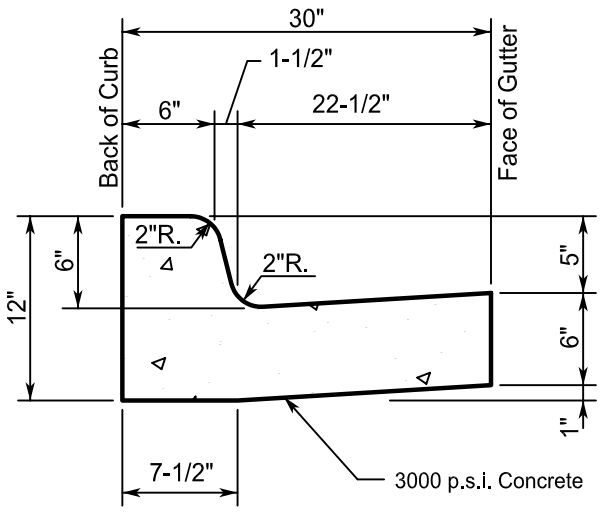
6. Install water, gas & electric service lines. Install curb and gutter. Form and pour tops of drainage structures. Place aggregate base for parking areas and drives.

7. Contractor should be aware that erosion may occur in areas that are unprotected on the construction site. If the contractor observes sediment accumulation or erosion problems on site, then the contractor should take the necessary measures to stop sedimentation, such as silt fences, straw bale dams, etc., and then take the necessary measures to stop the erosion, such as seed/mulch, sod, erosion blankets, etc..

8. Install sidewalks, handicap ramps and pave the parking area as specified. Flush or clean all sediment from storm pipes. Replace gravel bags around storm structures until all site construction is complete.

10. When site construction is completed, remove all silt fences and gravel bag filters. Spread and grade collected materials on site.

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 9
REV.	

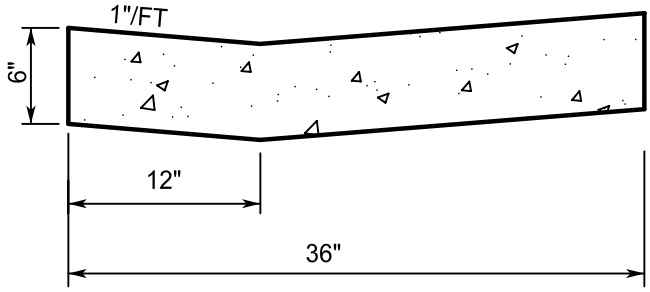


NOTE :
EXPANSION JOINTS REQUIRED
AT 75' INTERVALS

CONSTRUCTION JOINTS REQUIRED
AT 25 ' INTERVALS

STANDARD CURB AND GUTTER

(REQUIRED ON ALL NEW STREETS)
NOT TO SCALE

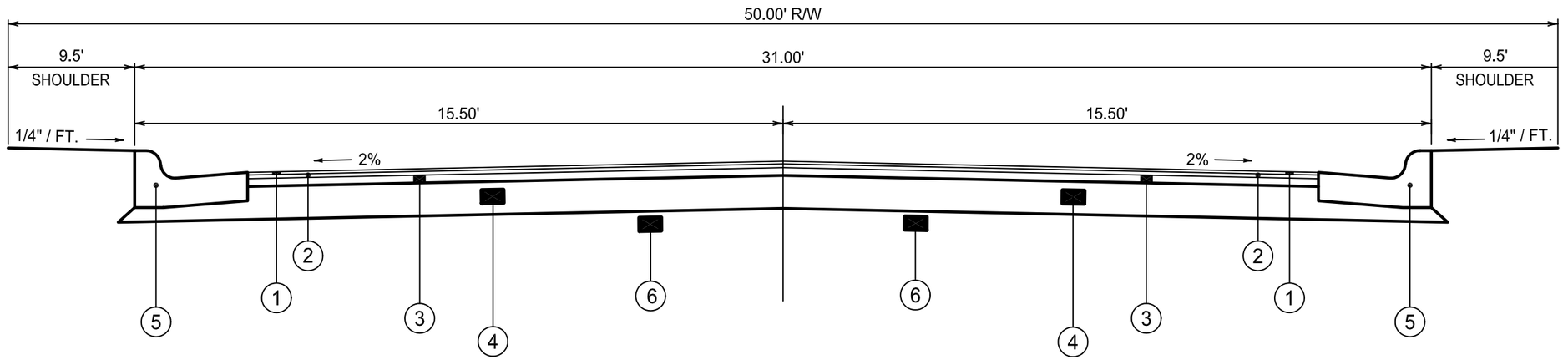


TOP CURB @ 0.16'
HIGHER THAN STREET
CENTER LINE

MODIFIED CURB & GUTTER

(MAY BE APPROVED BY THE PLANNING COMMISSION ON AN INDIVIDUAL BASIS)
NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 10
REV.	

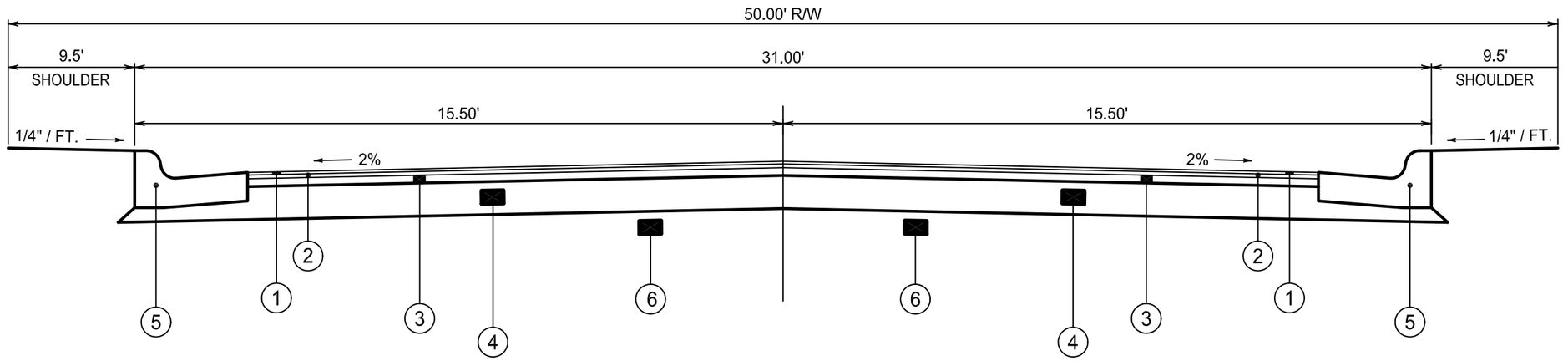


1. 429A-000 REQUIRED IMPROVED BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B (APPROX. 110#/SY)
2. 405A-000 REQUIRED TACK COAT 0.05 GAL/SQ YD.
3. 429B-000 REQUIRED IMPROVED BITUMINOUS CONCRETE UPPER BINDER LAYER, 1" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B (APPROX. 220#/SY)
4. 301A-008 REQUIRED CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 5" COMPACTED THICKNESS
5. 30" CONCRETE CURB & GUTTER
6. COMPACTED SUBGRADE

TYPICAL STREET SECTION (LOCAL STREET)

NOT TO SCALE

CITY OF MUSCLE SHOALS	
REV.	ISSUE DATE: 01/01/2006
REV.	STD. DWG. NO.: 11
REV.	



1. 429A-000 REQUIRED IMPROVED BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B (APPROX. 165#/SY)
2. 405A-000 REQUIRED TACK COAT 0.05 GAL/SQ YD.
3. 429B-000 REQUIRED IMPROVED BITUMINOUS CONCRETE UPPER BINDER LAYER, 1" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B (APPROX. 275#/SY)
4. 301A-008 REQUIRED CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 5" COMPACTED THICKNESS
5. 30" CONCRETE CURB & GUTTER
6. COMPACTED SUBGRADE

TYPICAL STREET SECTION (MINOR COLLECTOR STREET)

NOT TO SCALE

CITY OF MUSCLE SHOALS	
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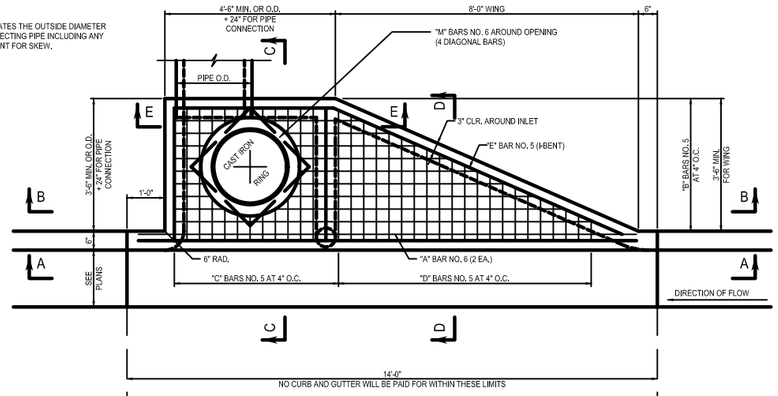
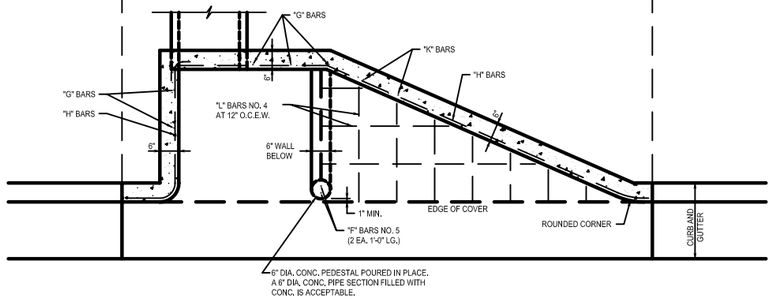
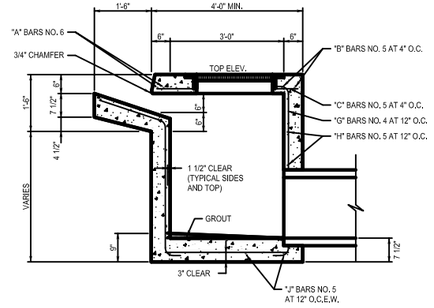
REV.	

NOTE:
O.D. INDICATES THE OUTSIDE DIAMETER OF INTERSECTING PIPE INCLUDING ANY ADJUSTMENT FOR SKEW.

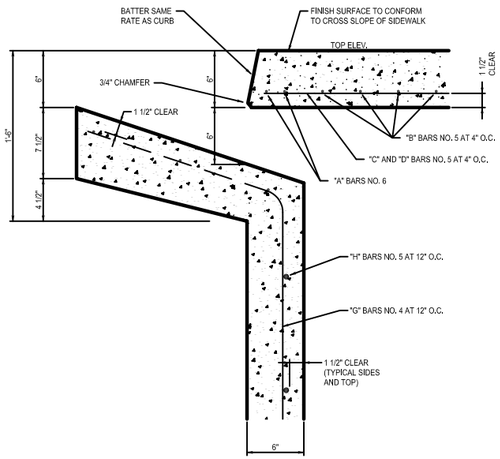




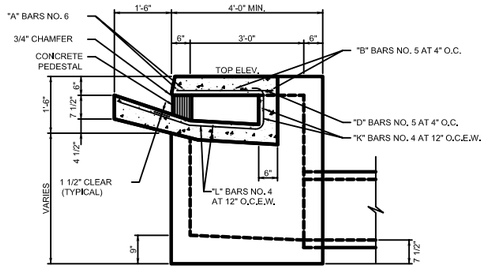
PLAN VIEW
SCALE: 1/4"=1'-0"



SECTION "C-C"
SCALE: 1/4" = 1'-0"



DETAIL "A"
SCALE: 3/4" = 1'-0"



SECTION "D-D"
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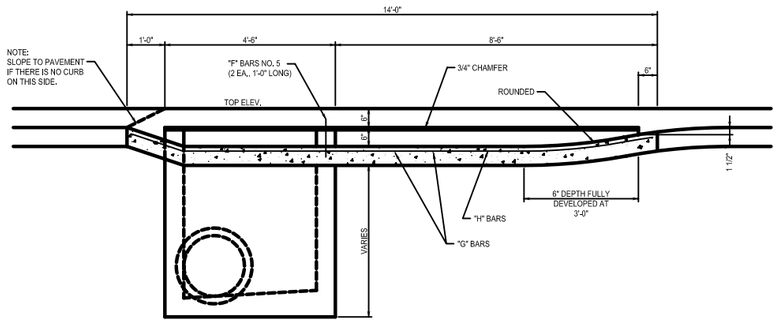

SECTION "A-A"
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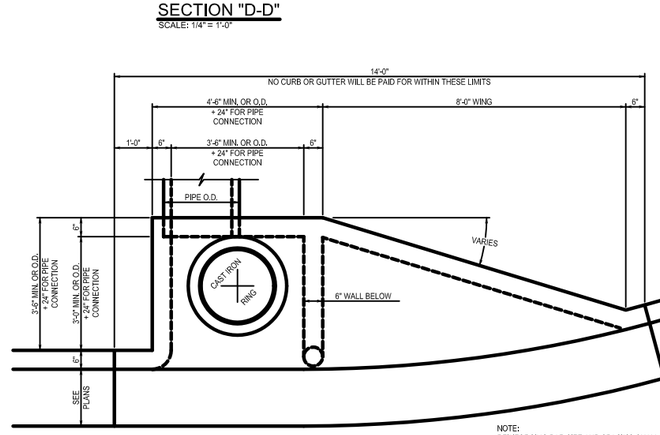
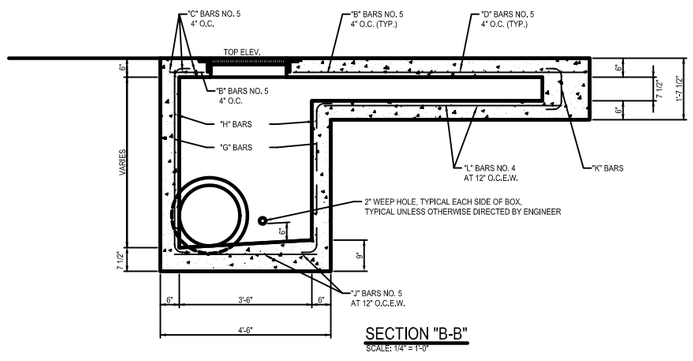
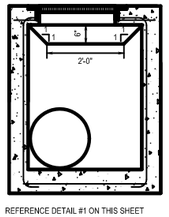


PLAN ON RADIUS
SCALE: 1/4"=1'-0"

NOTE:
REINFORCING BAR SIZE AND SPACING SHALL BE SAME AS INLET ON TANGENT LINE.



SECTION "B-B"
SCALE: 1/4" = 1'-0"



REFERENCE DETAIL #1 ON THIS SHEET FOR OTHER SPECIFICATIONS RELATED TO CURB INLET

SECTION "E-E"

WEIR OPTION
NOT TO SCALE

TYPE "S" INLET

GENERAL NOTES

CONCRETE	ALL CONCRETE SHALL BE 3500 PSI, 28 DAY COMPRESSIVE STRENGTH.
REINFORCING	ALL REINFORCEMENT SHALL BE DEFORMED BAR, GRADE 60.
INLET WINGS	WHERE THE DIRECTION OF FLOW IS FROM BOTH SIDES OF THE INLET, SIDE WING OPENINGS (AS SHOWN ON ONE SIDE ONLY) SHALL BE BUILT ON BOTH SIDES OF INLET. FOR EACH INLET SO BUILT PAYMENT WILL BE MADE UNDER ITEM "INLETS TYPE S, (DOUBLE WING)", WHERE ONE WING ONLY IS BUILT PAYMENT WILL BE MADE UNDER ITEM "INLETS TYPE S, (SINGLE WING)".
LARGE PIPE	TO ACCOMMODATE LARGE DIAMETER PIPE, OR TO FIT OTHER CONDITIONS, IT MAY BE NECESSARY TO INCREASE ONE OR BOTH PLAN DIMENSIONS OF THE INLET BOX AND COVER SLAB. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR THE CORRESPONDING INCREASE IN CONSTRUCTION MATERIALS WHERE CHANGES IN DIMENSIONS ARE REQUIRED.
PIPE CONNECTIONS	PIPE MAY CONNECT WITH INLETS FROM ANY DIRECTION, AND AS MANY CONNECTIONS SHALL BE MADE AS ARE NECESSARY.
WEEP HOLES	2" MINIMUM DIAMETER WEEP HOLES SHALL BE CONSTRUCTED IN INLETS AS DIRECTED BY THE ENGINEER TO FACILITATE SUBGRADE DRAINAGE.
RING AND COVER	SHALL CONFORM TO THE REQUIREMENTS OF CLASS 30 FOR GRAY IRON CASTING A.S.T.M. DESIGNATION A48.
MANHOLE STEPS	MANHOLE STEPS ARE REQUIRED WHEN DIMENSION FROM BOTTOM SLAB FLOW LINE TO TOP SLAB IS GREATER THAN 4'-0". STEPS SHALL BE INSTALLED AT 1'-4" O.C. VERTICALLY.

CITY OF MUSCLE SHOALS

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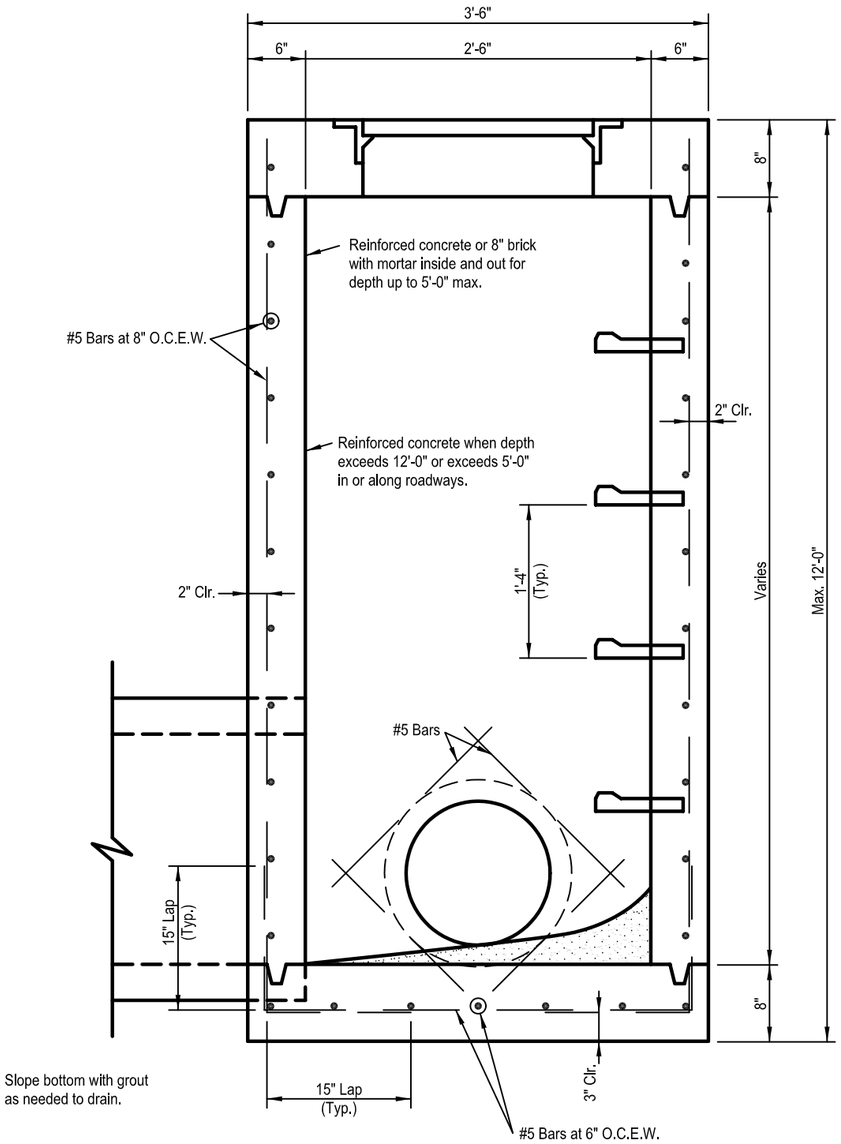
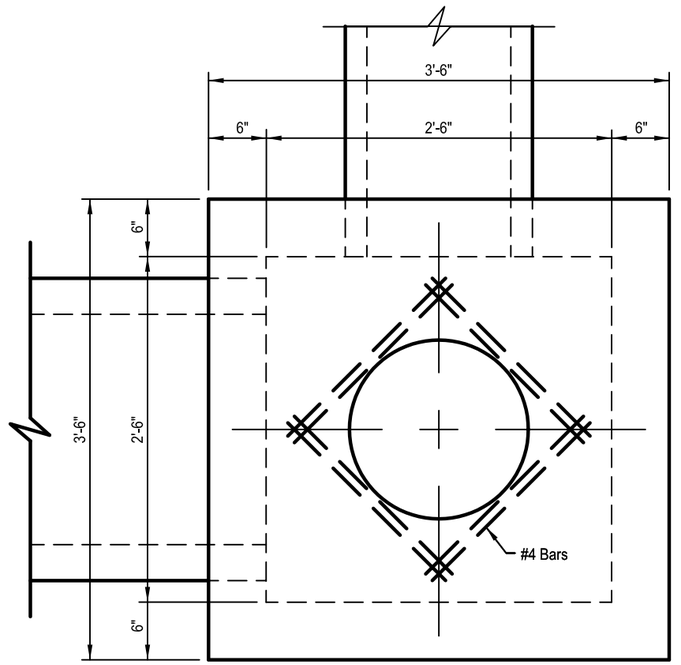


SECTIONAL VIEW



PLAN VIEW

NOTES

1. All concrete shall be class "A" and shall develop a minimum compressive strength of 3500 PSI in 28 days.
2. Reinforcing shall be grade 60 deformed bars and shall conform to ASTM requirements.
3. Steps are required on all Junction Boxes when dimensions from bottom of top slab to top of bottom slab is greater than 4'-0".

JUNCTION BOX FOR 15" TO 24" PIPES

NOT TO SCALE

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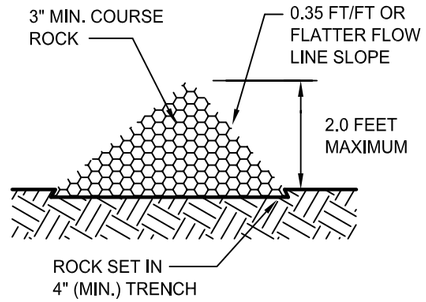
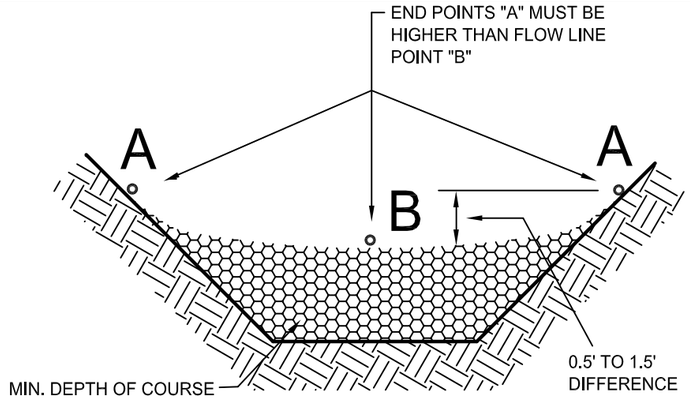
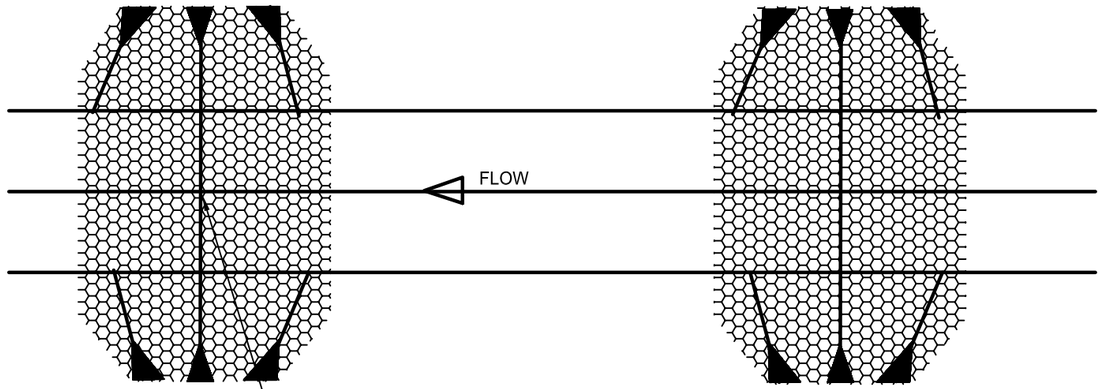


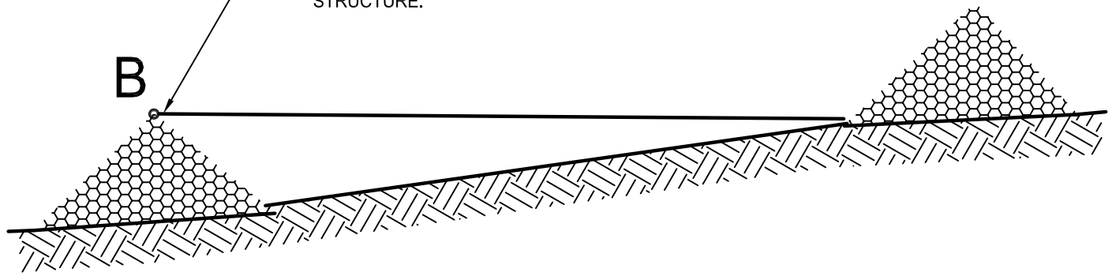
SIDE VIEW



FRONT VIEW



PLACE DOWNSTREAM STRUCTURE SUCH THAT POINT "B" IS APPROXIMATELY LEVEL WITH THE LOWEST GROUND ELEVATION OF THE UPSTREAM STRUCTURE.



D-50 OF ROCK (INCHES)	DOWNSTREAM FLOWLINE SLOPE OF STRUCTURE (FT/FT) 0.35 0.30 0.25 0.20 0.15 0.10 MAXIMUM WATER DEPTH OVER ROCK (INCHES)					
3	0.6	0.7	0.8	1.0	1.3	1.9
6	1.2	1.4	1.6	2.0	2.6	3.9

RECOMMENDED ROCK SIZE AND FLOW DEPTHS

ROCK CHECK DAM

NOT TO SCALE

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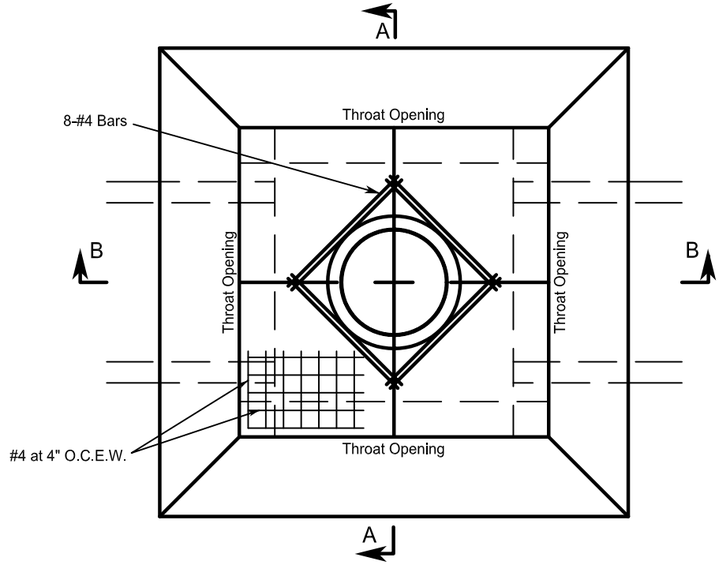
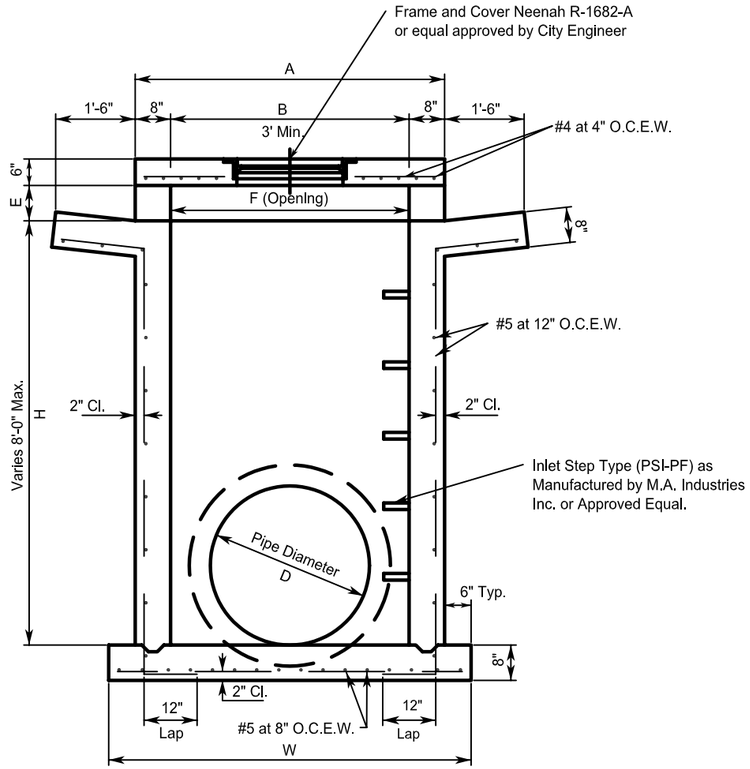
NOTES

1. Dimension "A" is determined by the largest diameter pipe entering the Open Throat Inlet.
2. Steps are required on all inlets when dimension from bottom slab flow line to top of top slab is greater than 4'-0".
3. All concrete shall be class "A" and shall develop a minimum compressive strength of 3500 PSI in 28 days.
4. Reinforcing shall be intermediate grade deformed bars and shall conform to the requirements of the Standard Specifications for billet steel concrete reinforcement bars,ASTM A-15 and deformations conforming to ASTM A-305.
5. When brick construction is used, walls will be 8" brick when "H" is less than 5'-0". Use 12" brick when "H"is more than 5'-0". Float with 1/2" mortar on both sides.
6. Provide concrete apron at throat openings.

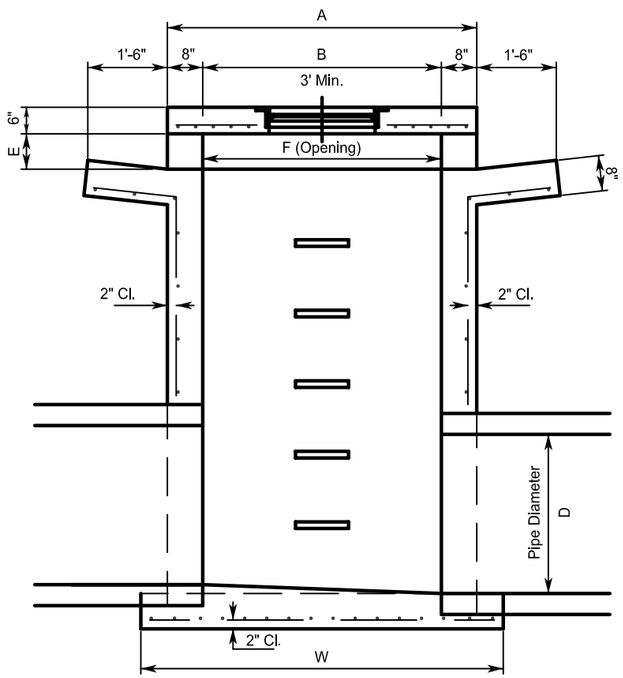
INLET DIMENSIONS					
Pipe Size	A	B & F	D	E	W
12"	4'-4"	3'-0"	12"	8"	5'-4"
15"	4'-4"	3'-0"	15"	8"	5'-4"
18"	4'-4"	3'-0"	18"	8"	5'-4"
21"	4'-6"	3'-2"	21"	8"	5'-6"
24"	4'-9"	3'-5"	24"	8"	5'-9"
30"	5'-4"	4'-0"	30"	8"	6'-4"
36"	5'-10"	4'-6"	36"	8"	6'-10"



PLAN VIEW



SECTION A-A



SECTION B-B

OPEN THROAT INLET

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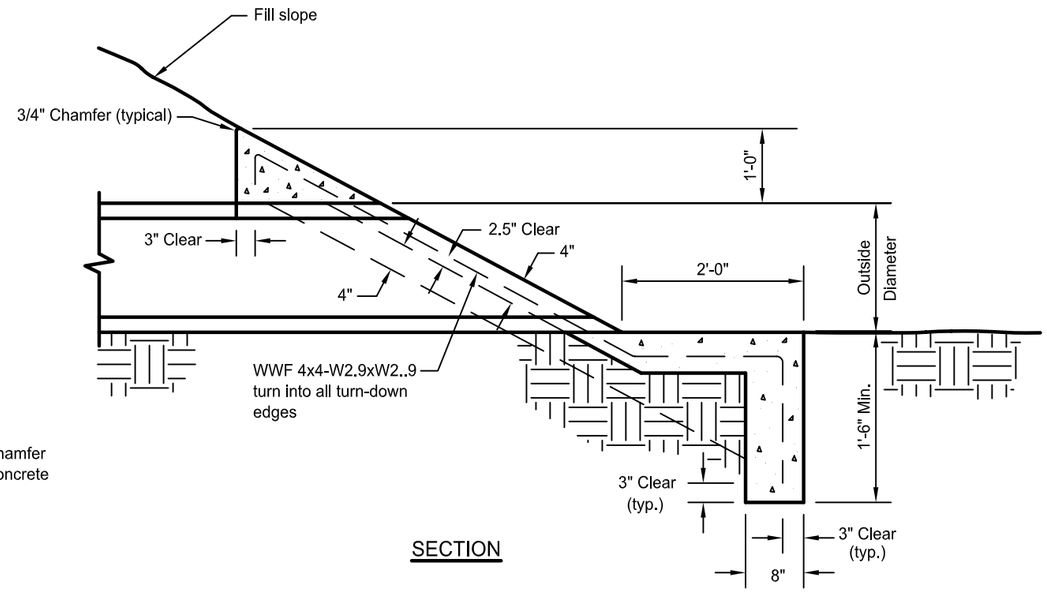
ELEVATION



SECTION

CONCRETE SLOPED PAVED ENDWALL

NOT TO SCALE

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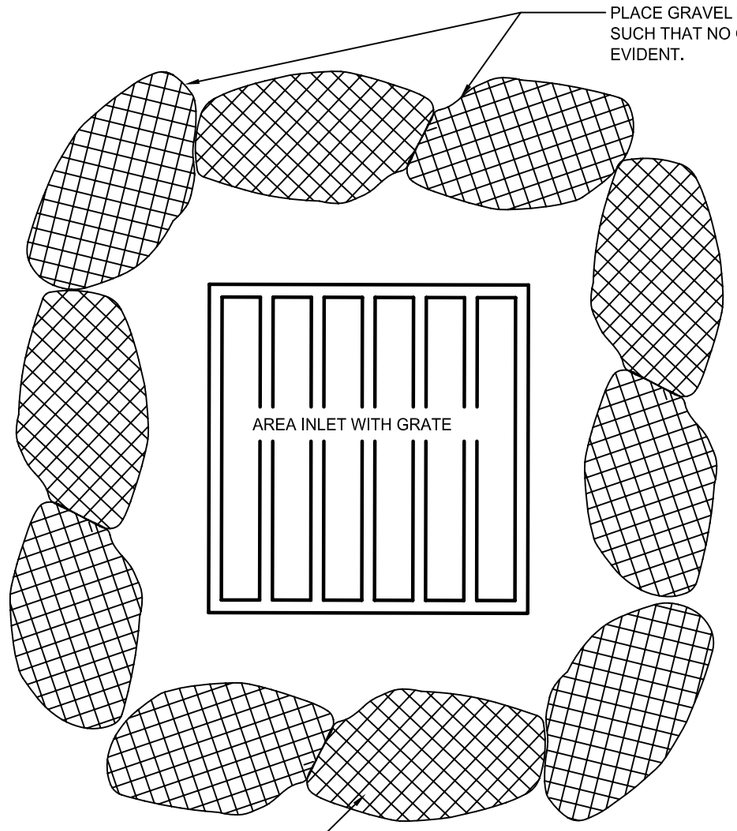
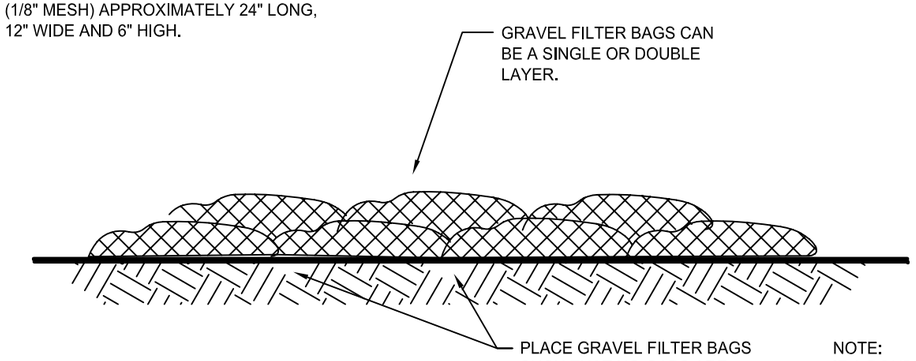
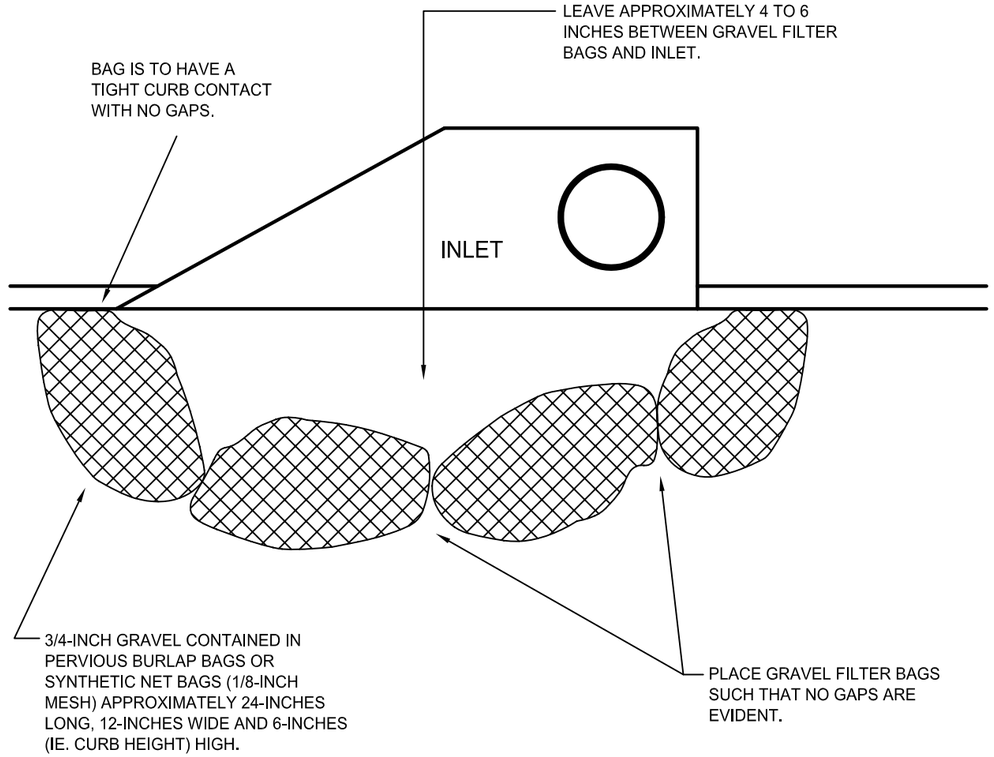
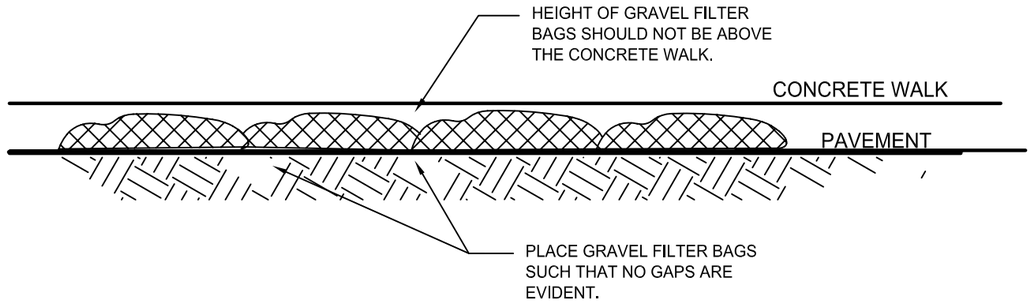




NOTE:
GRAVEL FILTER BAGS MAY BE USED ON PAVEMENT OR BARE GROUND.

NOTE:
IF A DOUBLE LAYER OF GRAVEL FILTER BAGS ARE USED, THE TOP BAGS MUST BE PLACED SUCH THAT NO GAPS ARE EVIDENT WITH THE LOWER LAYER OF BAGS.





FRONT VIEW

NOTE:
GRAVEL FILTER CAN BE USED ON PAVEMENT OR BARE GROUND.

GRAVEL BAG FILTER

NOT TO SCALE

CITY OF MUSCLE SHOALS	
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REV.	