

DEVELOPMENT STANDARDS



CITY OF GRANTVILLE, GEORGIA

Prepared: April 2023

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100. GENERAL INFORMATION

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101. Title

This document shall be known as "The City of Grantville Development Regulations," and may be referred to generally as "The Development Regulations," or as used herein, "these Regulations."

102. Purpose

These Regulations are intended to serve the following purposes:

1. To protect and promote the public health, safety, and general welfare.
2. To provide a system for the subdividing of land and the accurate recording of land titles.
3. To encourage economically sound and orderly land development in accordance with the policies and objectives of the comprehensive plan of the City.
4. To assure the provision of required streets, utilities, and other facilities and services to new land developments in the City.
5. To assure the adequate provision of safe and convenient traffic access and circulation, both vehicular and pedestrian, in new land developments in the City.
6. To assure the provision of needed public open spaces and building sites in new land developments in the City through the dedication or reservation of land for recreational, educational, and other public purposes.
7. To assure protection of streams, waterways, and wetlands within the City.
8. To assure equitable review and approval of all subdivision and site plans by providing uniform procedures and standards for the developer.

103. Intent

The intent and purpose of these Regulations is to provide for the harmonious development of the City and to insure a coordinated layout with adequate provisions for traffic, recreation, drainage, water, sewers, and other technical elements of land development. This control is necessary to assure the maximum return on the local and government investments and at the same time to assure the homeowner protection and the developer full consideration of his interests and responsibilities.

104. Use of Words and Interpretation

For the purpose of these Regulations, the following shall apply to the use of all words:

1. When appropriate to the context, words used in the singular shall include the plural, and the plural the singular; words used in the present tense shall include the future tense, and

vice versa.

2. Words in the masculine gender shall include the feminine.
3. The word "shall" is mandatory and not discretionary.
4. The word "may" is permissive.
5. Use of the word "and" is inclusive and requires that all of the component phrases so connected must be present or fulfilled for sufficiency.
6. Use of the word "or" is not exclusive and requires that at least one of the component phrases so connected must be present or fulfilled for sufficiency. The word "or" may allow more than one component phrase to be present or fulfilled, as is implied by the common term "and/or."

The following shall control the interpretation of words and phrases as used in these Regulations:

1. Words and phrases defined in these Regulations shall be interpreted as defined herein.
2. Words or phrases not defined herein shall be interpreted as defined in other ordinances and codes of the City. Words or phrases not defined in the above-mentioned documents shall have their customary dictionary definitions where not inconsistent with the context.

END OF SECTION 100

200. PLAN REVIEW AND GENERAL REQUIREMENTS

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201. Plan Review Procedure

201.1 Development Types

Plan review procedures are dependent on the type of the proposed development. There are three types of developments as follows:

- A. Subdivision developments (residential, commercial, and industrial) involving the subdividing of a tract or parcel of land into two lots or building sites.
- B. Subdivision developments (residential, commercial, and industrial) involving the subdividing of a tract or parcel of land into three or more lots or building sites.
- C. Non-subdivision commercial/industrial developments.

201.2 Stages of Residential Subdivision Development Plans Review:

Plan design, submittal, and review is divided into four stages which correspond to the following four types of plans:

- A. Preliminary Plat—Conceptual street and lot layout of subdivision with topography of not more than two-foot intervals. A plat review fee of \$200.00 shall be required at the time of submittal. No less than 20 working days prior to the next regular meeting of the planning commission, a letter addressed to the planning commission requesting review and approval of a preliminary plat shall be given to the Community Development office along with six copies of the plat for distribution. Upon approval of the plat by individual departments, six copies of the approved plat stamped by each department shall be submitted to the Community Development office to be distributed to the City Planning Commission for approval. Approval of a preliminary plat shall expire and be null and void after a period of 24 months from the date of approval unless an extension of time is approved by the Planning Commission. (A preliminary plat shall not be required of subdivisions on an existing street involving only two lots or building sites.

Preliminary subdivision plats shall contain the following information:

1. Subdivision Name.
2. Name, address and 24-hour phone number of developer.
3. Date including most recent revision date.
4. Graphic scale (not to exceed 1" = 100')
5. Location Index map (approximate scale 1" = 6,000')
6. North arrow.
7. Land lot, District and Section.
8. Maximum sheet size 24" x 36" unless otherwise approved.
9. Exact boundary lines of the entire tract indicated by a heavy line giving lengths and bearings.
10. Present zoning and zoning of abutting land.
11. Proposed street and lot layout.
12. Proposed street names.
13. Lot lines with approximate dimensions.
14. Location of bold lines for phased developments.
15. Lots numbered consecutively disregarding phasing.
16. General notes on the plat stating total project acreage, total number of lots and lot density, minimum size of lots, minimum lot width and frontage, and required setbacks for present zoning.
17. Existing streets, utilities, and easements on and adjacent to the tract.
18. Provisions for water supply, sewerage, and drainage.
19. Location of 100-year floodplain and Future Conditions floodplain or statement that no part of the property lies within the 100-year floodplain.
20. Minimum building front yard setback line shown graphically on the plat.
21. Surveyors and/or Engineer's Stamp.
22. Signature Statement for planning commission. Statement shall read as follows:

Preliminary Plat Approval Certificate

All requirements of the City Development Regulations relative to the preparation and submission of a Preliminary Plat having been fulfilled, approval of this plat is hereby granted subject to further provisions of said Regulations. This certificate is effective for 24 months from the date of signing unless a Final Plat is recorded.

Planning Commission Chairman *Date*

City Clerk *Date*

23. Any and all other information as may be required by the City.
24. Names of owners of record of adjoining properties.

- B. Construction Plans—Detailed design plans of proposed subdivision infrastructure improvements. Six sets of the construction plans shall be submitted to the Community Development office for distribution. A plan review fee of \$200.00 shall be required at the time of submittal. Upon approval of the plans, a stamped approved copy shall be given to each department and the developer sets up a pre-construction conference with the contractor(s) and the City departments mentioned herein. If any construction activity involves a state right-of-way, the developer must first contact Public Works and obtain Georgia D.O.T. approval before construction plans can be approved by the city.

Construction Plans shall contain the following information:

Road Design

1. Acceleration/deceleration lanes at entrance
2. Typical road section for all roads
3. Dimensions of turn radii.
4. Plan and profile of existing city or county road at proposed entrance with the City's minimum horizontal and vertical stopping sight distance requirements satisfied. The speed limit for the existing city or county road shall be shown.
5. If additional right-of-way is required to bring the City Road up to minimum standards, as shown on the current City Street Classification Map, the future right-of-way shall be shown on the plan. Setbacks shall be measured from the future right-of-way.
6. Proposed street profiles for all new streets.
7. Proposed street grades.
8. Proposed length of vertical curves.
9. Vertical stopping sight distance at all proposed internal subdivision intersections.
10. Street horizontal curve radii.
11. All radii, curb set back and taper details.
12. Typical construction details (curb and gutter, paving, etc.)
13. Street signs.

Storm Drainage

1. Topographic layout of development at two-foot contour intervals based on mean sea level datum with storm drain layout.
2. Location, size, and length of existing drainage structures with drainage area.
3. Description by registered engineer of downstream property showing the method of runoff control will not adversely affect the property downstream.
4. Location, size, length, and type of all proposed drainage structures.
5. Drainage area to each inlet point of the drainage system.
6. Ditch profiles.
7. Ditch cross-sections every 50 feet with velocity of runoff (no more than 5.0 fps without lining the ditch.)
8. Hydrology study by a state approved professional for detention ponds, if required.
9. The 100-year floodplain/Future Conditions floodplain limits and elevation or note absence.
10. Profile of storm drainage pipes.

11. All cross-drain pipes shown on the street profiles.
12. Water travel distance between catch basins.
13. Drainage at intersections indicated by flow arrows on plan sheet.
14. All drainage structure outlets to be erosion proofed.
15. Method of sizing all storm drainage structures.
16. Easements for drainage system—Minimum of ten feet for piped runoff, minimum of 20 feet for open ditches.
17. Dam breach zone shown if an existing or proposed permanent pond/lake is a part of the proposed subdivision.
18. Cul-de-sac grading detail for steep downhill cul-de-sacs.

Water Layout

1. Site plan with water layout only.
2. Pipe locations and sizes
3. Location and size of gate valves and air release valves.
4. Thrust blocks at all bends and tees.
5. Location of all existing and proposed fire hydrants.
6. Existing water main locations, sizes, and types of materials surrounding the project.
7. Detail of tap to water main.
8. Proposed meter sizes and locations.
9. Nearest existing line valves on main, in order to isolate tap.
10. Pressure flow-test results.
11. If proposed water line crosses private property, a 20-foot permanent easement is required.

Sewer Layout

1. EPD Sanitary Sewer Submittal Form filled out by registered engineer.
2. Site plan showing sewer layout.
3. Sewer layout should have manhole numbers, line designations, flow arrows, street names, and topography.
4. Sewer layout showing proposed storm drain crossings.
5. Detail tie-in of proposed lines with existing lines as to elevation and invert direction of manholes.
6. Profile of proposed sewer lines.
7. Manhole numbers and locations.
8. Outside drop-manhole designated.
9. Percent grade, length, size of lines.
10. Lateral locations.
11. Materials to be used.
12. Location in profile of streams and storm drains.
13. Easements to be 20-foot permanent and 60-foot for temporary construction.
14. Easements for future sewers if required.
15. Bedding details.

Additional Requirements:

1. Preliminary plat submitted with construction plans.
 2. Sidewalks.
 3. Show location of all wells within 100 feet of property or certify that there are no wells, if lots are served by septic tank.
 4. Names of all utility companies.
 5. Erosion control plan.
 6. Tree protection plan.
 7. Show location of any landfills or debris or garbage disposal sites on the property.
 8. Additional Notes Below:
 - a. It is the developer's responsibility to address any wetland issues to the satisfaction of the U.S. Army Corps of Engineers.
 - b. It is the developer's responsibility to abide by all the rules and regulations pertaining to the State of Georgia's National Pollutant Discharge Elimination System (NPDES) permit requirements.
 - c. It is the developer's responsibility to abide by all the rules and regulations pertaining to the U.S. Fish and Wildlife Service if applicable.
- C. Erosion and Sediment Control Plans—A plan for the control of soil erosion and sedimentation resulting from a land-disturbing activity involving the disturbance of 1.0 acres or greater. Said plans are a part of the requirements for a Land Disturbance Permit. An approved copy of this plan must be provided to all departments as part of the construction plan review process.
- D. Final Plat—Plan of subdivision which conforms to the approved preliminary plat and the specifications required herein for recording at the Clerk of Superior Court. A plat review fee of \$300.00 shall be required at the time of submittal. Prior to the submittal of the final plat for review, the following shall apply: 1.) All street and utility construction must be completed, inspected and approved; 2.) All property corner pins must be installed; 3.) As-built drawings must be submitted; and 4.) Bonding requirements, if applicable, satisfied. six copies of the final plat and as-built drawings shall be submitted to the Community Development office for distribution. Once the signatures of approval from the designated City Departments have been obtained on the final plat, the developer shall submit the plat to the Clerk of Superior Court for recording. Upon recording of the final plat, the developer shall provide four hard copies of the plat to the Community Development office. An electronic version of the final plat shall be provided in AutoCAD format to the Community Development office.

The Final Plat shall contain the following information:

1. Sheet size no larger than 18" x 24"
2. Exact boundary lines of the tract by bearings and distances determined by a field survey.
3. Field survey error of closure not to exceed one to 10,000.
4. Equipment used in field survey.
5. Calculated error of closure of plat.
6. Present zoning and zoning of abutting land.

7. Exact locations, R/W widths, and names of all streets that immediately adjoin the subdivision.
8. Appropriate data for all streets, lot lines, and centerlines as required by the city and according to the requirements of the State of Georgia for professional surveyors and engineers.
9. General notes on the plat stating total project acreage, total number of lots and lot density, minimum size of lots, minimum lot width and frontage, and required setbacks for present zoning. All zoning stipulations, if any, must also be on the plat.
10. Lots shall be numbered consecutively; divisions shall be made by units or phases.
11. Each lot's area in square feet or acres.
12. Deed book and page number of protective covenants if any.
13. Accurate location, material, and description of all monuments and markers.
14. Location of sidewalks.
15. Show all Storm lines on plat.
16. Location of all easements.
17. Required buffers and recreational areas (if any).
18. Land lot lines accurately tied to the lines of the subdivision by distance and angles when such lines traverse or are reasonably close to the subdivision.
19. All surveys and plats must be prepared by a state certified engineer and/or surveyor.
20. Location of 100-year floodplain and Future Conditions floodplain or statement that no part of the property lies within the 100-year floodplain.
21. The following certificate statements shall be shown on the plat:

Owner's Certificate

The owner of the land shown on this plat and whose name is subscribed hereto, in person or through a duly authorized agent, certifies that this plat was made from an actual survey, that all state, city and county taxes or other assessments now due on this land have been paid, that all streets, water systems drains and drainage easements, and public places are dedicated to the use of the public forever.

Owner

Date

Surveyor's Certificate

It is hereby certified that this plat is true and correct and was prepared from an actual survey of the property by me or under my supervision, that all monuments shown hereon actually exist or are marked "future" and their location, size, type and material are correctly shown, and that all requirements of the development and zoning regulations have been fully complied with.

Surveyor

Date

City Certificate

In accordance with the City Development Regulations and the City's Zoning Ordinance, all requirements of approval have been fulfilled; this plat was given final approval by the following City officials and personnel and on behalf of the City:

Planning Commission Chairman

Date

Community Development Director

Date

Mayor

Date

Covenants, if separately recorded

This plat is subject to the covenants set forth in the separate document(s) attached hereto dated, which hereby become a part of this plat, and which were recorded in plat book Page.

22. Any and all other information as required by the city.

201.3 Stages of Commercial/Industrial Subdivision Plan Reviews:

Plan design, submittal, and review is divided into 4 stages which corresponds to the following four types of plans:

- A. Preliminary Plat conceptual street and lot layout of subdivision with topography of not more than two-foot intervals. A plat review fee of \$200.00 shall be required at the time of submittal. No less than 20 working days prior to the next regular meeting of the planning commission, a letter addressed to the planning commission requesting review and approval of a preliminary plat shall be given to the Community Development office along with six copies of the plat for distribution. Upon approval of the plat by individual departments, six copies of the approved plat stamped by each department shall be submitted to the Community Development office to be distributed to the City Planning Department for approval. Approval of a preliminary plat shall expire and be null and void after a period of 24 months from the date of approval unless an extension of time is approved by the Planning Commission. (A preliminary plat shall not be required of subdivisions on an existing street involving only two lots or building sites.

Preliminary subdivision plats shall contain the following information:

- 1. Subdivision Name.
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- 3. Date including most recent revision date.
- 4. Graphic scale (not to exceed 1"=100')
- 5. Location Index map (approximate scale 1"=6,000')

6. North arrow.
7. Land lot, District and Section.
8. Maximum sheet size 24" x 36" unless otherwise approved.
9. Exact boundary lines of the entire tract indicated by a heavy line giving lengths and bearings.
10. Present zoning and zoning of abutting land.
11. Proposed street and lot layout.
12. Proposed street names.
13. Lot lines with approximate dimensions.
14. Location of bold lines for phased developments.
15. Lots numbered consecutively disregarding phasing.
16. General notes on the plat stating total project acreage, total number of lots and lot density, minimum size of lots, minimum lot width and frontage, and required setbacks for present zoning.
17. Existing streets, utilities, and easements on and adjacent to the tract.
18. Provisions for water supply, sewerage, and drainage.
19. Location of 100-year floodplain and Future Conditions floodplain or statement that no part of the property lies within the 100-year floodplain.
20. Minimum building front yard setback line shown graphically on the plat.
21. Surveyors and/or Engineer's Stamp.
22. Signature Statement for Planning Commission. Statement shall read as follows:

Preliminary Plat Approval Certificate

All requirements of the City Development Regulations relative to the preparation and submission of a Preliminary Plat having been fulfilled, approval of this plat is hereby granted subject to further provisions of said Regulations. This certificate is effective for 24 months from the date of signing unless a Final Plat is recorded.

Planning Commission Chairman *Date*

City Clerk *Date*

23. Any and all other information as may be required by the City.
 24. Names of owners of record of adjoining properties.
- B. Construction Plans detailed design plans of proposed subdivision infrastructure improvements. Six sets of the construction plans shall be submitted to the Community Development office for distribution. A plan review fee of \$500.00 shall be required at the time of submittal. Upon approval of the plans, a stamped approved copy shall be given to each department and the developer sets up a pre-construction conference with the contractor(s) and the City departments mentioned herein. If any construction activity involves a state right-of-way, the

developer must first contact Public Works and obtain Georgia D.O.T. approval before construction plans can be approved by the city.

Construction Plans shall contain the following information:

Road Design

1. Acceleration/deceleration lanes at entrance
2. Typical road section for all roads
3. Dimensions of turn radii.
4. Plan and profile of existing city or county road at proposed entrance with the City's minimum horizontal and vertical stopping sight distance requirements satisfied. The speed limit for the existing city or county road shall be shown.
5. If additional right-of-way is required to bring the City Road up to minimum standards, as shown on the current City Street Classification Map, the future right-of-way shall be shown on the plan. Setbacks shall be measured from the future right-of-way.
6. Proposed street profiles for all new streets.
7. Proposed street grades.
8. Proposed length of vertical curves.
9. Vertical stopping sight distance at all proposed internal subdivision intersections.
10. Street Horizontal curve radii.
11. All radii, curb set back and taper details.
12. Typical construction details (curb and gutter, paving, etc.)
13. Street signs.

Storm Drainage

1. Topographic layout of development at two-foot contour intervals based on mean sea level datum with storm drain layout.
2. Location, size, and length of existing drainage structures with drainage area.
3. Description by registered engineer of downstream property showing the method of runoff control will not adversely affect the property downstream.
4. Location, size, length, and type of all proposed drainage structures.
5. Drainage area to each inlet point of the drainage system.
6. Ditch profiles.
7. Ditch cross-sections every 50 feet with velocity of runoff (no more than 5.0 fps without lining the ditch.)
8. Hydrology study by a state approved professional for detention ponds, if required.
9. The 100-year floodplain and Future Condition floodplain limits and elevation or note absence.
10. Profile of storm drainage pipes.
11. All cross-drain pipes shown on the street profiles.
12. Water travel distance between catch basins.
13. Drainage at intersections indicated by flow arrows on plan sheet.
14. All drainage structure outlets to be erosion proofed.
15. Method of sizing all storm drainage structures.

16. Easements for drainage system - minimum of ten feet for piped runoff, minimum of 20 feet for open ditches.
17. Dam breach zone shown if an existing or proposed permanent pond/lake is a part of the proposed subdivision.
18. Cul-de-sac grading detail for steep downhill cul-de-sacs.

Water Layout

1. Site plan with water layout only.
2. Pipe locations and sizes
3. Location and size of gate valves, air release valves.
4. Thrust blocks at all bends and tees.
5. Location of all existing and proposed fire hydrants.
6. Existing water main locations, sizes, and types of materials surrounding the project.
7. Detail of tap to water main.
8. Proposed meter sizes and locations.
9. Nearest existing line valves on main, in order to isolate tap.
10. Pressure flow-test results.
11. If proposed water line crosses private property, a 20-foot permanent easement is required.

Sewer Layout

1. EPD Sanitary Sewer Submittal Form filled out by registered engineer.
2. Site plan showing sewer layout.
3. Sewer layout should have manhole numbers, line designations, flow arrows, street names, and topography.
4. Sewer layout showing proposed storm drain crossings.
5. Detail tie-in of proposed lines with existing lines as to elevation and invert direction of manholes.
6. Profile of proposed sewer lines with:
7. Manhole numbers and locations.
8. Outside drop-manhole designated.
9. Percent grade, length, size of lines.
10. Lateral locations.
11. Materials to be used.
12. Location in profile of streams and storm drains.
13. Easements to be 20-foot permanent and 60-foot for temporary construction.
14. Easements for future sewers if required.
15. Bedding details.

Additional Requirements:

1. Preliminary plat submitted with construction plans.
2. Sidewalks.
3. Show location of all wells within 100 feet of property or certify that there are no wells, if lots are served by septic tank.

4. Names of all utility companies.
 5. Erosion control plan.
 6. Tree protection plan.
 7. Show location of any landfills or debris or garbage disposal sites on the property.
 8. Additional Notes Below:
 1. It is the developer's responsibility to address any wetland issues to the satisfaction of the U.S. Army Corps of Engineers.
 2. It is the developer's responsibility to abide by all the rules and regulations pertaining to the State of Georgia's National Pollutant Discharge Elimination System (NPDES) permit requirements.
 3. It is the developer's responsibility to abide by all the rules and regulations pertaining to the U.S. Fish and Wildlife Service if applicable.
- C. Erosion and Sediment Control Plans A plan for the control of soil erosion and sedimentation resulting from a land-disturbing activity involving the disturbance of 1.0 acres or greater. Said plans are a part of the requirements for a Land Disturbance Permit. An approved copy of this plan must be provided to all departments as part of the construction plan review process.
- D. Final Plat plan of subdivision which conforms to the approved preliminary plat and the specifications required herein for recording at the Clerk of Superior Court. A plat review fee of \$300.00 shall be required at the time of submittal. Prior to the submittal of the final plat for review, the following shall apply: 1.) All street and utility construction must be completed, inspected and approved; 2.) All property corner pins must be installed; 3.) As-built drawings must be submitted; and 4.) Bonding requirements, if applicable, satisfied. six copies of the final plat and as-built drawings shall be submitted to the Community Development office for distribution. Once the signatures of approval from the designated City Departments have been obtained on the final plat, the developer shall submit the plat to the Clerk of Superior Court for recording. Upon recording of the final plat, the developer shall provide four hard copies of the plat to the Community Development office. An electronic version of the final plat shall be provided in AutoCAD format to the Community Development office.

The Final Plat shall contain the following information:

1. Sheet size no larger than 18" x 24"
2. Exact boundary lines of the tract by bearings and distances determined by a field survey.
3. Field survey error of closure not to exceed one to 10,000.
4. Equipment used in field survey.
5. Calculated error of closure of plat.
6. Present zoning and zoning of abutting land.
7. Exact locations, R/W widths, and names of all streets that immediately adjoin the subdivision.
8. Appropriate data for all streets, lot lines, and centerlines as required by the city and according to the requirements of the State of Georgia for professional surveyors and engineers.

9. General notes on the plat stating total project acreage, total number of lots and lot density, minimum size of lots, minimum lot width and frontage, and required setbacks for present zoning.
10. Lots shall be numbered consecutively; divisions shall be made by units or phases.
11. Each lot's area in square feet or acres.
12. Deed book and page number of protective covenants if any.
13. Accurate location, material, and description of all monuments and markers.
14. Location of sidewalks.
15. Location of all easements.
16. Required buffers and recreational areas (if any).
17. Land lot lines accurately tied to the lines of the subdivision by distance and angles when such lines traverse or are reasonably close to the subdivision.
18. All surveys and plats must be prepared by a state certified engineer and/or surveyor.
19. Location of 100-year floodplain and Future Conditions floodplain or statement that no part of the property lies within the 100-year floodplain.
20. The following certificate statements shall be shown on the plat:

Owner's Certificate

The owner of the land shown on this plat and whose name is subscribed hereto, in person or through a duly authorized agent, certifies that this plat was made from an actual survey, that all state, city and county taxes or other assessments now due on this land have been paid, that all streets, water systems drains and drainage easements, and public places are dedicated to the use of the public forever.

Owner

Date

Surveyor's Certificate

It is hereby certified that this plat is true and correct and was prepared from an actual survey of the property by me or under my supervision, that all monuments shown hereon actually exist or are marked "future" and their location, size, type and material are correctly shown, and that all requirements of the development and zoning regulations have been fully complied with.

Surveyor

Date

City Certificate

In accordance with the City Development Regulations and the City's Zoning Ordinance, all requirements of approval have been fulfilled; this plat was given final approval by the following City officials and personnel and on behalf of the City:

Planning Commission Chairman

Date

Community Development Director

Date

Mayor

Date

Covenants, if separately recorded

This plat is subject to the covenants set forth in the separate document(s) attached hereto dated, which hereby become a part of this plat, and which were recorded in plat book Page.

21. Lots, lot areas and lot numbers are optional at the discretion of the developer. If lots are included, the exact boundaries shall be shown by bearing and distances as determined by a field survey, and corners shall be marked on the ground with appropriate permanent monumentation.
22. Any and all other information as required by the City.

201.4 Commercial/Industrial Site Development Plans

- A. For individual commercial or industrial sites not within a Commercial or Industrial Subdivision, only construction plans are designed and submitted for review for this type of development. six sets of plans shall be submitted to the Community Development office to be distributed to other City departments. A plan review fee of \$500.00 shall be required at the time of submittal. Upon approval of the plans by individual departments, each department retains a copy of the approved stamped plans.
- B. For individual commercial or industrial sites within a Commercial or Industrial Subdivision Development, the same requirements as in A above may be submitted only after approval by the City and recording of the Final Plat for the development.

201.5 Plan Approval

- A. Approval of construction plans shall expire 18 months from the date of approval without the issuance of a building permit from the City.
- B. If a discrepancy occurs between the approved plans and the City's development standards, unless a variance or exception has been obtained, the Development Standards shall be the superseding document.

202. Permits

202.1 Subdivisions

The Community Development office issues the following permits for the construction of a subdivision:

- A. Land Disturbance Permit. After the approval of the construction plans, this permit is issued for the implementation of erosion control measures as shown on the approved construction plans for projects.

202.2 Sites not involving the subdividing of land

The Department of Community Development issues the following two permits for the construction of sites:

- A. Land Disturbance Permit. After the approval of the construction plans, this permit is issued for the implementation of erosion control measures as shown on the approved construction plans for all projects.
- B. Building Permit. This permit is issued for the construction of proposed buildings. The building permit is issued after the site construction plans are approved, the building architectural plans are approved, and the Land Disturbance Permit is issued (if applicable). Appropriate permit fees shall apply.

202.3 Driveway Permits

A review will be required of all new driveway cuts on public right-of-way for the purpose of ensuring the requirements of these Regulations are complied with and to determine if additional right-of-way improvements will be needed to be made by the property owner in order that the public right-of-way will accommodate the proposed vehicular use of said new driveway. When a building permit or land disturbance permit is required, the driveway permit will be incorporated into said permits and no additional fees will be required. When no other permits are required, a permit fee of \$50.00 will be required.

202.4 Pavement Cut Permit

A permit will be required prior to any work being done involving the cutting of any existing public right-of-way pavement. Said permit will be issued by the City Public Works Department. (No permit fee is required).

203. Construction

203.1 Pre-construction Conference

The developer is required to schedule a meeting with the Community Development office and all public and/or private utilities for the purpose of discussing the construction and inspection of the proposed development. The pre-construction conference is required before the issuance of any permits unless waived by all affected City Departments.

203.2 Approved Plans

An approved set of construction plans stamped by the City must be kept onsite at all times by the Contractor.

203.3 Notification

The City shall be notified by the developer or his/her contractor before construction begins, and at the various stages in construction required by the City. The City shall be given a two business days advance notice before construction begins. The appropriate department as outlined in Section 204 of these Regulations will be directly notified for an inspection request.

204. Inspections

204.1 Subdivisions

- A. Public Works Department. This department is responsible for inspection of roads, storm drainage, and grading construction.
- B. Water Department. This department is responsible for inspection of water and sanitary sewer construction.
- C. Community Development office. The Building Official in this department is responsible for inspection of erosion control construction.
- D. And any other appropriate City department whose inspections are necessary to ensure compliance with the Ordinance of the City.
- E. The City reserves the right to charge an inspection fee consistent with an approved fee schedule set by Mayor and Council.

204.2 Commercial/Industrial Sites not involving the subdividing of land

- A. Public Works Department. This department is responsible for inspection of entrance, storm drainage, and grading construction.
- B. Water Department. This department is responsible for inspection of water, sanitary sewer, and fire line for sprinkler system construction to the double detector check meter and vault. Construction of sanitary sewers onsite within sewer easements or offsite within the public rights-of-way are inspected by this department. Sanitary sewer services outside easements will be inspected by the Building Department. Water line construction up to and including water meters will be inspected by this department. Water line construction downstream of the meters (with the exception of the fire sprinkler system) will be inspected by the Building Department.
- C. Community Development office. This department is responsible for inspection of erosion control, parking layout and landscaping.

- D. And any other appropriate City department whose inspections are necessary to ensure compliance with the ordinances of the City.
- E. The City reserves the right to charge an inspection fee consistent with an approved fee schedule set by Mayor and Council

205. As-Builts

As-builts shall be required before the final plat is recorded for subdivisions or before a certificate of occupancy is issued for commercial/industrial sites. All as-built drawings must be on standard 24" X 36" sheets with a maximum scale of 1" = 50'. Electronic files must also be submitted in AutoCAD format with water, sewer and storm system all on separate layers in State Plane Coordinates as described as follows:

- A. The water system as-builts shall show locations of fire hydrants, line valves, tees, water main sizes, and types of materials.
- B. The sanitary sewer system as-builts shall show locations of manholes, lines, services, line sizes, types of materials, manhole inverts, and line grades.
- C. Street and storm sewer as-builts shall show street layout, profiles, and grades, storm sewers and sizes, storm drainage structures, and detention ponds.
- D. Commercial site layout as-builts in addition to water, sanitary sewer, and storm sewer as-builts shall include, but not be limited to, the following final locations of building(s), entrance(s), parking, and grading on computer disk format (if feasible).
- E. Sprinkler system as-builts with head count.

As-builts must also comply with all requirements as described in Section 600 of these Development Standards.

206. Maintenance Bond, Letters of Credit, and Performance Bond

- A. The Developer, after completion of construction to the standards of these regulations, must obtain written approval of said construction by the City before recording the Final Plat or final approval by the City.
- B. The maintenance bond or Letter of Credit covers the cost of maintaining the project for a period of 18 months from the date the City issues approval of the final plat or project.
- C. The City shall determine the amount of the bond or Letter of Credit based upon the type of project and the total cost which shall be a minimum of 25 percent of the total cost of the project. Maintenance bonds or Letter of Credits are only required for projects whose total project cost exceeds \$20,000.00. The appropriate legal representative shall approve the bond or Letter of Credit as to form. The bond or Letter of Credit shall be payable to the City.

- D. In cases where work on City right-of-way is required (i.e., Accel/decel lanes at development entrances), the City shall require a performance bond to cover the cost of estimated construction within the right-of-way. The performance bond amount shall be determined by the City Engineer. The bond term will be one year from the issuance of the Land Disturbance Permit. If the construction covered by the bond fails to be completed within this time frame, the City will access the bond and complete the work.

207. Eighteen Month Maintenance.

- A. The developer shall maintain the improvements in his/her development for a period of 18 months from the date the City issues approval of the Final Plat. At the end of the 18-month maintenance period, the City shall perform an inspection of the development and all improvements. The developer shall be notified by the City of the inspection results in writing within 15 days from the date of the inspection. The maintenance bond shall be released upon the issuance of a letter stating approval of the development by the City. (The final plat shall note said maintenance period and note the date that street dedication to the City shall occur).
- B. If repairs are needed at the end of the 18-month maintenance period in order for the improvements to meet City specifications, the developer shall be required to make such repairs within 60 days, after written notification by the City. If the repairs are not completed within said time, and the developer fails to show a legitimate hardship, as determined by the City, which inhibits the completion of the repairs, the maintenance bond shall be called in to pay for the repairs. Should the amount of the maintenance bond be inadequate to pay for the repairs, the developer shall pay the remaining amount. The following procedures shall apply in this situation:
 - 1. The City shall notify the developer in writing of such action.
 - 2. Upon completion of necessary maintenance repairs, the developer shall request in writing to the City for inspection of the maintenance repairs. The City shall make said inspection and in turn notify the developer of the inspection results.
- C. If the work is free from defects, and the improvements are in compliance with City specifications, the City shall provide written approval to the developer of said compliance and the maintenance bond shall be released. Bonds are to be written where the City must release the bond in writing. Bond expiration dates for release are not acceptable.

208. Certificate of Dedication and Maintenance Agreement.

Upon issuance of the maintenance bond as provided above, the developer shall execute a certificate of Dedication and Maintenance Agreement as provided by the City. All streets and right-of-way shown upon the final plat, together with all other public improvements shall be dedicated to the City either in fee simple or by perpetual easement, as appropriate. The Certificate of Dedication shall be recorded by the developer in the office of the Clerk of Superior Court. The developer shall also furnish to the City an opinion by an attorney acceptable to the City that title records have been examined and that

marketable fee simple title was vested in the developer at time of recording of the Certificate. The City reserves the right to refuse said dedication for reasons related to construction or maintenance.

The Maintenance Agreement shall obligate the developer, his/hers, successors and assigns to maintain the streets and improvements for a period of 18 months from date of written acceptance by the City and to correct or repair the same as required in this Section. Said acceptance being the date of Final Plat approval. Furthermore, the developer his/her successors and assigns, shall agree to hold the City harmless and indemnify the City from liabilities arising from defects in design, installation and/or maintenance during the 18-month period.

Upon submission of the Certificate of Dedication and Maintenance Agreement, a recordable executed easement shall be provided to the City for all easements to be dedicated to the City.

Insurance Requirements:

- A. Prior to the issuance of any permit which includes the construction or installation of infrastructure to be dedicated to the City within rights-of-way, easements, or other property either owned by, to be dedicated, conveyed, or used by the City, said contractor, property owner, or entity working on said property for himself/herself and for all subcontractors must provide the City a liability insurance certificate of \$1,000,000.00 in general liability insurance listing the City as a co-insured or indicating that coverage under said policy is provided for the City.
- B. Said certificate shall be presented to the City Manager prior to the issuance of any construction related permits and must be approved by him prior to the issuance of any construction related permits.

209. Model Home Permit.

The City at its discretion may approve up to two model home permits per residential subdivision development with the following stipulations:

- A. The streets of the development should be sufficiently complete having Graded Aggregate Base (GAB) in place to avoid the tracking of mud onto adjacent streets.
- B. A working fire hydrant must be within 250 linear feet of the model home site.
- C. Final connection to all utilities must be postponed until final platting is complete and recorded.

END OF SECTION 200

300. GENERAL DESIGN REGULATIONS

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301. General

301.1 Enforcement

The Community Development Office and/or the Public Works Department of the City shall be responsible for the enforcement, issuance of permits, and all other requirements contained in this article.

301.2 Use of this Document

- A. This document is subject to periodic revision to meet changing requirements for materials, state and federal regulations, etc. At the beginning of a project the user should verify that he/she has the latest edition.
- B. This document is intended to convey the general design and construction requirements for a typical project. It also lists the specific City requirements relating to plan review, inspection, testing and acceptance of facilities. It is not intended as a substitute for site-specific engineering and construction techniques.

302. Definitions

When used in this ordinance, the following words and phrases shall have the meanings given in this section. Terms not herein defined shall have their customary dictionary definitions where not inconsistent with the context. The term "shall" is mandatory. When not inconsistent with the context, words in the singular number include the plural and those used in the plural number include the singular. Words used in the present tense include the future.

As-Built Drawing: A survey or other drawing based on a field survey which shows existing features or components and horizontal or vertical information (grades or location of improvements). All as-built information submitted to the City in the form of electronic files must be in AutoCAD format and be drawn using State Plane Coordinates.

Block: A piece or parcel of land entirely surrounded by public highways or streets other than alleys. In cases where the plotting is incomplete or disconnected, the sub-divider may determine the outline of the block.

Building Line: Refer to the Zoning Ordinance for the City.

Clearing: The removal of trees or other vegetation, but not including grubbing activities.

Comprehensive Plan: City Comprehensive Plan, as amended.

Construction Plans: A set of engineering drawings of the proposed streets, drainage, and utilities as set forth in Article II in the "Subdivision Construction Plan Checklist."

Contractor: A person, firm, or corporation with whom the owner of a property has employed or contracted to perform construction activity associated with the development. For purpose of this ordinance the term contractor shall include all subcontractors who are under separate contract or agreement with the contractor for performance of a part of the work at the site.

Cul-de-Sac Street: A street having one end open to traffic and being permanently terminated within the development by a vehicular turnaround. For the purpose of designation, a cul-de-sac street shall be interpreted to begin at the intersection of two or more streets nearest to the vehicular turnaround.

Developer: Any person, individual, firm, partnership, association, corporation, estate, trust, or any other group or combination acting as a unit who directs the undertaking or proposes to undertake development activities whether the development involves the subdivision of the land for sale to individual users, the construction of buildings or other improvements on a single land ownership, or both.

Drainage Way: An area designated for the conveyance of storm water runoff through real property, including both natural and man-made areas.

Easement: Recorded authorization for a specified purpose by a property owner for the use of any designated part of the real property by another entity.

Final Plat: A plat of a tract of land which meets the requirements of the City for permanent recording in the office of the Clerk of Superior Court.

Frontage: Refer to "Lot Frontage" in the Zoning Ordinance for the City.

Georgia DOT: The Department of Transportation of the State of Georgia.

Grading: The movement, removal or addition of earth on a site by the use of mechanical equipment.

Grubbing: The removal of stumps or roots from a property.

Health Department: The County Health Department.

Industrial Development: Any development that will contain a loading dock or will be subject to frequent truck traffic.

Lot: A lot of record, or any combination of lots of record, held in a single ownership by one person, or in common ownership by more than one, which has both lot area and lot dimensions equal to or greater than the lot width and lot area requirements established by the City Zoning Ordinance for the zoning district in which such tract of land is located and for the use proposed for the tract of land.

Lot Width: The horizontal distance between the side lines of a lot measured at right angles to its depth along a straight line parallel to the front lot line at the minimum required building setback line.

Mean Sea Level: The average height of the sea for all stages of the tide. It is used as a reference for establishing various elevations within the floodplain. For purposes of these Regulations, the term is synonymous with the National Geodetic Vertical Datum (NGVD). All topographic information submitted to the City as part of a proposed development must be reduced to Mean Sea Level, temporary benchmark data will not be accepted.

Preliminary Plat: An overall layout of the proposed development usually shown on one sheet which meets the minimum standards of the City.

Project: A principal building or structure, or group of buildings or structures, planned and designed as an interdependent unit together with all accessory uses or structures, utilities, drainage, access, and circulation facilities, whether built in whole or in phases. Examples include but are not limited to: a principal building on a lot, a residential subdivision, a multi-family development, a shopping center, or an office park.

Responsible Party: In the context of enforcement procedures, a person who is alleged to have committed, caused, continued or created a violation of the terms, requirements, regulations, or provisions of these Regulations whether as a direct act, through lack of action, through neglect, or at the direction of or on behalf of others. A responsible party may be the owner of a premises where a violation has occurred; an occupant whether through ownership, lease or other tenancy; a contractor, builder or developer; an agent of or person otherwise acting on behalf of the aforementioned parties; or other person acting in violation of these regulations.

Street Classification Map: A comprehensive plan of arterial, major collector, minor collector, and local streets and roads for all or a portion of the City.

Site Work: Development activity to prepare a property for construction of buildings or finished structures, including clearing, grubbing, grading, and installation of soil sedimentation and erosion control facilities.

Street Classification: Will be defined according to the City Street Classification Map but are described in general as follows:

1. *Arterial*: A street having a minimum right-of-way of 100 feet, and which is used primarily for fast and heavy traffic flow, is of considerable continuity, and is used as a traffic artery for inter-transportation between large areas.
2. *Major Collector*: A street having a minimum right-of-way of 80 feet, and which carries traffic from activity centers and minor collector streets to arterial streets.
3. *Minor Collectors*: A street having a minimum right-of-way of 60 feet, and which is primarily used as a link between local streets and major collectors or arterial streets.
4. *Local*: A street having a minimum right-of-way of 50 feet, and which is used primarily in residential subdivisions for access to abutting properties as opposed to the collection and disbursement of traffic.

Sub-divider: Any person, corporation or duly authorized agent, planner, designer, land surveyor, (landscape) architect or engineer, who undertakes the subdivision of land as defined herein.

Subdivision: Any division of a tract or parcel of land into two or more lots, building sites, or other parts for the purpose of immediate or future sale, legacy, or building development. The term includes re-subdivision and any division of land involving a new street, existing street, or a change in existing streets, and, as appropriate to the context, relates to the process of subdividing or to the land/or area subdivided. The term does not include the combination or recombination of portions of previously plated lots, where the total number of lots is not increased and the resultant lots meet the standards of the city, or the division of land into parcels of five acres or more, where no new streets or new utility services are involved.

Variance: A variance is a change in the general design of a development, but which shall in no way make null the Development Regulations or the City Zoning Ordinance.

Water and Sewer System: City Water Department provides water and sewer in portions of the City.

Zoning Ordinance: The Ordinance adopted by the Mayor and Council and known as the City Zoning Ordinance.

303. Subdivisions

303.1 Minimum Lot Requirements

Minimum right-of-way: Each lot shall front upon a dedicated public street having a right-of-way of not less than 50 feet.

- A. *Arrangements*: Side lot lines should be at right angles (90 degrees) to straight street lines or radial to curved street lines. Side lot lines should be radial to the center points in all cul-de-sacs. Side lot lines may deviate up to five degrees if necessary to combine property corners.

- B. Building Lines: Building lines shall conform to the City Zoning Ordinance.
- C. Double Frontage Lots: Access shall be restricted to the interior street(s) for all residential subdivisions.
- D. Minimum Lot Frontage: The minimum width of frontage of any lot shall be as required by the City Zoning Ordinance for the specific zoning district in which the lot is located. The lot width at any point from the road right-of-way to the building line shall not be less than the minimum required frontage width.

303.2 Monuments

- A. All corners shall be marked with an iron pin, one-half inch in diameter or greater and 18 inches long and driven so as to extend not less than one inch above the finished grade. If unable to penetrate ground 18 inches, then set other permanent monuments (PK nail in asphalt, spike, chiseled x, etc.).

303.3 Drainage Ways and Easement

- A. Drainage ways for man-made drainage ditches shall be cleared and opened at the time of development to control surface water runoff. Runoff slopes, and side slopes to be specified by the Developer's Engineer, according to good engineering practices. Drainage ditches shall conform to the requirements of this regulation.
- B. Drainage ways shall be provided where a subdivision is traversed by a water course, natural stream, channel or any other circumstances where required by the Public Works Department. It shall conform substantially to the limits of such water course plus any additional width as is necessary to accommodate future development.
- C. Drainage ways off the street right-of-way that are to be dedicated to the City shall be clearly defined on the plat of the individual property owner and said property owner shall be required to keep easement free of obstructions and shall maintain same in such a way as to assure free and maximum flow at all times.
- D. All drainage ways, including existing drainage ditches, shall be clear of debris, excess dirt and other materials. The ground shall be smoothed down and grassed by the Developer within 14 days of completing construction work. The use of sediment control measures shall be required to protect the area until a vegetative cover is obtained.
- E. Permanent sanitary sewer easements of 20 feet in width shall be provided for sewer lines. If sanitary sewer lines are excessively deep, wider easements shall be required to maintain a 1:1 open cut slope.
- F. Easements for sanitary sewers, drainage, and other utility purposes may be combined, but shall be of a minimum width as specified by the Superintendent of the specific utility departments of the involved utilities.

- G. All drainage ditches and structures must be centered on dedicated easements unless otherwise approved by the Public Works Department.

303.4 Streets

- A. Prior to submission of preliminary plat, the developer shall meet with the Director of Public Works to have the proposed street classified, in order that it can be accepted into the City's System. In some cases, it may be desirable for a street to have a higher classification based upon ultimate development of the entire area, which is not necessarily just the one development being submitted. This is particularly true in the more outlying areas around the City. Street continuity may require that a cul-de-sac street be provided in a current development at the property line, such that it can be extended in the future. In a case of this nature, the current development would provide the street to the property line. The future development would pick up at the property line and continue the street.
- B. Existing Streets: When development is proposed on an existing street(s), all improvements required under these standards shall apply to the side of the street which the development abuts.
- C. Relation to Adjoining Street System:
 - 1. The proposed street system shall extend existing streets, but to current city standards.
 - 2. If lots front on the existing city street, it shall be improved out to an acceptable city or county road by the developer.
- D. Alleys: Alleys may be provided to the rear of all lots except lots with double frontage.
- E. Restriction of Access: When a subdivision fronts on an arterial or major collector as shown on the City Street Classification Map, double frontage lots shall be provided with frontage on an interior street with no access to the arterial or major collector.
- F. All dead-end streets shall have a cul-de-sac as defined in Standard Detail R006.
- G. Conformity to the City Street Classification Map:
 - 1. The location and width of all streets and roads shall conform to the official City Street Classification Map.
 - 2. Street plans and profiles shall be approved by the City.
- H. Intersections:
 - 1. Street intersections shall be as nearly at right angles as is possible.
 - 2. No intersection shall be at an angle of less than 75 degrees.
 - 3. The property line at street corners shall be mitered adequately to permit construction of a 13-foot clear shoulder behind the curb and gutter.
 - 4. Sight distance at intersections shall meet requirements of this regulation.
 - 5. Islands at intersections shall be subject to individual approval by the City. In no case shall anything extend more than two feet above the back of the curb within the right-of-way of the street to be intersected.

6. Landings shall be required for all intersections.
 7. Opposing tee street intersections shall be directly aligned or shall be offset at least 200 feet.
 8. Intersections shall have a minimum radius as measured to the face of the curb of 40 feet for residential, commercial and retail subdivisions and 75 feet for heavy industrial subdivisions.
- I. Names:
1. Proposed streets that are obviously in alignment with other already existing and named street(s) shall bear the name(s) of such existing street(s).
 2. No proposed street name shall duplicate an existing street name within the City or County regardless of the use of the suffix "Street," "Avenue," "Boulevard," "Drive," "Place," "Way," "Court," or however otherwise designated.
 3. All street names are subject to the approval of the City.
- J. Right-of-Way:
1. The minimum width of right-of-way, as measured from lot line, shall be as shown in the Standard Detail R001.
 2. Adequate right-of-way shall be provided to allow the construction of a 13-foot cleared shoulder behind the curb line except industrial streets shall have a 16-foot cleared shoulder.
 3. When the development (residential or commercial) is located on only one side of an existing street, one-half of the required right-of-way as measured from the centerline of the existing right-of-way, shall be shown on the plan and is required to be dedicated to the City.
 4. Lawn sprinkler systems and trees shall be located outside existing or proposed street rights-of-way unless otherwise approved by the City.
- K. Traffic Studies: The Public Works Department may require that a traffic study be performed prior to the issuance of any permits to evaluate the current capacity of streets expected to carry the traffic volumes from the proposed development.

303.5 Entrances:

- A. Maximum lots served: Subdivision developments with 200 or more lots shall be required to have at least two entrances.
- B. Street Access Curb Cuts in Other Than Residential Districts: Curb cuts for service drives, entrances, exits, and other similar facilities on public streets in other than Residential districts shall not be located within 50 feet of any intersection.
- C. Driveways: No more than two combined entrances and exits shall be allowed on any parcel or property when the frontage of which is less than 200 feet. Additional entrances or exits for parcels or property having a frontage in excess of 200 feet shall be permitted only after showing of actual requirements of convenience and necessity.
1. Angle: The angle of driveways shall not be less than 45 degrees with the edge of the road or street, except on divided highways the entrance angle to roadside

commercial establishments may be reduced to 30 degrees. Exit drives from roadside commercial establishments on divided highways shall have an angle of not less than 60 degrees with the roadway.

2. Driveways shall be constructed in accordance with the Standard Details.
- D. Subdivision developments shall construct entrance widening to the following requirements:
1. Residential Subdivisions:
 - a. Residential Subdivisions not exceeding 20 lots whose entrance is on a local or minor collector shall install offset radii and 50-foot tapers.
 - b. All other residential subdivisions shall construct full acceleration / deceleration lanes to conform to the "Standard Details" unless waived by the City.
 - c. Residential subdivisions exceeding 200 lots shall be required to install entrance with a center turn lane and longer acceleration / deceleration lanes if it is located on a minor collector, major collector or an arterial street.
 2. Commercial/Industrial Subdivisions
 - a. Full acceleration and deceleration lanes shall be installed per the "Standard Details" unless waived by the City. Paving section shall correspond to the street classification of the existing road.
 - b. Commercial/Industrial subdivisions shall be required to install entrance with a center turn lane and longer acceleration/deceleration lanes if it is located on a minor collector, major collector or an arterial street.
 3. Access onto a State road shall meet existing Georgia DOT requirements. Such an application for a DOT Permit shall be submitted to the City prior to submittal to DOT. Once approved by DOT, a copy shall be provided to the City. All such entrances shall be paved.
 4. Sight Distance: The developer shall be required to upgrade the existing City or County road to meet the sight distance requirements of these regulations.
 5. The Developer shall install any catch basins and drainage pipe which must be constructed when an existing City or County road is required to be modified as a result of proposed development at his/her expense.
 6. Existing or proposed water mains and storm sewers shall be relocated at the developer's expense, to a point outside of the entrance widening.
- E. State Department of Transportation Approval: All entrances or exits of any street or drive, public or private, from or to any State highway shall be approved by the State Department of Transportation prior to the permit for any improvement to be served by such street or drive.

303.6 Utilities

- A. The design and construction specifications for all public utilities shall conform to the Specifications for the City.
- B. All utilities shall be buried in a residential subdivision unless otherwise required by the City. This requirement may only be waived by the Director of the respective department; said waiver must be in writing.

303.7 Final Plats

- A. Final Plats shall be required to meet the State Plat Act and the current City Zoning Ordinance.

304. Individual Commercial/Industrial/Multifamily Sites

304.1 Development Entrances

In addition to the following, parking lots shall not drain onto a City Street except as approved by the Public Works Department.

- A. The City shall approve the number of entrances to a proposed development.
- B. On minor collector streets provide offset radii and tapers.
- C. Industrial developments, commercial businesses and multifamily developments shall install full acceleration / deceleration lanes if accessing a major collector or an arterial street.
- D. Industrial Developments on corner lots which have frontage on interior subdivision streets shall have access only from the interior subdivision street(s).
- E. Developments on corner lots which have frontage on a local or minor collector city road shall install an additional lane pursuant to the specifications of the Public Works Department.
- F. The City may require a center turn lane or a longer deceleration lane if the City determines the traffic the project generates and the existing city street warrants it.
- G. Access onto a state road shall meet existing Georgia DOT requirements, except for the entrance must be paved.
- H. Sight Distance: No entrance shall be allowed in a location that does not provide adequate sight distance. The Developer may choose to upgrade the existing city or county road to meet the sight distance requirements of Section 305.4.
- I. Fire lanes shall be designed with proper space for fire vehicles movement. Fire lanes shall be approved by the County Fire Department.

304.2 Off Street Automobile Parking

- A. Parking requirements shall conform to zoning ordinance requirements.

305. Street Design Criteria

305.1 AASHTO Standards

Road design shall conform to AASHTO (American Association of State Highway and Transportation Official(s)) requirements as published in "A Policy on Geometric Design of Highways and Streets" 1994 edition as amended, unless otherwise noted herein.

305.2 Minimum Design Speed and Maximum Grade

Minimum design speeds and maximum grades for proposed streets in the City by street classification shall be as follows:

Street Type	Maximum Allowable Grade (%)	Minimum Required Design Speed (MPH)
Arterial	8	55
Major Collector	10	45
Minor Collector	15	35
Local	18	25
Alley	12	N/A
Cul-de-sac	4	N/A

305.3 Minimum Street Grade

Minimum grade on cul-de-sacs shall be one and one-half percent to maintain one percent in curb line. Minimum street grade outside of cul-de-sacs shall be one percent.

305.4 Site Distance at Entrances

- A. Sight distance requirements along existing city roads shall be determined using the posted speed limit and the corresponding stopping sight distance.
- B. The sight distance for crest and sag vertical curves is the distance measured along the roadway from a driver's eye 3.5 feet above the pavement to an object six inches high at the intersection.
- C. The sight distance for horizontal curves is determined by the line of sight available 2.0 feet above the road surface. The sight distance is measured along the existing edge of pavement beginning at the centerline of the proposed entrance and ending where the line of sight intersects it. The line of sight is the projected line of visibility beginning at the entrance centerline and tangent to an obstruction 2.0 foot above the road surface. Examples of obstructions are vegetation, ground cover, signs, existing topography, etc.

305.5 Curves

- A. Vertical Curves: The length of vertical curves, both crest and sag, shall be based upon the standards included in 3.4.04 and the following:
1. For speed limits up to 40 mph: $LVC = (AxS^2)/1329$
 2. Speed limits greater than 40 mph: $LVC = 2S (132/A)$
LVC = Length of Vertical Curve
S = Sight Distance
A = Algebraic difference of intersecting grades
- B. Horizontal Curves: Streets shall be designed to have a centerline radius of curvature of no less than 100 feet. Proposed minor collector streets shall have a minimum 300 feet centerline radius of curvature. All other streets horizontal curvature shall be designed according to AASHTO Standards. Tangent distance between reverse curves shall be as follows:
1. Major Collectors: 300 feet
 2. Minor Collectors: 200 feet

305.6 Street Cross-Section

- A. Street cross-sections shall be as shown in Standard Details R001.
- B. Curb and Gutter shall be as shown in Standard Detail R003.

305.7 Street Paving

Pavement thickness for streets shall be as specified in Standard Detail R001.

- A. "GAB" refers to Graded Aggregate Base as specified in the Georgia DOT in Standard Specifications Section 815.
- B. "Type B" refers to Type B Asphalt concrete as specified in the Georgia DOT in Standard Specifications Section 828.
- C. "Type E" refers to Type E Asphalt concrete as specified in the Georgia DOT in Standard Specifications Section 828.
- D. "Type F" refers to Type F Asphalt concrete as specified in the Georgia DOT in Standard Specifications Section 828.
- E. All local commercial/industrial and minor collector commercial/industrial streets shall have the same paving section as the major collector street type.

305.8 Dam Supporting Road

No City Street shall be designed to cross an existing or proposed dam that is regulated by the Safe Dams Act.

305.9 Curb and Gutter

Curb and gutter shall be required on all paved streets. See Standard Detail R003.

305.10 Sidewalks

- A. Sidewalks shall be required on at least one side of all new streets. In addition, they shall be required on all existing streets where new building construction occurs if required by the Community Development Department. In addition, they shall be required on all existing streets where new building construction occurs if required by the Community Development Department.
- B. Sidewalks shall be constructed in accordance with Standard Details R009, R010A and R010B.
- C. Sidewalks shall be backfilled and landscaped.
- D. Sidewalks shall include handicap ramps at all street intersections to meet the Americans with Disabilities Act (ADA) requirements.

305.11 Traffic Signs

The design professional shall show the location of all required traffic signs. The developer shall furnish and install all street signage in the project. Unless otherwise noted, design of traffic signs shall conform to the Manual on Uniform Traffic Control Devices (MUTCD), Latest Edition, published by the United States Government Printing Office.

305.12 Street Lighting

Street lighting shall be required on all streets as specified by the power company servicing the subdivision. The developer or sub-divider shall bear the costs for all monthly street light charges for a full year payable in advance at the time of final plat approval.

305.13 Utility Locations

All utility locations shall correspond to the typical layout shown in Standard Detail R011.

306. Storm Drainage Design Criteria

306.1 Storm Sewers

- A. All storm sewer design calculations shall be certified by a Professional Engineer, Land Surveyor or Landscape Architect currently licensed in the State of Georgia.

- B. Storm drainage pipes shall be sloped so as to maintain a minimum velocity of three feet per second (fps) during the two-year design storm event in order that sediment will not collect.
- C. Drainage formulas used in determining size of storm sewer components shall meet all criteria of the
 - 1. "STORMWATER MANAGEMENT MANUAL," Latest Revision, facilitated by the Atlanta Regional Commission, the Georgia Department of Natural Resources-Environmental Protection Division and the cities and counties across Georgia.
 - 2. Drainage Manual for Highways, latest edition; or other methodology as approved by the City.
- D. The 25-year storm event shall be used in designing the storm drains. In cases where the property is traversed by a spring, creek, or other watercourse, the 100-year storm event will be used for design.
- E. Storm sewers shall not be less than 15 inches in diameter. No storm drain pipe running parallel to the existing primary road shall be located beneath the proposed entrance widening. Relocation of existing storm drainage structures shall be done by the Developer.
- F. Storm drainage structures or drainage ways shall not be located within 20 feet of any existing or proposed building.
- G. Storm sewers shall extend at least from edge of right-of-way to edge of right-of-way. Residential subdivision storm sewers shall extend at least to the rear of the building on all piping.
- H. Catch Basins, junction boxes, drop inlets and outlet structures shall have a minimum elevation drop from the inlet invert elevation to the outlet invert elevation of at least 0.20 ft.
- I. Maximum continuous length of pipe without a junction box, drop inlet, or catch basin, shall be 300 feet for pipes less than 42 inches in diameter, and 500 feet maximum for pipe greater than 42 inches in diameter.
- J. Storm sewers shall be reinforced concrete pipe (RCP) within the pavement of an existing or proposed street unless otherwise approved by the Public Works Department.
- K. Aluminum storm drain piping shall be encased in a polyethylene wrap when it is located within 20 feet of a steel gas line.

306.2 Drainage Structures (Excluding Pipe or Culverts)

The design engineer shall check the hydraulic capacity of each drainage structure designed as an inlet point in the drainage system. The actual storm water flows shall be compared with the structures flow capacity to ensure their capacity is not exceeded.

- A. Catch basins shall be constructed in accordance with the Georgia Department of Transportation Standard Details 1033D and/or 1034D.

- B. Catch basins shall be located outside of intersection radii.
- C. Catch basin spacing from each other shall be limited to a maximum distance as follows:
 - 1. 250 feet on grades up to seven percent
 - 2. 400 feet on grades from seven percent to ten percent
 - 3. 500 feet on grades over ten percent
- D. No curb cuts in lieu of drainage structures will be allowed.
- E. The outlet end of all storm drain pipes shall have either flared-end sections or concrete headwalls which meet Georgia DOT Standards 1120 or 1125. This same standard applies to the inlet end of storm sewers where an open pipe is designed to collect the runoff. Flared ends shall be of the same material as the storm drain pipe.
- F. Drop inlets shall be designed to Georgia DOT Standard Detail 1019A. Weir drop inlets shall be provided in landscaped areas. Grated drop inlets shall be provided in paved areas.
- G. Junction boxes or manholes having access to the pipe shall be constructed to meet the requirements of Georgia DOT Standard Detail 9031U or 1011A. Manholes shall be provided with eccentric cone sections.
- H. All drainage structures shall have a minimum elevation drop from the inlet invert elevation to the outlet invert elevation of at least 0.20 feet.

306.3 Hydrology Study

- A. All development plans requiring a Land Disturbance Permit will require a Hydrology Study provided by the Developer to the City. The Hydrology Study and all stormwater detention facility design calculations shall be certified by a Professional Engineer, Land Surveyor or Landscape Architect currently licensed in the State of Georgia. The City has the right to require proof of qualifications and registration, and to require that a copy of all calculations performed by the design professional be submitted to the City. Hydrology Study must address the following issues:
 - 1. Existing land uses downstream.
 - 2. Anticipated future land uses downstream.
 - 3. Magnitude of increased peak flows due to development.
 - 4. Presence of existing drainage problems.
 - 5. Capacity of existing and anticipated drainage systems.
 - 6. Creation of concentrated flows where none had occurred previously.
 - 7. Availability of feasible locations for detention facilities.
 - 8. Existing flows generated offsite which pass through the proposed development site.
 - 9. Anticipated future flows generated offsite which pass through the proposed development site.
 - 10. The nature of the receiving drainage way.
 - 11. For any development that impacts a stream, creek, lake, pond, or wet area, developer must provide confirmation from US Army Corps of Engineers that the

development complies with Section 404 of the Clean Water Act. (Contact US Army Corps of Engineers @ (678) 422-2721.

- B. The Hydrology Study shall identify the locations and quantities of stormwater runoff entering and exiting the site for both pre- and post-developed conditions. Analysis of the off-site properties shall address future development in addition to addressing existing conditions. It shall contain drainage area delineation maps and other exhibits at a satisfactory scale and sufficient in quantity and scope to define the boundaries of the site relative to watercourses, drainage divides, drainage structures and other pertinent features.
- C. The analysis of downstream conditions in the Hydrology Study shall address each and every point or area along the project's boundaries at which runoff will exit the property. The analysis shall focus on the area immediately downstream of the project property. This area shall generally extend a flow distance of about one-half mile from the project property line. However, the most critical downstream area investigation shall be conducted relative to existing and anticipated land uses on tracts which adjoin the project property. As part of the hydrological study, consideration should be given to the flow capacity of downstream drainage structures. If the downstream system is inadequate, the developer is required to either improve the downstream drainage structure or provide additional storage in the detention facility.
- D. The Method of Estimating Storm Water Runoff shall be of the hydrologic methods described in The Georgia Stormwater Management Manual. All storm data and input parameters for calculations shall be taken from this reference manual. The Method used shall be determined as follows:

Development Size	Approved Method
50 acres or less	SCS Method
50 acres to 1,600 acres	SCS Method
Larger than 1,600 acres	Coordinated with and approved by the City

- E. All developments, except single family residential, that are not required to obtain a Land Disturbance Permit shall submit a letter certified by a Professional Engineer, Land Surveyor or Landscape Architect currently licensed in the State of Georgia stating that all drainage and detention facilities have been designed in accordance with these regulations. The City has the right to require proof of qualifications and registration, and to require that a copy of all calculations, work product, reports and studies regarding the proposed development and performed by the design professional be submitted to the City.

306.4 Storm Water Detention Facilities

- A. Stormwater detention facilities shall be required for any portion of any site for which development activities will result in increased peak stormwater runoff.

- B. Permanent detention facilities will not be required if the design professional can provide calculations and proof there are no roads, culverts, buildings, or other property that will be adversely impacted by the increased runoff leaving the site, and that the discharge does not directly flow into a major flood plain or creek system with known or suspected flooding problems. Future phases of development of the drainage basin must be considered in determining adverse effects.
- C. When stormwater detention facilities are deemed not required, the 100-year elevation of the receiving stream shall be determined. Excavation of earth below said elevation in the shoulder of the stream or floodplain shall be required in a volume equal to or greater than that of the detention pond that would have been required.
- D. Stage-Storage-Discharge relationship calculations for Detention Facilities and their Outlet Structures shall constrain the Detention Facility's Outflow to the pre-developed Flow or less for the two-, five-, ten-, 25-, 50- and 100-year storm events.
- E. The Detention Facility shall incorporate overflow features and basin bank elevations which will accommodate the routing of the 100-year storm event through the Detention Facility with no damage to the Facility.
- F. Detention Basin discharge locations shall be in defined drainage ditches or storm sewers. If there is an existing storm drainage system within 150 feet of the discharge point of the outlet pipe for the basin, then the developer shall extend the outlet pipe and tie-in to the existing system. Obtaining any required easements for said tie-in are the responsibility of the Developer. Some method of re-establishing sheet flow may be approved at the discretion of the City.
- G. Earthen Detention Basin fill slopes and cut slopes shall be no greater than 3:1.
- H. All ponds which are normally dry having a depth, including freeboard, greater than four feet and a side slope steeper than 2:1 shall be fenced and have a ten-foot-wide lockable gate for entrance. The fence shall be a minimum of six feet in height and shall be of the chain link or privacy type.
- I. For improvements or expansion of existing developments, pre-development conditions shall reflect original land use before any structural development, such as buildings, roads, etc.

306.5 Stormwater Quality/Quantity Control Facilities

The City requires each new project to create adequate stormwater controls using Best Management Practices (BMPs). Use of BMPs to enhance water quality and to comply with the Clean Water Act (CWA) is federally mandated. The City will utilize the Atlanta Regional Commission's Georgia Stormwater Management Manual, Volumes I and II, as standards for compliance with the required BMPs.

305.6 Storm Water Ditches

- A. All ditches between storm drain pipes and downstream of storm drain pipe shall be designed by a Professional Engineer or Landscape Architect currently licensed in the State of Georgia.
- B. The ditch profile and cross-sections shall be shown on the plans. The plans shall show the velocity and flow for the ditch design. Drainage ditches shall be designed to limit the runoff velocity to less than five fps or the ditch shall have the bottom and sides lined with sod. Ditches shall be designed to limit the runoff velocity to less than eight fps or the ditch shall have a paved or concrete invert.
- C. In residential subdivisions, all ditches are to be installed and apparent prior to approval of the final plat.

306.7 Subdrainage

When subgrade compaction requirements of these specifications cannot be met sub-drainage will be installed to control the surplus ground water by intercepting side hill seepage or by lowering or regulating the ground water level.

306.8 Bridges

Bridges shall not be allowed unless otherwise approved by the Public Works Department.

306.9 Existing Dams

- A. It shall be the responsibility of the developer to provide any required information or studies, to include the dam breach analysis, for any dam located on the property proposed to be developed or located on adjacent property upstream of the proposed development, to the City. The design engineer shall search the entire watershed upstream of the property for other dams regulated by the state. The City shall maintain a record of dams reported to the City and their attendant breach zones. The design engineer shall include a statement in the dam breach analysis report whether or not any dams were found upstream and whether or not they affect the property to be developed.
- B. The City shall submit the required information to the Environmental Protection Division of the Georgia Department of Natural Resources for review.
- C. The City shall notify the dam owner in accordance with the procedures set forth in the Georgia Safe Dams Act.
- D. If development is proposed in the breach zone below the dam, then the dam owner shall be required to upgrade the dam to Category I standards, as defined in the Georgia Safe Dams Act, or breach the dam in a safe manner as authorized by the Environmental Protection Division of the Georgia Department of Natural Resources. If the dam owner elects to breach the dam, measures must be taken to ensure that stormwater flows are not increased on downstream property owners.

306.10 Proposed Dams

The Developer of any proposed new dams which are regulated by the Georgia Safe Dams Act shall obtain necessary permits and approvals from the State of Georgia prior to obtaining a development permit from the City. A development permit shall be required before the construction of said dam.

307. Materials

307.1 Compliance

All materials shall comply with Georgia DOT Standard Specifications for Construction of Roads and Bridges, 1993 edition, as amended, with supplemental specifications and standard details, unless otherwise noted.

307.2 Streets

- A. Graded Aggregated Base (GAB) course shall consist of mineral aggregate and may be a combination of natural deposit or a blend of the materials specified in the Georgia DOT in Standard Specifications Section 815.
- B. Black base shall consist of asphalt concrete conforming to Type B specifications of the Georgia DOT in Standard Specifications Section 828.
- C. Prime. After the base has been placed, mixed, compacted, shaped, inspected and accepted, it shall be primed with suitable asphalt materials as specified in Georgia DOT in Standard Specifications Section 412.
- D. Tack. Tack Coat shall be applied on a prepared road surface according to the requirements of Georgia DOT in Standard Specifications Section 413.
- E. Surface Course. Type E Asphalt concrete as specified in the Georgia DOT in Standard Specifications Section 828.

307.3 Curb and Gutter

Concrete shall be Class "A" as defined by Georgia DOT in Standard Specifications Section 500 and have a minimum compressive strength of 3,000 psi at 28 days.

307.4 Storm Sewers

- A. Georgia DOT Standard Detail 1030D shall be used in determining class concrete or gauge of pipe under fill.
- B. A certification by the supplier of the pipe specifications for each pipe shall be required before installation.

- C. Concrete pipe shall be steel reinforced in accordance with AASHTO: M170.
- D. All corrugated metal pipe shall be type II aluminized steel.

308. Construction

308.1 Compliance

All construction shall comply with Georgia DOT Standard Specifications Construction of Road and Bridges, with Supplemental Specifications and Standard Details, 1993 edition, as amended, unless noted otherwise.

308.2 Clearing and Grubbing

Grading sections shall be cleared and grubbed of all trees, bushes, stumps and debris. Such debris shall be disposed of in a lawful manner. There shall be no burial of such debris on site.

308.3 Grading

- A. Grading shall be accurately done to the lines and grades shown on the plans. Embankments shall be placed in uniform layers not to exceed six inches and compacted to a density of 95 percent of the maximum laboratory dry weight per cubic foot as determined by AASHTO Method T-99. The contractor shall add moisture to the material as required as it is placed to obtain required compaction.
- B. Compaction test shall be provided by the developer and shall be performed by a geotechnical engineer licensed in the State of Georgia. Required test shall be every two feet vertically and 500 feet horizontal.
- C. Maximum Construction Cut and Fill Slopes are as follows:

Depth of Cut or Fill	Cut Slopes	Fill Slopes
2 feet or less	4 to 1	4 to 1
2 feet to 5 feet	3 to 1	3 to 1
5 feet to 10 feet	2 to 1	2 to 1
Over 10 feet	2 to 1	2 to 1

- D. The depth of cut referred to shall be constructed to the maximum cut or fill occurring in any one section of cut or fill. The slope on cut or fill slopes shall be uniform throughout for each section or cut or fill. When a cut is made in rock that requires blasting, the slope may be changed to vertical slope upon the written approval of the Public Works Director.

308.4 Subgrade

- A. After the earth work has been completed, all storm drainage and other underground utilities have been installed under the roadbed, and the backfill in all such ditches thoroughly compacted, the subgrade shall be brought to the lines, grades and cross-section shown on the plans.
- B. If any sections of the subgrade are composed of unsuitable or unstable material, such material shall be removed to the depth directed by the authorized representative of the City and replaced with suitable, thoroughly compacted material.
- C. When the street is to be used for construction traffic before the paving work is completed, a layer of GAB can be laid as a traffic surface.
 1. This material shall not be used as part of the base material.
 2. It may be worked into the subgrade, or it shall be removed before the base course is set up for paving.
 3. Provision shall be made to drain low points in road construction when the final paving surface is delayed.

308.5 Curb and Gutter

- A. Line and grade shall be set by developer's engineer, landscape architect, or land surveyor.
- B. One-half inch expansion joints or pre-molded bitumastic expansion joint material shall be provided at all radius points and at intervals not to exceed 50 feet in the remainder of the curb and gutter.
- C. Cross-Section shall be in accordance with Standard Detail R003.
- D. All curbing within a public street right-of-way must be installed on a minimum of six inches of compacted GAB (Graded Aggregate Base).

308.6 Street Cuts

- A. The City's policy is no existing streets can be open cut unless unusual circumstances warrant it. No street shall be cut or bored without a written permit issued by the Public Works Department. Application for such permit shall be made at least two business days prior to the desired time for starting work.
- B. All trenches shall be backfilled and compacted the same day the trench is opened. Compaction requirements are as follows:
 1. Trenches under paving shall be backfilled with GAB and returned to 100 percent compaction.
 2. Trenches elsewhere shall be returned to 95 percent compaction.
- C. If the City allows open cutting, all trenches under existing paving shall be backfilled and compacted in six-inch lifts and excavated to allow for concrete and asphalt to be placed as shown in Standard Details R007 and R008. The edges of the paving cut shall be saw cut smooth.

- D. Compaction test on cuts shall be made at two per cross cut.

308.7 Underground Utilities

- A. All utilities within the curbs shall be installed and the ditches backfilled and thoroughly compacted before any pavement or base is installed.
- B. All utility manholes and valve boxes shall be brought to the finished grade within the roadway section.

308.8 Easements

Easements shall be clear of limbs and debris, graded smooth, and established in grass.

308.9 Foreign Materials on Streets

- A. The developer, builders, and/or homeowners shall be responsible for keeping dirt, mud, building materials, concrete, etc., off the pavement and curbing of existing City or County roads during construction of buildings in all developments covered by these regulations.
- B. Before the streets are accepted by the City, all litter and trash shall be removed from the dedicated rights-of-way and surrounding areas.

308.10 Storm Sewers

Pipe installation shall conform to Georgia DOT Standard Specifications for Construction of Roads and Bridges.

- A. Before any traffic over a storm drain is allowed, the developer shall provide an adequate depth and width of compacted backfill to protect the structure from damage or displacement. Any debris or silt that constricts the flow through a pipe shall be removed by the developer as often as necessary to maintain drainage. All pipe structures shall be cleaned before the work is accepted. Any damage or displacement that may occur due to traffic or erosion shall be repaired or corrected at the developer's expense.
- B. Minimum Clearances Are:
 - 1. One foot between the bottom of the base or sub-base, if used, and the exterior crown of the culvert.
 - 2. A minimum of 0.5 foot between underground utilities and exterior crown of culverts.
- C. Trench construction for storm drainage pipe shall be in accordance with State Highway Standard 1030D.
- D. Storm drainage pipe shall be bedded in Size No. 57 (1" to No. 4) per ASTM D-448 Table 1, standard sizes of processed aggregates when structural fill material is not available.

309. Standard Details

See Standard Details in Appendix A.

310. Private Streets

310.1 Definitions

City Engineer. Shall be the individual designated by the City Manager to perform said functions.

City Development Standards. The City Zoning Ordinance, City Development Regulations and all codes and ordinances adopted by the City.

Subdivision. For the purpose of this section, subdivisions include only the following uses:

1. Single family residential units; and
2. Fee simple town home units, fee simple condominiums or other fee simple ownership of the individual residential units.

310.2 Private Streets Permitted

Private streets may, upon application, be permitted by the Planning Commission within subdivisions, subject to the requirements of this section. Applications for approval of Private Street shall be considered by the Planning Commission at the time of preliminary plat approval by the Planning Commission. Following a recommendation by the Public Works Director or City Engineer to authorize private streets in a major subdivision, the Planning Commission shall consider the application and may impose conditions on the approval of private street to ensure various public purposes and to mitigate potential problems with private streets. No final plat involving a private street shall be approved unless said final plat conforms to the requirements of this section.

310.3 Engineering Plans Required

It shall be unlawful for any person, firm, or corporation to construct a new private street or alter an existing private street or to cause the same to be done without first obtaining approval of engineering and construction plans from the Public Works Director and the City Engineer in accordance with the requirements of this Ordinance and the City Development Standards.

310.4 Standards

All private streets shall be constructed to all standards for public street including all related appurtenances as required by the City Development Standards, applicable construction specifications of the City Engineer, and as approved by the City Engineer.

- A. If a gate or other controlled access is installed at the entrance to the development, a place which provides emergency access to the development by emergency agencies must first be approved by the emergency agencies of the City. Access must also be provided to anyone providing utilities to said development; there shall be an automatic gate opening on any power disconnect.
- B. All provisions of the zoning ordinances of the City shall apply to the development of said development.
- C. There shall be only one entrance/exit from the development to a public street unless otherwise recommended by the City Engineer, Fire and Police Department or other emergency services and approved by the Planning Commission. In no event shall a private street be constructed so as to permit said street, in any configuration, to serve as a connecting street between two public streets. Other than the entrance/exit to the private development, no private street shall adjoin any property outside the limits of the private development.
- D. There shall be an independent certified inspector approved by the City provided by the developer to determine compliance with the specific rules and requirements for streets and utilities during the entire project.

310.5 Street Names and Signs

Private streets shall be named, subject to the approval of the City Manager or his/her designee. The sub-divider of land involving a private street shall install street signs with content containing the street name and the designation "private," as approved by the City Manager. The sign signifying the private street may be required by the City Manager to be a different color than that of street signs provided for public streets, in order to distinguish maintenance responsibilities in the field.

310.6 Easements

- A. Easements for private streets shall be designated on final plats as general-purpose public access and utility easements, along with the name of said Private Street. Said easement shall at minimum be of the same width as that required for the right-of-way of a public street by the major thoroughfare plans and the City Engineer for the type of public street (local, collector, etc.) most closely resembling the proposed private street. Easements for private streets shall not be included in any calculation of minimum lot size or density limitations established by local land use regulations. In the cases of private streets, the general-purpose public access and utility easement for the private street shall either:
 1. Be shown in a manner on the final plat such that each lot fronting the private street shall extend to the edge of the curb, right-of-way, or easement for said Private Street. No lot shall be permitted to be divided by the general-purpose public access and utility easement required and established for a private street; or

2. Shall be drawn as its own discrete parcel to be dedicated to a private homeowner's association (i.e., not shown to be a part of any lot).
3. All utility easements as required by the City Development Standards must be installed and dedicated to the City.

310.7 Maintenance

- A. The City shall not maintain, repair, resurface, rebuild, or otherwise improve streets, signs, drainage improvements or any other appurtenances within general purpose public access and utility easements established for private streets. A private maintenance covenant recorded with the Carroll County and/or Douglas County Clerk of the Superior Court shall be required for any private street and other improvements within general purpose public access and utility easements established for private streets. The covenant shall set out the distribution of expenses, remedies for non-compliance with the terms of the agreement, rights to the use of easements, and other pertinent considerations. The Covenant shall specifically include the following terms.
 1. The Covenant shall establish minimum annual assessments in an amount adequate to defray costs of ordinary maintenance and procedures for approval for additional needed assessments. The Covenant shall also specify that the funds from such assessments will be held by a homeowners or property owners association in all cases.
 2. The Covenant shall include a periodic maintenance schedule.
 3. The Covenant for maintenance shall be enforceable by any property owner served by the private street.
 4. The Covenant shall establish a formula for assessing maintenance and repair costs equitably to property owners served by the private street.
 5. The Covenant shall run with the land.
 6. The Planning Commission may, at its discretion, as a condition of approving private street, require a performance bond and/or maintenance bond and/or letter of credit be submitted by the sub-divider and held by a homeowners or property owners association, or the Planning Commission may require that the sub-divider pay an amount of money as recommended by the City Engineer into an escrow account or other suitable account for the maintenance and repair of private streets and stormwater management improvements, to be drawn from by the homeowners or property owners association as maintenance and repair needs may arise.
 7. All agreements, restrictive covenants and other documentation related to the development shall be furnished and approved by the City Engineer prior to commencement of development.

310.8 Specification for Final Plats Involving Private Streets

- A. The City Manager or his/her designee shall not approve for recording any final plat involving a private street unless and until it shall contain the following on the face of the plat:
1. Deed book and page reference to the recorded covenant required by this section.
 2. "WARNING: The City has no responsibility to build, improve, maintain, or otherwise service the private street, drainage improvements and other appurtenances contained with the general public purpose access and utility easement or easements for private streets shown on this plat unless otherwise indicated hereon.
 3. "Grant of Easement." The general purpose public access and utility easement(s) shown on this plat for private street(s) is hereby granted and said grant of rights shall be liberally construed to provide all necessary authority to the City and to public or private utility companies serving the subdivision, for the installation and maintenance of utilities, including, but not limited to, electric lines, gas lines, telephone lines, water lines, sewer lines, cable television lines, and fiber optic cables, together with the right to trim interfering trees and brush, together with a perpetual right of ingress and egress for installation, maintenance and replacement of such lines.
 4. The Following certificate of dedication shall be required by the City unless the Mayor and City Council waives the dedication requirement.

Certificate of Dedication

All water and sewer lines and other utilities installed within the general-purpose access and utility easement(s) shown on this plat for private street(s) are hereby dedicated to City.

Property Owner	Date
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310.9 Requirement of Purchaser's Acknowledgement of Private Responsibilities

- A. Prior to the sale or as a condition of the closing of a real estate transaction involving any lot served by a private street in the City, the sub-divider or seller of said lot shall execute a notarized purchaser's acknowledgement of private street construction and drainage maintenance responsibilities as set forth below. A copy of the purchaser's acknowledgement shall be retained by the purchaser and shall be required to be submitted as a condition of a building permit for a principal building on said lot:

Purchaser's Acknowledgement of Private Street and Drainage Maintenance Responsibility

(I)/(We) have read the Declaration of Covenant which pertains to the lot that is the subject to this real estate transaction _____ (insert address or attach legal description). (I)/(We) understand that the Declaration of Covenant applies to the lot that (I am)/(we are) purchasing and requires (me)/(us) to provide a specified percentage or amount of the financing for the

construction and maintenance of any private street and drainage facilities serving the lot which (I am)/(we are) purchasing, and that owners of other lots in this plat may sue for and recover those costs which this covenant requires (me)/(us) to pay, plus their damages resulting from (my)/(our) refusal to contribute, plus reasonable attorney's fees. (I)/(We) further understand that the City has no obligation to assist with the maintenance and improvement of the private street, drainage facilities, and other appurtenances within the general-purpose public access and utility easement for the private road serving the lot in question. (I) (We) understand that a copy of this purchaser's acknowledgement shall be required as a condition of the issuance of a building permit for a principal building on the lot (I am)/(we are) purchasing.

Purchaser

Date

310.10 Agreements

All agreements, restrictive covenants and other documentation related to the development shall be furnished and approved by the City Engineer prior to commencement of development.

END OF SECTION 300

400. SEWER REGULATIONS

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401. General

401.1. Use of this Document

- A. This document is subject to periodic revision to meet changing requirements for materials, environmental regulations, etc. At the beginning of a project the user should verify that he has the latest edition.
- B. This document is intended to convey the general design and construction requirements for a typical project. It also lists specific City requirements relating to plan review, inspection, testing and acceptance of facilities. It is not intended as a substitute for site-specific engineering and construction techniques.

401.2. Definition of Sewer Line Terminology

- A. "Building Sewers" or "Service Laterals" are defined as those pipes used to convey wastewater from the building or portions of a building to a main sewer. The minimum diameter for a service lateral is four inches. These sewers are privately funded and owned.
- B. "Main Sewers" are located in streets or dedicated easements. They are gravity piping systems used to collect sewage from one or more service laterals to other main sewers. Main sewers are a minimum of eight inches in diameter and may extend beyond the property boundaries of a development. Funding of main sewers is by the developer.
- C. "Force Main Sewers" are pressure piping systems which convey sewage from a pump station to a main sewer. These sewers are constructed of ductile iron pipe and have a minimum diameter of four inches. Funding of force mains is by the developer.

401.3. Connection to Existing Sewers

- A. Except as provided below, all future buildings within the city's corporate limits which are to be utilized for occupancy or any other use such as commercial or industrial purposes which

requires sanitary sewerage facilities shall be connected to the public sewer system. Cost of constructing the necessary facilities for connection to public sewers shall be at the expense of the developer.

- B. Waiver of the requirement to connect to public sewers will be considered on a case-by-case basis for non-subdivided, single-lot buildings when the nearest connection point to a public sewer is more than 1,000 feet from the property line, when such buildings are to be used for single-family dwelling or some other use where the wastewater loading is no more than that of a single-family dwelling.
- C. The City maintains the option of requiring developers of individual lots to construct main line extensions of up to 500 feet to avoid cutting pavement on existing streets for connection to the public sewer.

401.4. Lift Station Policy and Requirements

- A. Lift Station Policy: It is the goal of the City to provide for the conveyance of wastewater by natural gravity flow wherever and whenever possible. In order to facilitate the City's goal, the City has policies that allow the reimbursement of certain costs of off-site trunk sewer extensions and over sizing lines. The installation of a lift station increases the cost of providing sewer service and transfers the burden of extending trunk sewers and/or repairing, improving, and replacing the lift station to the City and its sewer customers. Lift stations, if deemed necessary, must be carefully integrated into the City's overall plan for providing wastewater service to its customers.
- B. Detailed Plans and Specifications Design drawings and specifications for the lift station shall be reviewed by the City concurrently with the overall development plans. This submittal shall contain:
 - 1. Design and operational information,
 - 2. Detailed design drawings, and
 - 3. Technical specifications.
- C. Lift Station Requirements: Lift stations must be designed by a Professional Engineer licensed in the State of Georgia and shall be designed and constructed in accordance with the City's standards in affect at the time. These standards, in conjunction with the standard details in the Appendix and the current Rules and Regulations, shall include, but not be limited to, the following:
 - 1. The lift station shall be located, whether inside or outside of the proposed development, to service the entire drainage basin where the development is being constructed. The maximum required service area shall be located no more than 2,500 feet of gravity sewer outside the development. The service area may include areas currently served by any existing public sewer system. Any area served by an existing lift station within the gravity basin will need to be served by the new gravity sewer and pump station facilities and the existing pump station will be

abandoned.

2. The lift station must be located at or beyond the nearest downstream confluence outside the development. The maximum required amount of gravity sewer outside the development to meet this requirement shall be 100 linear feet per developed acre or 2,500 feet, whichever is less. This requirement may be waived if the lift station located within the proposed development area will serve more than two-times the service area requirement.
3. The lift station cannot be located upstream of an existing lift station. If the proposed lift station is upstream of an existing lift station, the developer shall install a gravity sewer line from the proposed development to convey flows to the existing lift station and upgrade the existing lift station as necessary. The maximum amount of gravity sewer line required outside the development shall be 100 linear feet per developed acre or 2,500 feet, whichever is less.
4. The lift station cannot be located downstream of an existing lift station. If the proposed lift station is downstream of an existing lift station, the developer shall install a gravity sewer line to convey the flow from the existing lift station to the proposed lift station, thus eliminating the existing lift station. The maximum amount of gravity sewer line required outside the development shall be 100 linear feet per developed acre or 2,500 feet, whichever is less. Furthermore, the developer may request, and the City may approve depending on applicability and condition, the reuse of equipment from the existing lift station. If the reuse of equipment is allowed, the developer must coordinate with the City and assume complete responsibility for the handling of all flows during the transition period.
5. A waiver of any or all of the above requirements, Items 1-4, may be considered in the sole discretion of the City in any of the following cases:
 - a. The proposed lift station will eliminate two or more existing lift stations.
 - b. The proposed lift station will be eliminated by a future project or projects known to the City.
 - c. The total amount of gravity sewer required outside of the development (both upstream and downstream together) to satisfy all of the applicable requirements above, Items 1-4, is greater than 100 linear feet per developed acre or 2,500 feet. In this case, the City, on a case-by case basis and at its discretion, will determine the best combination of requirements to locate the proposed lift station. In no case will the developer be required to install more than one 100 linear feet per developed acre or 2,500 feet, whichever is less, outside the development.
 - d. The City is compensated for the difference in cost to locate the lift station at a site that satisfies the applicable requirements above, Items 1-4, versus locating the lift station on the project site or another site proposed by the developer. The cost difference shall be determined by the City.

6. If the proposed developed area covers more than one drainage area (e.g. parts of the development naturally drain to more than one location), the area shall be divided by its respective drainage pattern(s) and treated as separate developments where each lift station must meet these requirements separately.
7. No lift station will be permitted for a proposed development of less than forty (40) Equivalent Residential Units (ERUs) or a watershed having an estimated ultimate development of less than 80 ERUs.
8. The lift station and incoming manholes shall be outside the 100-year flood zone wherever possible. If not reasonable and/or the City determines installation within the 100-year flood zone is acceptable, the lift station and incoming manholes shall be designed and constructed according to all applicable FEMA, NFIP, EPA, EPD, State, and local ordinances.
9. The deeded lot size shall be minimum 60-feet by 80-feet. The lift station shall be fenced minimum 65-feet by 50-feet with 6-inches of crushed stone extending 6-inches outside fence.
10. The lift station layout shall be such that a driveway will access the pump loading point. The lift station access drive shall be paved with either concrete or asphalt, as directed by the City. The pump station driveway slope shall not exceed 10%. Drives shall be minimum twelve-feet wide and in accordance with Georgia DOT standards and Grantville standards for industrial roads. The sub-base shall be compacted to 95% standard proctor per ASTM D698 standards. For driveways over fifty feet in length, a turnaround will be required and shall be twenty-feet off the fence, 16-foot deep with a 15-foot radius to the driveway.
11. The pump station layout shall be configured so the station can be expanded to the ultimate size to pump the ultimate upstream flow. Initial and future land requirements including access for the pump station shall be obtained by the developer and donated to the City in fee simple.
12. A debris manhole is required inside the fence.

401.5. When Public Sewers Are Not Available

If sewers are not available within 1,000 feet of the property line the options available are:

1. Do not develop.
2. Install septic tanks or other on-site treatment system.
3. Extend city sewers to the area.

402. Plans, Specifications and Submittals

402.1. General

All projects which involve construction of Main Sewers and/or Force Mains and Pumping Facilities

shall have detailed construction plans and specifications prepared by a Registered Professional Engineer or Licensed Surveyor licensed in the State of Georgia. Developments which only involve building sewers may have plans and specifications prepared by the project Architect.

402.2. Preliminary Review

Preliminary plans will be prepared and submitted for review as described elsewhere in the development regulations. Questions relating to availability of sewers and proposed location of connection should be resolved at this stage before proceeding with final planning. A submittal for preliminary review must include all land to be developed although the land is to be developed in several phases or units. Availability determinations will be made only for the phases of the project proposed for current construction. Availability determinations will be valid for a period of one year from the date of project approval. The Developer must submit any data required for accurately projecting sewer flow quantities and rates. The Developer is also responsible for furnishing any other information deemed necessary for evaluating service feasibility.

402.3. Sewer Construction Plans

All plans for public sewer facilities shall be prepared in accordance with the requirements outlined herein and as required in regulations promulgated by the Georgia Environmental Protection Division. All sewer line extension projects require approval by GA EPD. The developer shall be responsible for submitting plans and other data to the Georgia EPD for required approvals. The following requirements will apply to preparation of sewer construction plans:

- A. The site plan shall show land lots, district and north arrow, lot layout, and existing and proposed building locations. The site plan shall also show all existing and proposed streets and their names, all streams, water courses, existing and proposed storm drains, and the discharge points for all drainage structures. The site plan shall accurately show the topography with contour lines at two-foot intervals. Elevations shall be referenced to Mean Sea Level and plans shall note the location of the specific USGS Vertical Elevation Marker used for deriving site elevations. The site plan shall show the sewer layout with existing and proposed lines, manhole numbers, line designation and direction of flow, and proposed sewer easements and other utility easements. It shall also show the location of proposed services.
- B. The design of cross-country sewer lines and force mains shall be based on field-run surveys. The site plan for cross-country sewer lines and force mains need not show contour intervals on the plan view, but the profile views shall accurately depict ground level elevations and elevations of all relevant structures. Site plans for lift stations shall show existing and proposed contours. In the event the subdivision is developed in phases, the final construction plans for sewers may be submitted in phases or units. However, at the time the first phase is submitted, the engineer will submit one copy of the preliminary layout of the entire sewer system. This layout will show all lines required to serve any lots to be developed and any surrounding property that may be served through the property.

The site plans for each phase or unit shall contain a location drawing showing the relationship of the phase or unit to the total project and to the surrounding streets and sewers.

- C. Profiles should have a horizontal scale of not more than 100 feet to the inch for cross-country lines and 40 feet to the inch for congested areas, and a vertical scale of not more than ten feet to the inch. The plan view should be drawn to a corresponding horizontal scale. The plan view should normally be shown on the same sheet as the profile. In any case both the plan and profile view should have line designations, station numbers, manhole numbers and any other indexing necessary to easily correlate the plan and profile view. Plans and profiles shall show:
1. Location of streets, sewers and utility easements.
 2. Profile of ground surface, the grade of the sewer between each two adjacent manholes, size and material of pipe, length between manholes, invert of sewer in and out of each manhole, and ground surface elevation at each manhole. All manholes shall be numbered on the plan and correspondingly numbered on the profile and station numbers will be shown for each manhole. The profile of adjacent parallel stream beds and of adjacent lake surfaces, low buildings, and lots shall be shown on the profile.
 3. Locations of all special features such as connection to existing sewers, concrete encasements, collar walls, ductile iron pipe sections, elevated sewers, piers, special manhole covers such as vented outfall covers or sealed covers, etc.
 4. All known existing structures both above and below ground which might interfere with the proposed construction, particularly water mains, gas mains, storm drains, utility conduits, etc.
 5. The vertical datum used shall be the elevation above mean sea level with benchmarks shown on the plans.

402.4. Erosion and Sedimentation Control Plan

- A. The Georgia Soil and Water Conservation Commission has taken provisions of ACT 599 and published a Manual for Erosion and Sediment Control in Georgia, 1992 Edition (or any more current edition as they are published). Sewer construction plans and specifications shall include appropriate segments of this manual. Developers, Engineers and Contractors performing work in the City are responsible for acquiring a copy of this manual and using the best practical methods contained therein to control the erosion and sedimentation of the construction site in conformance with the intent of ACT 599. Copies may be purchased from the Georgia Soil And Water Conservation Commission, P.O. Box 8024, Athens, Georgia 30603. For additional information, call the Commission at 706-542-3065.
- B. Plan: An erosion and sediment control plan, meeting the requirements of applicable state regulations, shall be provided as part of the overall construction drawings.

402.5. Detail Drawings

- A. Sewer Details: Special detail drawings made to a scale to clearly show the nature of the design shall be furnished to show the following particulars:
 1. All stream crossings and storm drain outlets with elevations of the stream bed and of normal and extreme high and low water levels. Gravity sewer lines shall cross streams (1) where the top of pipe is below the stream channel elevation, or (2) where the bottom of the pipe is at least 36-inches above the stream base flow elevation or where the bottom of the pipe is above the 50-year return interval stream flow elevation, whichever elevation is higher.
 2. Details of special sewer joints and cross sections.
 3. Details of special sewer appurtenances such as manholes, service connections, elevated sewers, piers, pipe bedding, special highway crossings, railroad crossings, etc.
- B. Erosion Control Details: Erosion Control Details and Symbols may be taken directly from the Manual For Erosion and Sediment Control In Georgia, current edition, referenced above.

402.6. As-Built Drawings

- A. At the completion of construction (and preferably prior to the final field inspection), "As-Built" drawings of the project shall be submitted to the city to serve as a permanent record of the project and shall be furnished in the form of one set of mylar sepias (or other suitable form of reproducible drawings) and two sets of blue line copies. Acceptance by the city will be made only after satisfactory as-built drawings have been submitted. As-built drawings will be in the same format as the original construction plans and normally will be an updated version of the construction plans. As-built drawings shall be prepared by the project design professional. Each sheet of these drawings shall bear words "As-Built" or "Record Drawings." Guidelines for preparation of As-Built:
 1. As-Built drawings will be same format as the original construction plans.
 2. Contour lines are required.
 3. Road names and lot numbers should be on plan.
 4. "As-Built" or "Record Drawing" is to be stamped in large clear print on plans.
 5. Sheet should be no larger than 24" X 36."
 6. Lateral locations must show distance from the downstream manhole. Ends of lateral lines must show distance from downstream manhole and offset distance from the main line. Approximate depth of end of lateral must be indicated.
 7. Show elevations of manhole inverts and tops.
 8. Show field-measured distance between manholes.
 9. For any lines which are outside paved streets, show the field-measured azimuth or bearing of the line from manhole to manhole.
 10. Show actual slope of pipe.
 11. When a phase of a subdivision is completed, a location sketch of entire subdivision

with said phase outlined shall appear on plans.

12. Maximum error of as-built measurements shall be:

- a. Manhole inverts: measure to 0.10 foot with maximum vertical error of 0.15 foot per 1,000 feet of horizontal traverse.
- b. Manhole tops: measure to 0.10 foot with maximum vertical error of 0.50 foot per 1,000 feet of horizontal traverse.
- c. Horizontal Locations: Measure to nearest 1.0 foot with allowable error of 1.0 foot per 1,000 feet of traverse.

- B. As-builts must also comply with all requirements as described in Sections 205 and 600 of these Development Standards.

402.7. Easement Acquisition and Utility Encroachment Permits

- A. It shall be the responsibility of the developer to obtain any off-site easements required to connect the project to existing public sewers. Easements will be conveyed to the City for all facilities which are to be conveyed to the city. This process must be started early enough to allow construction of the sewer before any building construction is to begin. No building permits or sewer tap applications can be issued until off-site sewers have been constructed and accepted. This condition shall override any provision for speed up of house starts such as furnishing a bond to guarantee completion of the streets and other appurtenances.
- B. All easements shall allow adequate room to construct the sewer and appurtenances. Permanent easements shall be a minimum of 20 feet wide, ten feet on each side of the line; except that when the depth of the sewer exceeds ten feet the required sewer easement width shall increase such that the easement width is at least twice the depth from the ground surface to bottom of the pipe. Designs involving utilities sharing a common easement will be coordinated with the utilities to ensure adequate separation of utilities and overall easement width is achieved.
- C. Easement drawings for work outside the development shall be furnished and recorded prior to approval of the sewer plans. The drawings shall be of a size suitable for legal recording and shall be prepared by a Registered Land Surveyor. The drawing will show property lines, the name of property owners with the length of line encroaching on each property owner, size of line, line designation, manhole numbers and stations, width of permanent and construction easement, scale of drawing, north arrow, land lot and district numbers, and a tie to the nearest land lot corner. Any streets or other existing easements shall also be shown. The title block shall contain the following information:
 1. City
 2. Name of outfall or development
 3. Easement type (utility easement for water or sewer)
 4. Name of property owner
 5. Land lot, District & Section
 6. Submittal date
 7. Revision date(s)

- D. The engineer shall furnish appropriate drawings for any submittal to agencies such as any state or federal highways, railroads, power lines, water lines, gas lines, petroleum lines, or any other utility lines on which the sewer construction will encroach. The drawing shall normally be 8-1/2" X 11" or 8-1/2" X 14" and shall show a plan view and profile view. The drawing will show the same information required for easement drawings. Also, the drawing will show the right-of-way of the existing street or utility, the owner's designation of the line, the name or number of the nearest intersection or milepost or tower number and the distance to that appurtenance. The clearance distance between the street surface, or the bottom of the rail, or the utility and the sewer will be shown. The drawing will show the type of material to be used for the sewer and the method of construction to be used. The drawing will also contain any other special information required by the controlling authority of the facility on which the sewer is encroaching. A minimum of five copies of the utility encroachment drawing will be furnished with the plans when they are submitted for approval. The engineer is also responsible for furnishing a completed encroachment permit application ready for signature by Department Superintendent. Construction permits will not be issued until the utility encroachment permit has been obtained and until any special conditions such as insurance requirements have been complied with.

403. Gravity Sewer Design Criteria

403.1. General

The criteria listed herein is not intended to cover all aspects of design, but rather to mention the basic guidelines and those particulars that are required by the City Water and Sewer Department. For more detailed criteria, the reader should refer to standard references such as "Ten States Standards," Georgia EPD Rules, "Gravity Sanitary sewer Design and Construction," ASCE – Manuals and Reports on Engineering Practice No. 60, Water Pollution Environment Federation Manual of Practice No. FD-5, and other available literature.

403.2. Types of Sewers

All sewers for the conveyance of wastewater shall be designed as separate sanitary sewers in which groundwater, stormwater or other runoff from roofs, streets, parking lots, foundation drains and any source other than wastewater are excluded. Overflows from sewers shall not be permitted.

403.3. Design Period

Gravity sewer pipelines should, as a minimum, be designed with capacity sufficient to handle the estimated tributary population. Tributary population is considered to be all areas upstream of the discharge point of the system being designed as well as any anticipated pumped flow from other basins. Sewers will be designed and installed to the uppermost property line of the development being served. Consideration should be given to the maximum anticipated capacity of institutions, industrial parks, etc.

403.4. Capacity and Size Determinations

- A. In determining the required capacities of sanitary sewers, the following factors should be considered:
1. Maximum hourly sewage flow.
 2. Additional maximum sewage or waste flow from industrial plants.
 3. Ground water infiltration.
 4. Topography of the area.
 5. Depth of excavation.
- B. New sewer systems shall be designed on the basis of an average daily flow of sewage of not less than 100 gallons per person per day. Normally, all sewers shall be designed for a peak hour flow computed using the following Peaking Factor (PF) formula:

$$PF = \frac{18 + P^{0.5}}{4 + P^{0.5}}$$

Where: P= population in 1,000s of people

Sewers should be designed to carry the peak flow when flowing at a depth of two-thirds pipe diameter. Two-thirds full pipe is considered as the “full flow” capacity of gravity sewer lines. The city land use plan should be consulted, and special consideration given to commercial and industrial areas. Where developers are installing major trunk lines or interceptor sewers, the city's long-range plan should be consulted as a guide and the sewer should as a minimum be of the size called for in the long-range plan. If proposed land use conditions have changed subsequent to the plan, these changes should be factored into the determination.

403.5. Special City Requirements

- A. Distance Between Manholes: Maximum distance between manholes shall be 400 feet.
- B. Depth: Any sewers installed in the street shall, topography permitting, be sufficiently deep to provide five feet of cover over service laterals at the street right-of-way, and over any part of the main or service within the street right-of-way. The maximum depth for PVC pipe shall be 15 feet, depths in excess of this shall be ductile iron. Sewers installed in streets shall have maximum depth of 12 feet. Any sewers on off street easements shall have a minimum of four feet of cover unless ductile iron pipe is used. Filling over the pipe to obtain minimum cover is not allowed.
- C. Drop Across Manholes: All manholes shall be provided with, a minimum vertical drop across the manhole between in and out pipes of 0.1 feet.
- D. Detection tape shall be installed over all sewer pipe. Bury tape 12 inches minimum below grade. Use detection wire on all service laterals.

403.6. Slope

- A. All sewers shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013. The following are the minimum slopes which should be provided; however, slopes greater than these are desirable:

Sewer Size (inch)	Minimum Slope (Ft per 100 Ft)
8	0.40
10	0.29
12	0.22
14	0.17
15	0.15
16	0.14
18	0.12
21	0.10
24	0.08

- B. These minimum slopes will be used only when sufficient flows are expected to maintain a velocity of 2.0 feet per second and maintain a cleaning action in the line. Sewers shall be laid with uniform slope between manholes.
- C. Sewers on 20 percent slope or greater shall be ductile iron pipe and shall be anchored securely with concrete anchors (See Standard Details) to prevent displacement by erosion or shock. Maximum slope of sewers shall be 30 percent and sewers shall be designed at less than 20 percent whenever possible.

403.7. Increasing Size

When a small sewer is connected to a large one, the connection shall not be lower than matching the top of both sewers to the same elevation.

404. Pump Station Design Criteria**404.1. General**

- A. Pumps, pump controls, and level sensing equipment must be manufactured by Xylem FLYGT unless otherwise specified by the City. Lift stations shall utilize two submersible centrifugal pumps each having a capacity of at least 1.5 times the peak hour wastewater influent flowrate.
- B. Lift stations having a capacity of 500 gpm or more shall be reviewed on an individual basis and may have requirements differing from those outlined herein.
- C. Force mains shall be sized to provide a velocity of at least 2.5 per second.
- D. The design shall allow for easy removal of any pump or equipment item without the need

of shutdown of the entire lift station.

- E. The design engineer should consult the City after preliminary design data has been developed for information on approved pump Manufacturers. The City reserves the right to review each application on an individual basis and to reject the use of non-approved manufacturers or designs.
- F. The lift station shall be sized based upon an anticipated upstream flow that will be realized in a seven-year period of basin development. A peaking factor of four will be utilized for design.
- G. Wet well volume and pumping rate shall be sized to provide no less than 4 cycles per hour at peak hour design influent flowrate.

404.2. Submittals

- A. Submittal of construction plans shall include the following lift station information:
 - 1. Capacity calculations. Use one gpm capacity per house on residential developments of less than 200 units, except that the minimum pump capacity shall be 150 gpm.
 - 2. System head calculations; tabulated and plotted on the pump curve. Include a plot of force main velocity.
 - 3. Standard drawings, details and specifications sufficient to ascertain compliance with these regulations.
 - 4. Cycle time. Calculations showing determination of wet well volume and cycle time at design conditions.
 - 5. Storage Volume. Calculations showing volume of storage available in the event of a power outage. The storage zone shall be delineated on plan and profile drawings of the sewer system. (See subsection "Standby Power" below.)
 - 6. Construction drawings and specifications in sufficient detail to ascertain compliance with these regulations.
 - 7. Buoyancy computations showing that structures are protected against flotation.
- B. Shop Drawings. After construction plan approval but before purchasing any lift station equipment, shop drawings shall be submitted including the following information:
 - 1. Manufacturer's catalog sheets, performance curves, installation drawings, specifications and list of options for the specific pump that is offered for approval.
 - 2. Similar catalog data for controls, valves, hatches, yard hydrants, precast wet well and other manufactured items.
- C. Certification. After installation and before placing the system into full operation, the work must be inspected by the Developer's Engineer who must then issue a certification to the City verifying that all work has been done in accordance with approved plans. After acceptance of the work by the City, a factory representative shall inspect and start up the system certifying rotation, capacity, amperage draw, lack of vibration and other standard check points. This certification shall state the beginning date of the warranty and include a copy of the warranty. The Factory Representative shall provide a minimum of four hours

training.

- D. Operation and Maintenance (O&M) Manuals. On or before the date of start-up, five sets of factory O&M Manuals shall be delivered to the City. These shall include the name of the purchaser, the serial numbers of pumps, detailed wiring schematics, telephone number and address for purchase of parts.
- E. After construction is complete as-built drawings shall be furnished including one set of mylar sepias plus two sets of prints.

404.3. Spare Parts:

- A. Lift stations shall be supplied with a spare complete pump/motor combination plus a complete set of manufacturer's recommended spare parts.

404.4. Standby Power:

- A. The minimum requirement for standby power for lift stations shall be that each station have a permanent in-place generator and shall have an automatic transfer switch.
- B. Emergency standby power will be supplied by an on-site emergency generator and must be Caterpillar, Cummins-Onan, Kohler or Baldor. The generator shall be diesel powered with an automatic transfer switch and provisions for an automatic exercise cycle. The transfer switch must be a NEMA-4 enclosure obtained from Cummins-Onan, ASCO, Hubbell, or GE Zenith.
- C. Generators must have 200-gallons minimum fuel storage capacity or 24-hour operating time, whichever is greater and must be supplied with all auxiliary systems necessary for operations (batteries, battery charger, block heater, etc.)
- D. Generators must have a minimum of five-year manufacturer warranty.

404.5. Site Requirements:

- A. Flooding. Lift stations shall remain fully operational and accessible during the 100-year return interval flood event. All electrical controls shall be at least 2 feet above the 100-year floodplain elevation. All motors and mechanical equipment shall be protected against physical damage from the 100-year return interval flood.
- B. Access Road. Access roads shall be paved with a 12-foot-wide asphalt or concrete pavement. Maximum grade shall be 10 percent.
 - 1. Asphalt Pavement: Asphalt pavement cross section shall be six-inch Graded Aggregate Base plus two-inch Type E asphalt).
 - 2. Concrete Pavement: Concrete pavement cross section shall be 3-inches Graded Aggregate Base and 6-inches 4,000 psi compressive strength concrete.
- C. Ownership. Both the lift station site and the access road right-of-way shall have ownership

dedicated to the City, and this shall be indicated on the subdivision plat. The dedicated space for the lift station shall include sufficient space for parking of two trucks, plus turn-around, plus slope maintenance. The dedicated width on road right-of-way shall be 30 feet minimum.

- D. Fencing. Lift station sites shall be fenced with a minimum of six-foot-high chain link fencing topped with three strands of barbed wire. Access gates shall be a minimum of 12 feet in width. The space inside the fencing shall be large enough to facilitate service vehicle access to the pumping station wet well and other facilities. A paved turn around area shall be provided whenever the access road length exceeds 200 feet or when the road grade exceeds ten percent.
- E. Water Supply. A metered water supply line (three-quarter-inch minimum size) shall be installed to the site, and a freeze-proof yard hydrant located near the wet well. The hydrant shall be equipped with a suitable backflow preventer.
- F. Lighting. One pole-mounted, photo cell controlled, 150-watt mercury vapor or LED equivalent security light shall be installed. It shall be equipped with a manual on/off switch (located in the main control panel) to override the photo cell control.
- G. Screening. Where natural screening is not present to screen the site from view of residences, special plantings shall be installed to screen the site.
- H. Ground Covers. All unpaved ground areas inside the fence and extending four feet beyond the fence shall be treated with an herbicide and covered with a geotextile fabric, followed with a four-inch thick layer graded aggregate base material. The geotextile fabric shall be a non-woven polypropylene weighing eight oz./S.Y. with a minimum burst strength of 250 psi, such as Amoco type 4553 or equal.

404.6. Design Features:

- A. Wet Well Volume. The wet well volume shall be sized to limit pump cycles to no more than 10 cycles per hour at average daily flow and no fewer than four pump cycles per hour under peak hour influent flow conditions.
- B. Ventilation. For wet wells, the minimum requirement shall be a single 3-inch or larger vent with stainless steel mesh screen designed for natural ventilation. Where conditions are conducive to formation of hazardous conditions (in the design engineer's opinion) then mechanical ventilation shall be provided. For dry wells, mechanical ventilation shall be required.
- C. Structures. Submersible lift stations shall have a wet well structure and a separate valve pit.
 - 3. Wet wells may be either round or rectangular and shall have a diameter or width of at least 6 feet with a monolithic base. Wet wells shall be sized to meet cycle time requirements with a drawdown (i.e., the distance between high water level and low water level), of not more than 3 feet nor less than 2 feet. The wet well shall have a 300

- lb per square foot live load rated lockable aluminum hatch large enough for easy removal of pumps. Riser sections in precast units shall be sealed watertight using two strands of mastic and a coating of mortar on the inside and outside of the structure. Exterior riser joints of wet well structure shall have external joint seal bands conforming to requirements of ASTM C877. Structures shall be adequately reinforced for all loading conditions normally encountered during shipping, construction and service. All openings (for pipes, hatch, conduits) shall be either cast in place or neatly cut. Sewer pipe and other pipe connections shall be watertight and shall be accomplished using rubber link pipe connectors by Link-Seal, BMW Company Pipe Seals, Proco PenSeal, or equal.
4. The valve pit shall be a minimum of 6' L x 6' W x 6' D inside dimensions precast concrete with a monolithic base. The valve pit shall have a 300 lb per square foot live load rated 36" X 48" lockable aluminum access hatch centered over the piping. The valve pit shall have drain pipe to the wet well.
- D. Accessories. All materials inside the wet well and valve pit shall be corrosion resistant. Mechanical equipment requiring ferrous metals shall have a coal tar epoxy coating. Guide rails for pumps shall be stainless steel. Miscellaneous metals including fasteners shall be aluminum or stainless steel; anchor bolts shall be stainless steel.
- E. Pressure gage. Pressure gages shall be installed on each force main pipe in the valve pit downstream of the plug valves. The pressure gauges shall be located inside the valve pit and visible from ground level. Pressure gauges shall be stem mounted, with stainless steel cases and glycerin filled dials. The gauges shall be equipped with brass threaded 0.25-inch male connections. The dials of the gauges shall be 3.5 inches in diameter with scale readings in psig ranging from zero to approximately twice the anticipated operating pressure. A slotted adjustable pointer shall be provided with accuracy to conform to ASME B40.100, Grade A. A lever handled gauge cock and filter type snubber shall be provided.
- F. Valves. The discharge pipe of each pump shall have a check valve followed by a plug valve before the two pipes join into a common force main.
1. Check Valve: Swing check valves, 2 inches and smaller, shall have a bronze body, in accordance with ASME B16.11 threaded ends. Swing check valves larger than 2 inches shall meet the requirements of AWWA C508 and have Class 125 flanged end connections. Valves shall have a swing type, replaceable butadiene acrylonitrile or polytetrafluoroethylene (PTFE) disc. Valves shall be rated for 200 psig service.
 2. Plug Valve: Nonlubricated type eccentric valves, 3 inches through 16 inches, shall be rated for 175 psig service at 140 degrees F. Valves shall have drip-tight shutoff with pressure from either direction, and cast iron bodies in accordance with ASME B16.1 flanged or AWWA C111/A21.11 mechanical joint end connections. Plugs shall be cast iron with round or rectangular ports of no less than 80 percent of the connecting pipe area and coated with hard natural rubber. Valves shall have nickel seats, self-lubricating stainless steel stem bearings, and multiple stem seals. Lever operators are allowed on quarter-turn valves 3 inches and smaller. Plug valves 4-inches and larger shall have gear and handwheel operators.

- G. Surge control valves. The pumping system shall be checked to determine if a surge control valve is required. If a surge control valve is required, it shall be located within the valve pit on the common force main and a drain line installed to drain to the wet well.

404.7. Pump Features:

- B. Pumps shall have the following features:

1. Non-clog impeller.
2. Be capable of passing a three-inch sphere.
3. Be capable of dry operation without overheating.
4. Have dual mechanical seals with seal leak indicator light in the control panel.
5. Pump and motor casings shall be cast iron, and all fasteners shall be stainless steel.
6. Motor shall be selected to be non-overloading under all operating conditions.
7. Motor winding shall have a heat sensor with auto reset to prevent overheating; three-phase motors shall have two sensors.
8. Operating speed of the pump shall not exceed 1800 rpm without special approval.
9. Motor shall have upper and lower roller bearings.
10. The pump shall be automatically connected to the discharge connection elbow when lowered into place and shall be easily removed for inspection or service. There shall be no need for personnel to enter pump well. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump. Each pump shall be equipped with a chain (of aluminum or other non-corrosive material) for easy removal.

404.8. Force Main:

- A. The force main shall be sized for a minimum velocity of two feet per second with one pump operating.
- B. Force mains shall be HDPE (with minimum DR17 IPS or DIPS PE4710), ductile iron pipe or C-900 PVC (minimum DR-25).
- C. The force main profile shall slope continuously upward where practical. If high points occur where air could be trapped in the pipe, then a combination sewage air release valve will be installed within a vented manhole structure at the high points.
1. Combination Sewage Air Release Valve: Combination sewage air release valve shall be rated for a working pressure of 150 psig. Air release valves operating from 2 to 40 psig shall be designated as low-pressure valves, and air release valves operating above 150 psig shall be designated as high-pressure valves. The valve body and interchangeable drop-in-head assembly shall be cast or fabricated 316 stainless steel and shall incorporate a clamp to attach the head assembly to the body at the outlet. The flange clamp must be located at the outlet of the body for ease of cleaning and maintenance. All non-sealing internal metal components shall be 316 stainless steel. Valves 3 inches or smaller shall have NPT inlets and outlets, and valves 4 inches and larger shall have flanged inlets and NPT outlets. Valves shall be furnished with 2-inch inlets and 2-inch

outlets. Valve assemblies shall be furnished with 2-inch stainless steel pipe nipples and 2-inch stainless steel ball valve for isolation from force main. Combination sewage air release valves meeting the specified requirements are Crispin Model UX20-2BL, or approved equal.

404.9. Electrical:

- A. Lift station controls and electrical components shall be factory-wired in completely weatherproof stainless steel metal cabinets (NEMA 4X stainless steel). The cabinet shall be provided with condensate heaters. Spare fuses of each type that is used in the electrical/control system shall be furnished.
- B. A main circuit breaker shall be installed to disconnect power to the entire station.
- C. Three phase power will be provided for all motors.
- D. Protection against voltage surge and loss of a phase shall be provided.
- E. The factory-wired panel shall be equipped with a ground bus and neutral bus. Terminal shall be suitable for either aluminum or copper wire. All internal panel wiring shall be copper.
- F. Motors shall be suitable for either 230-volt or 460-volt operation. Design engineer shall consult with the current power company in the area to verify specifics pertaining to electrical power availability.
- G. Wet well level shall be controlled by a submersible pressure transducer with two back-up sealed mercury tube float switches. The control sequence within the control panel shall be such as to activate and terminate the operation of the equipment in hand/off/automatic modes of operation. Submersible Pressure Transducer and Float Switches shall be used to sense wet well levels. The system shall provide for the automatic and manual control and alternation of the pumps to maintain a pumped down condition of the wet well. Level controls shall be set to wet well operating levels shown on the plans. The operating level shall be sensed by a pressure transducer or float regulator and shall control each pump operation at level set points. The pump(s) shall remain "on" until a common "off" level is reached. The automatic mode of operation shall allow the pumps to operate as indicated on the drawings.

In the event the "off" or "on" level control regulator fails, the system shall sense the failure and switch the "off" or "on" level to the back-up float regulator. The system shall provide indication for the regulators and indicate a failure of the "off" unit.

Control systems contingent on the "off" or "on" float regulator supplying control power to the other units is not acceptable.

Level controls shall be as follows:

1. Control level 1 Low Level (Pumps Off)
2. Control level 2 High Level (Lead Pump On)
3. Control level 3 Extra High Level (Lag Pump On)

4. Control level 4 Surcharge Level (Alarm Activated)

- H. Transducer Controller: A duplex pump controller shall be provided with analog input for level control. The controller shall contain four output 10 amp relays for pump call, and for low and high level alarms. A regulated 24VDC power supply shall be provided for powering a pressure transducer circuit. The controller shall include a red LED vertical bar graph to display the level as well as pump call and alarm levels. LED's shall be provided for level setting and simulation. The controller shall include a 10 second power-up and a 5 second lag pump delay to prevent pump operation immediately after a power interruption. The analog input shall be transient protected. The controller shall be UL 508 listed as a control device and be a part number SC100-10 as manufactured by MPE Electronics, or equal.

The controller shall contain a Zero adjustment used to make the bar graph display zero feet of water for an input of 4.0mA, and a Span adjustment used to select the point on the bar graph display that corresponds to an input of 20 ma.

The controller shall be UL approved, be power by 120VAC, and shall perform both pump down and pump up functions. The unit shall be able to be ordered with an option to use an absolute pressure transducer that does not require an air line to vent to atmosphere.

All electrical connections shall be made by quick disconnect, phoenix style connectors.

1. Submersible Transducer: A submersible transducer manufactured from 316 stainless steel, containing a piezo resistive sensor with output signals proportional to applied pressure shall be supplied. The electronics shall be padded in a silicon compound for protection and have 316 stainless or plastic composite device protecting the sensing face of the transducer. The transducer shall operate from a power supply voltage of 10-30 VDC and supply a 4-20ma signal proportional to water level into the controller. The control signal shall be transmitted via a vented, molded polyurethane jacketed cable. The cable shall be gripped by a neoprene grommet and potted in place. The transducer shall be protected by a desiccant and surge arrestor. Surge protection shall be provided for the transducer. The suppressor shall be a dual pair module implementing three stage hybrid technology to address over voltage transients and fault currents. The surge suppressor shall be supplied with a female connector and be part number PC642 as manufactured by EDCO.
 2. Transducer Intrinsically Safe Barrier: An intrinsically safe barrier shall be supplied for the transducer as manufactured by Cooper Crouse Hinds or equal. The barrier shall have an LED indicating power with replaceable fuses and dual ground. The barrier socket shall be of plug in design utilizing back plane technology. The barrier shall be UL listed as associated apparatus providing intrinsic circuits for use in Class I, Group A,B,C,D, Class II, Group E,F,G, Class III when used with drawing number SBO3 US1.
- I. Back-up Float Relay Intrinsic System: The back-up float relay system shall be completely independent from the primary level control system. An intrinsically safe control shall be provided for the back-up float level system. The system shall provide for the automatic operation of the pumps and alarm notification. The high-high level back-up float regulator shall call all pumps to run and cause a high-level alarm condition. The low-low level back-

up float shall cause all pumps to stop and cause a low-low alarm.

Use a direct acting float switch consisting of a normally-open contact switch enclosed in a float. Use float molded of rigid high-density polyurethane foam, color-coded and coated with a durable, water and corrosion-resistant jacket of clear urethane. Provide continuous length of connecting cables in accordance with manufacturer recommendations. Mount floats at fixed elevations as shown. Use floats designed to tilt and operate their switches causing sequential turn-on turn-off of the pump, when the liquid level being sensed rises or falls past the float.

The system shall provide indication of the regulators and indicate a failure of any unit.

Intrinsically safe relays shall be plug-in style with LED indicating float switch has activated the relay. Intrinsic relay shall be rated for use in Class I, Groups A, B, C, D, Class II Groups E, F, G and Class III Hazardous Locations. The relay shall be UL listed 73VL, UL 913.

1. Float Switch: A mechanical float switch shall be supplied for level control and be suspended at the desired height from its own cable. The float switch case shall be made of polypropylene and the cable is sheathed with a special PVC compound. The float switch cables shall be supplied with 50' of cable and shall be attached to a stainless steel bracket mounted at the top of the wet well.

J. The pump control system shall include the following features:

1. Lead pump/lag pump alternator.
2. Alarm light and horn to indicate high water level.
3. Seal failure indicating light.
4. Pump failure indicating light.
5. Condensate heater.
6. Lead pump selector switch.
7. H-O-A switch and run light for each pump.
8. Control voltage shall be 120V.
9. Wiring shall be neatly tied and number coded to facilitate maintenance. A schematic diagram shall be furnished with the panel.
10. A 120 V. GFCI type electrical receptacle shall be located at the control panel.
11. Pump stations will be equipped with a remote transmitting unit and telemetering circuitry connecting to the city's SCADA system. The design engineer should consult the city for specific requirements at the beginning of design.

404.10. Warranty:

- A. Regardless of the manufacturer's warranty terms, the Developer will be responsible for all repairs necessary within two years from the date the station is completed and approved by the City. The Developer will be required to furnish such assurances to the City as deemed appropriate by the City to ensure prompt action.

405. Materials Specifications

405.1. Ductile Iron Pipe

A. Material

1. Ductile iron pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51, latest revision. Ductile iron pipe shall be of the thickness according to ANSI A21.50, latest revision, for Laying Condition Type 2.
2. Flange Pipe or Victaulic grooved pipe shall be Pressure Class 350.

B. Fittings

1. Fittings shall conform to ANSI/AWWA C111 A21.11, latest revision, and shall be mechanical joint type.
2. Mechanical Fittings shall conform to ANSI/AWWA C153/A21.53, latest revision. Bolts shall conform to ANSI B18.2.1, latest revision. Nuts shall conform to ANSI B-18.2.2, latest revision. Bolts and nuts shall conform to ANSI B1.1.
3. Flanged Fittings shall conform to ANSI /AWWA C110/A21.10, latest revision. The ANSI/AWWA C110/A21.10 fitting flanges shall have facing and drilling which match ANSI/AWWA C115/A21.15 threaded-on flanges which also match ANSI B16.1 Class 125 flanges except where Pressure Class 250 is noted.

- H. Joints shall conform to ANSI A21.11, latest revision, push on type unless otherwise shown.
- I. Lining for the interior of ductile iron pipe and fittings shall be 40 mils nominal dry film thickness of ceramic epoxy, conforming to ASTM E-96-66, ASTM B-117, ASTM 6-95, ASTM D-714-87, latest revision. Ceramic epoxy shall be Protecto 401, or approved equal. Lining application, inspection, certification, handling and surface preparation of the area to receive the protective coating shall be in accordance with the manufacturer's specifications and requirements.
- J. Exterior coating shall be an approved bituminous coating 1 mil thick in accordance with ANSI/AWWA C153/A21.51, latest revision.
- K. Polyethylene Encasement When required polyethylene encasement shall conform to ANSI A21.5, latest revision for high density, cross-laminated polyethylene film. Polyethylene encasement shall be used on all ductile iron piping, fittings, valves and appurtenances and installed according to the requirements of ANSI A21.5, Sec. 4.4, Method A.
- L. Bonded Joints: Where required on ferrous pipe, a metallic bond shall be provided at each joint, including joints made with flexible couplings, caulking, or rubber gaskets, of non-ferrous-metallic piping to effect continuous conductivity. The bond wire shall be Size 1/0 copper conductor suitable for direct burial shaped to stand clear of the joint. The bond shall be of the thermal weld type.

405.2. PVC Pipe

A. Pipe Material

1. Pipe shall be made of PVC Plastic having a Cell Classification of 12454 with a minimum tensile modulus of 500,000 psi as defined in ASTM D1784.
2. Pipe for gravity sewer shall meet the requirements of ASTM D3034 for pipe 15" and smaller, latest revision (SDR 26). Pipe 18" and larger shall conform to ASTM F679.
3. Pipe for sewer force mains 4-inches through 12-inches shall conform to AWWA C900, DR-25 (165 psi), latest revision, unless shown otherwise on the Drawings.
4. PVC Pipe less than 4 inches in diameter shall be Class 200, DR21 conforming to ASTM D2241, latest revision with pipe made from PVC 1120 material.
5. Pipe shall be GREEN in color.

B. Certification

1. Each length of pipe shall be marked with the following information: Manufacturer, Size, PVC Cell Classification, Type PSM, SDR, PVC Gravity Sewer Pipe, ASTM D3034 and Code Number.

C. Outside Diameter

1. Pipe shall have an outside diameter equal to the outside diameter of ductile iron pipe.

D. Joints

1. PVC pipe joints shall have integral bell and spigot joints with elastomeric gasket conforming to ASTM F477, latest revision, integral thickened wall bell end. Gasket groove wall thickness shall meet or exceed the thickness of the pipe barrel.

E. Fittings

1. Fittings on 3-inch and larger pipe shall be ceramic epoxy lined ductile iron conform to ANSI/AWWA C-153/ A21.53, latest revision.
2. Fittings shall be made of PVC Plastic having a Cell Classification of 12454 B, 12454 C, or 13343 C as defined in ASTM D1784.

M. Affidavit of Compliance

1. The manufacturer of the pipe shall submit evidence of having consistently produced pipe of the specified quality and having satisfactory performance results in service over a period of not fewer than 5 years, unless otherwise specified.
2. At the time of shipment, the manufacturer shall submit 3 copies of written certification and test results to the Engineer that the pipe was manufactured and tested in accordance with the above specifications.

405.3. Polyethylene Pipe

- A. High Density Polyethylene Pipe (HDPE), high extra molecular weight for sewer force mains shall conform to ASTM D3350, latest edition, and cell classification PE4710, minimum DR 17. Pipe shall be Driscopipe 1000, or approved equal. Minimum nominal size shall be 1-1/2 inch.
- B. Fitting supplied shall be molded or manufactured by the same company that

manufacturers the pipe itself in accordance with these specifications and shall be molded or manufactured from polyethylene compound having a cell classification equal to or exceeding the compound used in the pipe.

- C. Pipe may be joined by the fusion technique or Brass (Domestic Made), or bronze compression type fittings shall be used. Flared connections will not be permitted.
- D. Marking tape over the pipe and tracer wire attached to the pipe shall be required.
- E. Pipe shall be supplied with Green stripe for identification.

405.4. Reinforced Concrete Pipe (RCP):

- A. General: The use of reinforced concrete pipe for sewers will be subject to approval on a case-by-case basis depending upon size of the sewer and site conditions. When approved for use, concrete gravity sewer pipe shall meet all materials and testing requirements of ASTM C-76, ASTM C-443, and ASTM C-497 (except where modified herein).
- B. Quality Assurance: The Contractor must submit to the Owner and Engineer the concrete pipe manufacturer's evidence of a working Quality Control Program for approval, prior to any pipe being manufactured. The program and standards of manufacturing must be established and well defined. The program must include the minimum following requirements:
 - 1. A full time Quality Control Technician.
 - 2. A complete and working Quality Control Laboratory capable of testing and recording the requirements set forth in these Specifications for concrete pipe.
 - 3. A zero-defect program for daily material testing and finished product testing to assure quality control as the pipe is being manufactured and shipped for this particular project.
- C. Guarantee: The Contractor shall provide a guarantee against defective materials and workmanship in accordance with the requirements of the section entitled "Guarantees and Warranties" of these specifications.
- D. Material:
 - 1. All concrete pipe and fittings 12 inches in diameter and larger shall be reinforced concrete sewer pipe conforming to the latest requirements of ASTM C-76 with the following modifications: All concrete pipe with zero—20 feet of fill shall be a minimum of Class III with 4500 psi concrete. All pipe with 20—30 feet of fill shall be Class IV with 4500 psi concrete. All pipe with 30 feet of fill and over shall be Class V with 5500 psi concrete.
 - 2. Pipe shall have circumferential reinforcement as required for the particular class of pipe furnished. The bell and spigot of the joint shall contain circumferential and longitudinal reinforcement. Reinforced concrete pipe shall be centrifugally cast or vibrated, horizontally or vertically cast or made on a Packer head machine and shall be furnished in lengths not more than 20 feet and not less than eight feet, except where

- short lengths are required for construction conditions. Reinforced concrete pipe shall have bell and spigot joints suitable for the use of a rubber gasket to be provided as a part of this item.
3. Concrete pipe for sanitary sewers shall have bell and spigot joints consisting of self-centering steel joint rings securely attached to the pipe reinforcing steel. The steel joint rings shall be suitable for use with a rubber O-ring type gasket to be provided as part of this item.
 4. Bell and spigot joints consisting of self-centering steel joint rings shall have the joint rings securely attached to the pipe reinforcing steel. The rings which form the joint shall be made so that they will join with a close, sliding fit. The joint surfaces shall be such that the rubber gasket shall be confined on all sides and shall not support the weight of the pipe. The spigot ring shall have an external groove accurately sized to receive the gasket. Special section steel for spigot rings shall conform to ASTM A-283, Grade A, or ASTM A-306, Grade 50. The bell ring shall be flared to permit gradual deformation of the gasket when the joint is assembled. Minimum thickness of bell rings shall be three-sixteenths of an inch. Bell rings one-quarter inch or thicker shall conform to ASTM A-283, Grade A, or ASTM A-306, Grade 50. Bells less than ¼ inch thick shall conform to ASTM A-570, Grade A. Each ring shall be precisely sized by expansion beyond the elastic limit of the steel and then gauged on an accurate template. All exposed surfaces of both rings shall be protected by a corrosion-resistant coating of zinc applied by an approved metalizing process after proper cleaning.
- E. Lining: The coal tar epoxy system shall be Koppers Bitumastic 300 M, Porter Tarsel, Wise Chem CTE 200, Amrcoat 78, Protecto 101 or equal.
1. The interior concrete or mortar surfaces of pipe and fittings are to be sandblasted and painted with one coat of a high-build, coal tar epoxy system or two coats of a standard coal tar epoxy system. The dry film thickness of the total system shall be 16 mils minimum on concrete or mortar surfaces and on steel joint ring surfaces.
 2. Sandblasting shall result in a clean dry surface free of oil, grease, or other contaminants. Any air pockets over one-quarter inch in diameter and one-eighth-inch-deep appearing on the concrete surface after sandblasting will be filled with an epoxy sand patching material such as those sold by Sherwin-Williams, Glidden, or Moran. The epoxy sand patch should be troweled prior to the application of the coal tar epoxy.
 3. Any steel surfaces to be painted should be sandblasted, solvent cleaned, or wire brushed prior to painting. Application of the coal tar epoxy shall be by brush, roller, or spray system using equipment recommended by the manufacturer of the coal tar epoxy system. The temperature during application and curing of coal tar epoxy shall be as recommended by the manufacturer of the coal tar epoxy. Time between coats (if applicable) shall be as recommended by the manufacturer of the coal tar epoxy.
 4. If the inside joint recess will be mortared and painted with coal tar epoxy in the field, the pipe supplier shall not paint the inside vertical surfaces at the ends of the pipe. When the inside joints will not be mortared in the field, the pipe supplier shall paint the inside vertical concrete or mortar surfaces at each end of the pipe.
 5. The paint shall be extended continuously over the front lip of the steel spigot ring and a

minimum of two inches onto the sealing surface of unrestrained bell rings so that all interior joint surfaces which can be exposed to the fluid inside the pipe are coated.

405.5. Precast Concrete Manholes:

- A. Manholes: Sewer manholes shall consist of precast reinforced concrete sections with eccentric top section, or flat slab for shallow manholes, and a base section conforming to the typical manhole details as shown on the Standard Detail Drawings. Flat top manholes will be approved only if a need for such can be demonstrated by the design engineer.
- B. Manhole Sections: Precast manhole sections shall be manufactured, tested, and marked in accordance with the latest provisions of ASTM Standard Specifications, Serial Designation C 478.
- C. Manhole Section Joints: Joints of the manhole sections shall be of the tongue-and-groove type with the inside tongue in the up position, sections shall be joined using a double strand seal of butyl mastic sealant (Kent Seal, Ram-Nech or equal). The inside and outside of all joints, lift holes and any bricks or precast adjusting rings shall be covered with non-shrink grout.
- D. Lift Holes: Each section of the precast manhole shall have not more than two holes for the purpose of handling and laying. These holes shall be sealed before backfilling using either rubber plugs specially designed for this purpose or with quick-setting cement mortar.
- E. Manhole Steps: Manhole steps shall be cast into the manhole riser and cone sections by the manufacturer. Steps shall be 12 inches wide, 5-inch minimum projection, arranged in a single row 12 inches on center. Steps shall be of a tough copolymer polypropylene that encapsulates a 1/2-inch, Grade 60, steel reinforcing rod. Manhole steps shall have serrated tread and tall end lugs and shall have a 1,500 pound pull out resistance and a 300-pound impact resistance. See Standard Detail S009.
- F. Manhole Castings: Provide covers with the inscription "SANITARY SEWER" cast into the cover in lettering at least 2 inches high. Covers shall be 25-3/4 inches in diameter and shall be 2-inches thick at the bearing surface. Frame shall provide a 24-inch clear opening. Manhole covers and frames shall be USF 227, or equal.
- G. Pipe Holes: Holes in precast bases to receive sewer pipe shall be precast at the factory at the required locations and heights. Knocking out of holes in the field will not be permitted on new construction; however, holes can be cored in the field with a coring machine. All manholes shall have Kor-N-Seal by Press Seal Gasket Corporation (or equal) rubber boots for all pipe entries/exits.

405.6. Pipe Casing:

- A. Steel casing pipe shall be used where boring and jacking of more than 20 feet in length is required for installation.

- B. Steel casing pipe shall be Standard Class thickness with a minimum yield strength of 35,000 psi and shall conform to the requirements of ASTM A139. It shall be fully coated on the exterior and interior with a coal tar coating.
- C. Wherever steel casing is required, the carrier pipe shall be ductile iron pipe with restrained joint gaskets. Approved spacers made of stainless steel straps with UHMW skids shall be used to center the carrier pipe. See Standard Detail P009.

405.7. Plug Valves

- A. Plug valves shall be used on all sewer applications unless approved otherwise by the Engineer. Plug valves shall be of the non-lubricated eccentric plug type with a resilient seat seal unless otherwise specified and shall be furnished with mechanical joint ends in accordance with ANSI Standard A21.11, latest revision, unless specified otherwise on the Drawings. Port area for all valves shall be a minimum of 80% of the full pipe area. Seats shall be of non-metallic with seat coating thermally bonded and in full conformance to AWWA Standard C550, latest revision.
- B. Valve bodies shall be of ASTM A-126 Class B cast iron. All exposed nuts, bolts, washers, springs, etc. shall be stainless steel. Resilient seat seals shall be of Buna-N or Neoprene, suitable for use in sewage service. Valve bodies shall be of ASTM A-126 Class B cast iron. Valves shall be furnished with permanent corrosion resistant bearing surfaces in the upper and lower journals designated to withstand full rated bearing loads and provide long life in sewage service.
- C. Valves furnished shall have their internal wetted surfaced protected by nonmetallic coatings factory applied, thermally bonded and in full conformance to AWWA Standard C550, latest revision.
- D. Nominal valve pressure ratings, body flanges and wall thicknesses shall be in full conformance to ANSI B16.1-1975. Valves shall seal leak-tight against full rated pressure in both directions. Valve seats shall be tested and provide leak-tight shut-off to 175 psi for valves 14" and larger, with pressure in each direction. A hydrostatic shell test at twice rating shall be performance with plug open to demonstrate overall pressure envelope integrity.

405.8. Combination Sewage Air Valves

- A. Combination sewage combination air valves shall be provided at points shown on the force main and shall be 2 inch size unless noted otherwise. The valves shall be capable of venting air from the pipeline while filling, permit air to reenter the pipeline to reduce the potential for vacuum on the system, and release air from the pipeline while the pipeline is pressurized. Combination sewage air release valve shall be rated for a working pressure of 150 psig. Air release valves operating from 2 to 40 psig shall be designated as low-pressure valves, and air release valves operating above 150 psig shall be designated as high-pressure valves. Valves 3 inches or smaller shall have NPT inlets and outlets, and valves 4 inches and

larger shall have flanged inlets and NPT outlets. Valves shall be furnished with 2-inch inlets and 2-inch outlets. Valve assemblies shall be furnished with 2-inch stainless steel pipe nipples and 2-inch stainless steel ball valve for isolation from force main.

- B. The valve body and interchangeable drop-in-head assembly shall be cast or fabricated 304 or 316 stainless steel and shall incorporate a clamp to attach the head assembly to the body at the outlet. All non-sealing internal metal components shall be 316 stainless steel. The valve shall be able to operate at pressures up to 300 psi with all internal parts and floats of stainless steel. The flange clamp must be located at the outlet of the body for ease of cleaning and maintenance.
- C. Combination sewage air release valves meeting the specified requirements are Crispin Model UX20-2BL, or approved equal.

406. Execution

406.1. Licensing and Safety:

All contractors who work on sewer systems that will be owned by the City must be licensed in accordance with State of Georgia law and local ordinance. Compliance with applicable safety regulations is the responsibility of each company engaged in the work; the city assumes no responsibility for the actions of others on the job site. It is the responsibility of those installing sanitary sewers, lift stations and related appurtenances to conform to OSHA regulations, 29 CFR Part 1926, Subpart P, Paragraph 1926.650 through 1926.653. Publications from OSHA can be obtained by contacting OSHA Publications Distribution, Washington, D.C.

406.2. Construction Permits:

- A. No construction shall be allowed until a construction permit has been issued by the City.
- B. The contractor shall submit one copy of the approved construction plans which have been stamped approved. The contractor shall furnish his name and address, telephone number. He shall also furnish the name of the person in charge of the project and any subcontractors and the name and telephone number of a responsible person who can be contacted in case of emergencies during nonworking hours.
- C. The contractor shall furnish his construction schedule and shall notify the City 24 hours prior to doing any work. Once the contractor begins work, he shall proceed in a workmanlike manner and shall complete the work in a reasonable time without undue off days and periods of inactivity which make it hard for the City to keep up with his activity.

406.3. Changes from Approved Plans:

Any major changes from the approved plans will require that the engineer submit revised drawings along with a request explaining the reason for the change prior to construction of the change. Any deviation from City standards will be considered a major change as will any change

that will affect capacity, longevity, operation or maintenance of the facility. Any deviation from approved materials will not be accepted without prior approval.

406.4. Handling:

Pipe and fittings shall, unless otherwise directed, be unloaded at the point of delivery, hauled to and distributed at the site of the project by the Contractor. They shall at all times be handled with care to avoid damage. In loading and unloading, they shall be lifted by hoists or slid or rolled on skidways in such a manner as to avoid shock. Under no circumstances shall they be dropped. Pipe handling on skidways must not be skidded or rolled against pipe already on the ground. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

406.5. Trench Excavation:

- A. Sewer lines shall normally be installed by open-cut trench excavation. Trenches shall be cut true to the lines and grades shown on the plans.
- B. Pipe trenches shall not be excavated more than 100 feet in advance of pipe laying, and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic.
- C. All excavations shall be adequately guarded with barricades and lights in compliance with all OSHA and Georgia Department of Transportation requirements so as to protect the public and workers from hazard.
- D. Excavations adjacent to existing or proposed buildings and structures, or in paved streets or alleys shall be adequately protected by the use of trench boxes, sheeting, shoring and bracing to prevent cave-ins of the excavation, or the undermining or subsequent settlement of adjacent structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition.
- E. Streets, sidewalks, landscapes, and other public and private property disturbed in the course of the work shall be restored to as near as original condition as possible or better in a manner satisfactory to the City.
- F. Trenches shall be kept free of water by pumping or well-pointing, as determined by the contractor. No structure shall be built or pipe shall be laid in water. Water shall not be allowed to flow over or rise upon any concrete, masonry or pipe until the same has been inspected and the concrete or joint material has thoroughly set. All water pumped, bailed, or otherwise removed from the trench or other excavation shall be conveyed in a proper manner to a suitable place of discharge. Such discharge shall not cause injury to public health, property, work completed, work in progress, or to any street surface, or cause any interference with the use of same by the public.
- G. Construction occurring around active sewer systems shall be done in such a way so as to

prevent the spillage of wastewater.

- H. Sewer line excavation shall be 15 feet or greater distance from buildings or structures. Sewer lateral excavation shall be located 5 feet or greater from property corner.

406.6. Rock Excavation:

Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws and regulations governing blasting and the use of explosives. Rock excavation near existing pipelines or other structures shall be conducted with the utmost care to avoid damage. Injury or damage to other structures and properties are the sole responsibility of the installation contractor and shall be promptly repaired by the Contractor to the satisfaction of the City and property owner.

Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

Size of Pipeline Inches	Depth of Excavation Below Bottom of Sewer Pipe, Inches
4 to 8	6
8 to 18	8
18 to 30	10

The undercut space shall then be brought up to grade by backfilling with Size #57 crushed stone material or approved equal.

406.7. Pipe Installation

- A. No pipe shall be laid which is known to be defective. All such material that is defective in manufacture or has been damaged in transit or after delivery shall be removed from the job site.
- B. All pipe shall be thoroughly cleaned before being laid and shall be kept clean until accepted in the completed work.
- C. Pipe shall be laid using a laser to conform accurately to the lines and grades shown on the drawings.
- D. PVC sewer pipe shall be installed in accordance with ASTM D2321 and Section 02221. Bedding shall be Class I, II or III.
- E. Pipe shall be placed on the site of the work parallel with the trench alignments and with bell ends facing the direction in which the work will proceed unless otherwise directed. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times.
- F. Cutting pipe for inserting fittings, or closure pieces, shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise directed, pipe shall be

laid with the bell ends facing the direction of laying. Wherever necessary to deflect the pipe from straight line, whether in the vertical or horizontal direction to avoid obstructions, the degree of deflection shall be in accordance with manufacturer's instructions. No pipe shall be laid in water or when the trench condition or the weather is unsuitable for such work. Installation shall be in accordance with manufacturer's instructions.

- G. Construction stake-out will be required prior to construction of sewer lines. As a minimum, the horizontal alignment will be staked at 100-foot intervals and each manhole will be located with a centerline stake and two offset hubs. "Cuts" to invert elevations will be shown for each manhole entry and exit pipe. A copy of the stake-out notes will be provided to the city.
- H. Pipe and accessories shall at all times be handled with care to avoid damage. Whether moved by hand, skidways or hoists, material shall not be dropped or bumped. The interior of all pipe shall be kept free from dirt and foreign matter at all times. Each joint of pipe shall be unloaded opposite or near the place where it is to be laid in the trench.
- I. Sewer pipes shall be joined by "push-on" joints using elastomeric gaskets to affect the pressure seal. The ends of pipe to be joined and the gaskets shall be cleaned immediately before assembly, and the assembly shall be made as recommended by the pipe manufacturer. Lubricant used must be non-toxic and supplied or approved for use by the pipe manufacturer. Sewer pipes shall be laid in the uphill direction with the bells pointing upgrade. Any variation from this procedure shall require approval from the City.
- J. When pipe laying is not in progress, the open ends of installed pipe shall be plugged with a watertight plug to prevent entrance of trench water into the line.
- K. Bedding for pipe shall normally be as listed below (also see city standard details):
- L. In wet areas, the minimum bedding requirements will be increased as required to ensure a stable support under the pipe and on the sides of the pipe.

406.8. Joint Restraints

All valves, plugs, caps, bends 113 degrees or greater and tees shall be provided with restrained joints.

406.9. Manholes

A. General

1. Manholes shall be constructed at such points as designated on the Drawings. In all cases the channel shall be smooth and properly rounded. Special care shall be exercised in laying the channel and adjacent pipes to grade. The connection of the sewer with the wall and channel of the manholes shall be tight and smooth. Pipe connections shall be made to manholes using water stops, standard O ring joints,

special manhole couplings, or shall be made in accordance with the manufacturer's recommendations. The Contractor's proposed method of connection, showing materials selected and specials required, shall be submitted to the Engineer prior to installation.

2. The top of manholes outside of roads, streets and highways shall be constructed to grades 1 1/2 ft above ground surface, unless otherwise shown. Manholes in roads, streets and highways shall be constructed as shown on the Drawings, to match pavement elevations.

B. Precast Concrete Manholes

1. Precast Concrete manholes shall be constructed of reinforced Class "A" Concrete. Walls shall be not thinner than 5 inches, or 1/12 of the inside diameter, whichever is greater. Precast manholes shall meet all requirements of ASTM C478, "Specification for Precast Reinforced Concrete Manhole Sections."
2. Rings shall be custom made with openings to meet the necessary pipe alignment conditions and invert elevations. All inlets and outlets shall be cast in or core drilled. Shop drawings shall be submitted consisting of manufacturer's standard details of various sections, before placing order for manholes. Joints and gaskets shall conform to the applicable provisions of ASTM C443, "Joints for Circular Concrete Sewer and Culvert Pipe using Rubber Gasket" or Ram Neck Remolded Plastic Joint Sealer. The sealing compound shall not leak at the joints (while being tested, if required, at 10 psi) for a period of 24 hours. Bell and spigot surfaces shall be smooth, accurately formed, and provide a loose, sliding fit, with a clearance between the bell and spigot of not more than 1/6 inch. Precast manholes shall be bedded on not less than 6 inches of compacted crushed stone at the Contractor's expense. The crushed stone shall extend not less than 6 inches outside the base of the manhole and under the entire length of pipe within the excavation for the manhole.
3. Connection to existing manholes shall be by coring and placement of a flexible boot of proper size for the pipe diameter. Flexible pipe to manhole connector shall accommodate both angular and lateral misalignment and shall conform to ASTM C923 specifications. All pipe clamp bands and expansion bands shall be stainless steel. Flexible connectors shall be Lock Joint, Kor-N-Seal II, or approved equal.

C. Drop Manholes

1. Drop manholes shall be precast conforming to ASTM C478 and shall be built at the locations and in conformance with the details shown where the difference in invert elevation between incoming pipe and manhole invert is more than 2 feet. The drop pipe shall be the same size as the influent sewer.
2. In such cases that a greater than 2 ft drop is unavoidable, use an outside drop as shown in Standard Detail S001.

D. Stub Outs: Stub outs from manholes shall be laid to the proper grade and alignment,

plugged with a suitable pipe stopper and made watertight.

- E. Pipe Connectors: ASTM C923, KOR N SEAL or approved equal.
- F. Inverts: Manhole inverts shall be constructed of either concrete or brick in accordance with details on Standard Detail Drawings and the invert (flow channel) shall have the same cross-section as the sewers which it connects. The manhole bench and invert shall be carefully formed to the required size and grade by gradual and even changes in direction. Changes in direction of flow through the invert shall be made to a true curve with as large a radius as the size of the manhole will permit. Inverts shall have a "smooth trowel" finish. The manhole bench shall be sloped 30 degrees from the manhole wall toward the invert.
- G. Manhole Foundation: The manhole base shall be set upon an 8-inch minimum thickness compacted mat of Size #57 crushed stone graded level. In wet areas the crushed stone mat shall be thickened as needed to provide a non-yielding foundation.
- H. Brick: Brickwork required to complete the precast concrete manhole shall be constructed using one part Portland cement to two parts clean sand, meeting ASTM Specifications, Serial Designation C 144, thoroughly mixed to a workable plastic mixture. Brickwork shall be constructed in a neat and workmanlike manner. Nonshrink grout shall be used to grout interior and exterior exposed brick joints and faces. No more than three courses of brick with nine-inch maximum total depth of bricks may be used to adjust manhole covers.
- I. Masonry Work: Masonry work shall be allowed to set for a period of not less than 24 hours before being placed under traffic or in operation. All loose or waste material shall be removed from the interior of the manhole.
- J. Location: Manholes shall be installed at the end of each line; all changes in grade, size, or alignment; at all intersections; and at distances normally not greater than 400 feet. Cleanouts may be used only for special conditions and shall not be substituted for manholes nor installed at the ends of laterals greater than 150 feet in length. Manholes in cross-country areas shall be elevated so that the top is 18 inches above ground, unless noted otherwise.

406.10. Adapters

Prefabricated flexible couplings or adaptors shall be used for connecting pipe of dissimilar materials.

406.11. Service Connections

- A. Service connections shall be at locations shown on the Drawings. The connection shall be made as shown on the Drawings, or shall be a pipe stubbed out from a manhole, and shall extend to a distance 1 foot from the property line at an elevation of at least 2 feet below the finished floor elevation of the building being served or deeper if necessary to provide service to a building as shown on the Drawings.

- B. Service pipe shall be Ductile Iron Pipe or PVC Sewer Pipe conforming to ASTM D3034 SDR 26. Mylar detectable tape shall be installed where PVC pipe is used.
- C. The end of each of each 4-inch sewer lateral shall be stubbed 24-inches above finish grade at the property line.

406.12. Location and Grade

The line and grade of the sewer and the position of all manholes and other appurtenances will be according to the Drawings. The grade line as given on the profile or mentioned in these Specifications means the invert or bottom of the inside of the pipe, and the price for trenching shall include the trench for the depth below this line necessary to lay the sewer to this grade, but measurements for payment will be made only to the grade line from the finished grade. All necessary lines and grades will be laid out by the Contractor from the control lines and benchmarks furnished by the Engineer.

406.13 Roadway and Other Crossings

- A. At such crossings, and other points as may be required, the trenches shall be bridged in an open and secure manner, so as to prevent any serious interruption of travel upon the roadway and sidewalks, and also to afford necessary access to the premises.
- B. The material used, and the mode of constructing said bridges, and the approaches thereto, shall be submitted to the Engineer for review. The cost of all such work must be included in the price bid for the sewer.

406.14. Stream Crossings:

- A. The preferred method of crossing a river, stream, creek, impoundments, or wet weather ditch is with a minimum of six inches of cover between the lowest point in the stream and the top of outside diameter of the pipe. Ductile iron pipe is required for all stream crossings and shall extend a minimum of ten feet beyond the top of bank on each side. Concrete collars or encasement must be provided at all joints for ductile iron pipe with less than three feet of cover.
- B. The stream bed and sides at the crossing site shall be protected from erosion with the use of Rip-Rap, as defined and sized in the Manual for Erosion and Sediment Control In Georgia, Appendix C Construction Materials, 1992 or most current edition.
- C. Aerial Crossings will require detailed plans and will be allowed only when, in the city's opinion there is no reasonable alternative.
- D. Erosion control measures shall be installed prior to installing pipe across any stream. All work should be performed when stream flows are at their lowest, and all work should be performed as quickly and safely as possible. As soon as conditions permit, the stream bed shall be cleared of all falsework, debris, and other obstructions placed therein or caused by

the construction operations. Erosion control measures can include, but are not limited to, the following items:

1. Silt fencing, type S.
 2. Erosion control check dams.
 3. Channel diversion through temporary storm drain pipe.
 4. Rock filter dams.
- E. The construction and installation of these various structures are detailed in the Manual for Erosion and Sedimentation Control in Georgia or the Georgia Department of Transportation Standards and Construction Details, both of which are available for purchase by the Contractor.

406.15. Casing for Sewers:

- A. Where pipe is required to be installed under railroads, highways, streets or other facilities by jacking or boring methods, construction shall be done in a manner that will not interfere with the operation of the facility, and shall not weaken the roadbed or structure.
- B. The diameter of the bore shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation shall be pressure grouted. Each segment of the casing pipe shall be welded (full circumference butt weld) to the adjoining segment. The completed casing shall have no sags or crowns which cause the grade for any segment to be less than the minimum slope for the size pipe being installed.
- C. The carrier pipe shall be fitted with approved spacers to secure its position within the casing. At each end of the casing pipe the void between the carrier pipe and casing shall be sealed with brick and mortar.

406.16. Replacement of Pavement:

Contractor shall fully restore and replace all pavement, curbs, gutters, sidewalks and other surface structures removed or disturbed, to a condition that is equal to or better than the original condition in a manner satisfactory to the City (see standard details).

406.17. Protection of other Utilities and Structures

- A. Any damage done to existing utility lines, services, poles and structures of every nature shall be repaired or replaced by the Utility Owner at the Contractor's expense. The approximate position of certain known underground lines are shown on the Drawings for information. Existing small lines may not be shown. The Contractor shall locate these and other known utility lines and shall excavate and expose all existing underground lines in advance of trenching operations.
- B. At locations where the sewer is to be constructed in roadways, the Contractor shall take all

pre-cautions, and comply with all requirements, as may be necessary to protect the improvements, including installation and maintenance of lights and barricades for protection of traffic.

406.18. Interim Cleaning

The Contractor shall prevent the accumulation of pipe cuttings and filings, gravel, cleaning rags, and other foreign material within piping sections during fabrication. The piping shall be examined to assure removal of these and other foreign objects prior to assembly and installation.

406.19. Mylar Tape

- A. Mylar maintenance tape shall be installed over the pipe and 12-inches minimum below the finish grade of all pipe. The tape shall be 3 inches wide, of green color and have imprinted on the tape "Caution Sewer Main Below". The tape shall be laid the entire length of the trench.
- B. No. 12 AWG solid plastic-coated copper wire shall be attached to the top of all force mains with duct tape where non-metallic pipe is used. The wire shall be laid the entire length of the trench and shall be continuous. The Contractor shall demonstrate continuity in wire through the entire length of the project. The tracer wire shall be run up and be securely attached at an exposed point and at each end. Wire shall be bonded at splices with 3M DBY-6 Direct Bury Splice Kit at every connection. The City will test all tracer wires in the system prior to acceptance.

406.20. Utility Marking Post

Utility marking post shall be placed every 500 feet or as shown on the Drawings above the utility and at fittings and labeled accordingly. The marking post shall be rigid enough to be easily installed in most soil conditions and durable to withstand repeated impacts. The marking post shall be 3 inches minimum in width and remain flexible from -40 F to +140F with UV stabilizers. The marker shall be highly visible standard fade resistant green color. The warning label shall be White Background and black Lettering with the following imprinted thereon: international No Dig symbol, federal law warning, FORCE MAIN BELOW with letter size and stroke to comply with the Federal Office of Pipeline Safety Specifications, City name, phone number and State one-call number. Markers shall be Rhino Triview, or approved equal. For test stations, the #12 gauge tracer wire shall be run to each marker from the underground utility, as shown in Standard Detail P011.

406.21. Clean-Up:

- A. Prior to requesting the "completion of sewer construction" inspection, the Contractor shall remove and dispose of in an acceptable manner all shipping timbers, shipping bands,

spacers, excess materials, broken material, crates, boxes and any other material brought to the job site.

- B. Any work areas within public right-of-way or property outside of the development that were damaged by the sewer construction shall be repaired or replaced with the same kind of material as existed prior to the damage occurring. All easement areas shall be cleared of trees, stumps and other debris and left in a condition such that the easement can be maintained by bush-hog equipment.
- C. All shoulders, ditches, culverts, and other areas impacted by the sewer construction shall be at the proper grades and smooth in appearance.
- D. All manhole covers shall be brought to grade.
- E. A uniform stand of grass or mulch for erosion protection, as defined in the Manual For Erosion and Sediment Control In Georgia, is required over all construction easements and sanitary sewer easements prior to the City's acceptance of the sewer. Use a grass mixture consisting of at least 50 percent fescue.

406.22. Shop Drawings

Shop drawings shall be submitted on each manufactured item supplied under this Section along with other information as specified herein.

406.23. As-Built Drawings

- A. The City will require As-built Drawings seventy-two 72 hours before final inspection will be made. The Contractor shall keep on the work site one set of clean Drawings to which at the end of every day the necessary information will be marked by the Contractor's superintendent. All deviations from the Drawings shall be stationed and clearly marked. As-built drawings shall include measurements between each valve, bends, permanent land markers, manholes, laterals locations from property corners, fire hydrants & manholes.
- B. As-builts must also comply with all requirements as described in Sections 205 and 600 of these Development Standards.

407. Testing and Inspections

407.1. General

- A. All sewer pipes, manholes and appurtenances shall be inspected by the Engineer and the Contractor. Inspection shall include lamping each sewer segment from manhole to manhole. All defects will be noted and a list thereof transmitted to the Contractor. The City reserves the right to require the Contractor to televise any lines which fail any test.
- B. The developer's contractor will be responsible for the quality, accuracy and workmanship of his completed work.

- C. City personnel will visit the job site on a periodic basis and will make spot checks as they deem appropriate. The City shall have the right to review and inspect all construction and may reject any work that does not meet quality control standards.
- D. Authorized representatives of the City, which may include city employees, the city engineer, state or federal agencies, shall have access to the site for inspection at any time.
- E. Cost for all testing shall be paid for by the developer.

407.2. Communications During Construction:

- A. A preconstruction conference will be required for all projects. The Developer has sole responsibility for scheduling. The Developer, design professional, contractor, and subcontractor(s) are required to meet with the City and all private utilities in this conference. The contractor will notify the city in writing two days before starting construction. The contractor will provide notification by phone any time the work is to be vacated and will provide notice by phone prior to resuming work. The contractor shall request the final inspection.
- B. The city inspector may have informal verbal communications with the contractor foreman or superintendent at any time during construction. The city inspector will not direct the actions of contractor's workmen.

407.3. Concealed Work:

The city inspector may direct that the contractor notify the city and receive inspection approval prior to concealing certain work such as manhole foundations, pipe bedding, tees, bends, service laterals, or other appurtenances. At the City's discretion, the City may require work to be uncovered which was not inspected prior to backfilling.

407.4. Minimum Inspection by Developer:

The following minimum information shall be determined and certified by the engineer:

- A. Horizontal location. Horizontal location of the line will be checked by measuring "as-built" distances between manholes and bearings from manhole to manhole.
- B. Elevation and slope. Elevation of each invert and top of manhole will be measured and recorded. Actual pipe slope will be computed and any segment having less than minimum allowable slope will be rejected and re-done.

407.4. City Inspection:

- A. Manhole construction. Manholes will be visually inspected to check for plugging of lift holes, use of connecting boots, use of joint material, leakage, proper invert construction, proper setting of frame and cover.

- B. Pipe straightness. Sections of sewer line will be visually checked for straightness. A passing section shall show at least 80 percent of a full circle when observed from one end. Any section which fails this visual test shall be further checked. The section shall have water run through it sufficient to fill any sags that may exist. Then it shall have a television camera pulled through it to check for sags. Any sag holding more than one and one-half inches of water will require that the pipe be removed and replaced to proper grade after which the section shall be televised again to verify correction. The contractor may propose alternative methods other than televising sewers for the City's approval to determine failing sections of sewers.
- C. Infiltration. The allowable limit for any section from manhole to manhole will be 100 gallons per day per inch of pipe diameter per mile of pipe. If any infiltration is present at the most downstream point, then it will be measured using a specially-made weir and measurements will also be made at each upstream manhole that has any visible flow of water. Any individual segment which exceeds the allowable infiltration shall be corrected to within allowable limits.
- D. Compaction of backfill. Compaction testing may be required for sewers constructed in paved areas or where pavement is planned. A minimum of two tests per 500 feet of trench line located in roadways will be required. If any of these tests show failing results, then the failing backfill will be removed, re-compacted and re-tested, and one additional area will be tested as well.

407.5. Manhole Pressure Testing

- 1. Where adjustment to grade using bricks and mortar is required, test manholes prior top placement of final elevation adjustment and castings.
- 2. Perform manhole vacuum tests in accordance with ASTM C 1244, or using the following general procedures:
 - a. Plug all lift holes with a non-shrink grout.
 - b. Temporarily plug all pipes entering the manhole and securely brace each plug to prevent them from being pulled into the manhole.
 - c. Place the vacuum testing equipment test head at the top of the manhole in accordance with the testing equipment manufacturer's recommendations.
 - d. Draw a vacuum of 10 inches of mercury on the manhole and close the valve on the vacuum line of the testing equipment and shot off the vacuum pump. Measure the time for the vacuum to drop to 9 inches of mercury.
 - e. The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the values indicated in the following table:

Depth (Ft)	Time (s) per Manhole Diameter
------------	-------------------------------

	48 inch diameter	60 inch diameter	72 inch diameter
0 – 8	20	26	33
8 – 10	25	33	41
10 – 12	30	39	49
12 – 14	35	46	57
14 – 16	40	52	67

- f. If the manhole fails the initial test, permanently correct excessive leakage determined by manhole vacuum testing and repeat vacuum test until the Engineer witnesses a successful test.

407.6. Test for Deflection

- A. When PVC Sewer Pipe is used, the Contractor will be required to perform a deflection test. The deflection may be checked by one of two techniques. One of these is through the use of a specially designed deflectometer which when pulled through a sewer section automatically measures and records at frequent intervals the pipe's vertical and horizontal diameters.
- B. The other technique is to use a "go, no go" mandrel which is sized to such dimension that it will not "go" when encountering a deflection greater than 5 percent. This type of mandrel, as well as a deflectometer, must be of such design as to minimize the possibility of its being hung up in the pipe by silt or other residues.
- C. Test for deflection shall be conducted no less than 30 days after installation of the pipe. If deflection is found to be greater than five percent of the inside pipe diameter, the Contractor shall repair or replace that portion of pipe. Another deflection test will be conducted 30 days after repairs or replacement.
- D. Prior to testing, the pulling of a deflectometer and/or a go-no-go mandrel, shall be done by attached rope no more than 1/4" inch in diameter, pulling apparatus through the pipe by means of one person pulling on the rope, in either direction of the flow of the pipe.

407.7. Infiltration and Exfiltration Tests

- A. The contractor shall be responsible for demonstrating the elevation of the ground water. Infiltration and exfiltration tests will be made as soon as possible after construction of sufficient lines to warrant a test. The Contractor shall notify the Engineer when he is ready to conduct the tests.
- B. Infiltration
- When the water table is higher than the top of the sewer main at the upper end, the main will be inspected for infiltration. All visible leakage into the main or from laterals will be unacceptable. All joints shall be tight and any visible leakage in the joints shall be repaired at the Contractor's expense. Prior to making an infiltration test, all dewatering operations

shall be stopped to permit the groundwater to return to its normal level. The Contractor shall furnish, install and maintain a V notch sharp crested weir in a wood frame tightly secured in a manhole at the low end of each sewer and at locations on the main sewers designated by the Engineer. Maximum allowable infiltration shall be 25 gallons per mile per inch of diameter of sewer per 24-hour day at any time. When infiltration is demonstrated to be within the allowable limits, the Contractor shall remove the weirs.

C. Exfiltration

When the water table does not cover the sewer main at the upper end, an exfiltration test shall be performed to determine the acceptance of the sewer. The contractor may elect to test the gravity sewer hydraulically or by air testing in accordance with ASTM C828. The Contractor shall furnish and install all necessary materials, equipment, water supply, etc. for the tests.

1. Hydraulically: The maximum allowable exfiltration shall be 25 gallons per mile per inch of diameter of sewer per 24-hour day at any time, based on a 2-foot minimum internal head. An allowance of 10 percent of gallonage shall be permitted for each additional 2-foot head over the basic head. The joints shall be tight and leakage in excess of that specified above shall be repaired at the Contractor's expense. Precaution shall be taken to prevent forcing of stoppers from house service laterals.

D. Air Testing

1. Air test shall be conducted in strict accordance with testing equipment manufacturer's instructions, including all recommended safety precautions. No one will be allowed in manholes while testing. Equipment used for air testing shall be specifically designed for this type of test and is subject to the approval of the Engineer. The Contractor shall furnish an air compressor which will provide at least three hundred cubic feet per minute of air at one hundred pounds per square inch along with all necessary plugs, valves, air hoses, connections and other equipment necessary to conduct air test. Pressure gauges on test apparatus shall be a minimum of 4-inch diameter with a minimum of 1-psi graduations and a maximum range of 0-10 psi. Plugs in sewer eighteen inches (18") in size and larger shall be connected by cable for thrust protection.
2. The sewer section shall be plugged at both ends and air pressure shall be applied until the pressure inside the pipe reaches 4 psig. When a stable condition has been reached, the pressure shall be bled back to 3.5 psig above the average backpressure of any ground water above the pipe's invert. At this starting pressure, the time shall be observed and recorded. If there has been no leakage (zero pressure drop) after one hour of testing, the test section shall be accepted and the test complete.
3. If the time for the air pressure to decrease from the starting pressure (3.5 psig) to 3.0 psig is equal to that shown in the following table, the pipe shall be presumed to be free of defects. When these times are not attained, pipe breakage, joint leakage, or leaking plugs are indicated and the cause must be determined and

corrected. After repairs have been made, the sewer sections shall be retested. This process shall be repeated until all sewer sections pass the air test.

Air Leakage Allowance Time Table (Per 100 feet of pipe)		
Pipe Diameter (inches)	Minutes	Seconds
4	1	53
6	2	50
8	3	47
10	4	43
12	5	40
15	7	05
18	8	30
21	9	55
24	11	24
27	14	25
30	17	48
36	25	39
42	34	54
48	45	35

E. Testing Manholes

Each manhole shall be visually inspected for leak. All visible leakage into the manhole, around the casting, or from laterals will be unacceptable. All joints shall be tight and any visible leakage in the joints shall be repaired at the Contractor's expense.

407.8. Hydrostatic Testing

- A. All pressure and leakage test shall be performed in accordance with the latest edition of AWWA C600. Leakage test shall be conducted simultaneously with the pressure test. The duration of the test shall be 2 hours and during the test the main or section of main under test shall be subjected to a pressure of 150 psi based on the lowest point in the line or section under test, and connected at that elevation to the test gauge. Test pressure shall not vary more than 5 psi for the duration of the test. Testing allowance shall be defined as the quantity of makeup water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi of the test pressure after the pipe has been filled with water and the air has been expelled. Testing allowance shall not be measured by a drop in pressure in a test section over a period of time. Testing allowance is defined as the quantity of water to be supplied into the newly laid pipe or any valved section thereof, necessary to maintain the specified leakage test pressure after the air has been expelled and the pipe has been filled with water at the test pressure. No pipe installation will be accepted until the testing allowance is less than the number of gallons per hour as determined by the formula.

$$L = \frac{S \times D \times P}{133,200}$$

L = testing allowance (makeup water) in gallons per hour

S = the length of pipe tested in linear feet

D = the nominal diameter of the pipe in inches

P = the average test pressure during the hydrostatic test in psi (gauge)

- B. Should any test of pipe laid disclose leakage greater than the above specified, the Contractor shall at his own expense locate and repair the defective joints until leakage is within the specified testing allowance. All visible leaks shall be repaired regardless of the allowance used for testing. Line shall be retested until Testing Allowance requirements are within the allowable leakage. All additional testing shall be at the Contractor's expense.

407.9. Flushing

Following assembly and testing, and prior to final acceptance, piping systems shall be flushed with potable water to remove accumulated construction debris and other foreign matter. The piping shall be flushed until all foreign matter is removed from the pipeline. The Contractor shall provide all hoses, temporary pipes, ditches, and other items as required to properly dispose of flushing water without damage to adjacent properties. The minimum flushing velocity shall be 2.5 fps. For large diameter pipe where it is impractical to flush the pipe at the minimum flushing velocity, the pipeline shall be cleaned in-place from the inside by brushing and sweeping, then flushing the pipeline at a lower velocity. Cone strainers shall be installed in the flushing connections of attached equipment and left in place until cleaning is completed. Accumulated debris shall be removed through drains, or by removing spools or valves.

407.10. Final Inspection and Conditional Acceptance:

- A. In no circumstances shall any buildings and plumbing fixtures be connected to the sewers until inspected and approved by the City.
- B. The contractor shall request in writing a final inspection. This final inspection will generally include spot checks of manholes and sewer lines and a complete overview of the project.
- C. After any discrepancies are corrected, the city will issue a letter certifying conditional acceptance of the sewer system. This letter shall commence the start of the 18-month warranty period which is required of the contractor.
- D. On projects having phased development, this letter will allow the developer to apply for a permit for the next phase of development.
- E. At the end of 18 months, the subdivision inspection team will again re-inspect the entire development. When all discrepancies have been corrected, the city will issue an acceptance letter and will begin perpetual maintenance and operation of the sewerage system.

407.11. Maintenance Bond or Letter of Credit:

The developer shall post a maintenance bond or Letter of Credit of 25 percent of the total project cost on the facility for an 18-month period after completion and conditional acceptance of the facility by the City for all projects whose costs exceeds \$20,000.00. Bonds are to be written where the City must release the bond in writing. Bond expiration dates for release are not acceptable.

407.12. Maintenance until Final Acceptance:

It shall be the developer's obligation to provide all maintenance for an 18-month period after conditional acceptance of the project by the City. At the end of the 18-month maintenance period the City shall inspect the sewer system, and upon correction by the developer of all deficiencies noted by the City, the City will accept the sewer system for operation.

END OF SECTION 400

500. WATER REGULATIONS

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501. General

501.1. Use of this Document

- A. This document is subject to periodic revision to meet changing requirements for materials, fire and safety regulations, environmental regulations, etc. At the beginning of a project, the user should verify that he has the latest edition.
- B. This document is intended to convey the general design and construction requirements for a typical project. It also lists specific requirements relating to plan review, inspection, testing and acceptance of facilities. It is not intended as a substitute for site-specific engineering and construction techniques. Individual project conditions may require variance from the provisions in this document in which case such variances should be noted in the plans and other data submitted by the project engineer for the city's approval.
- C. The Contractor shall comply with all applicable local codes and regulations for local utilities. He shall coordinate work necessary for the completion of utilities with local utility companies and cooperate with the companies as required.

502. Submittal Requirements

502.1. Water Flow Test:

- A. A water flow test must be performed on the existing water line to determine the adequacy of the water supply for the project.
- B. The test shall consist of a fire hydrant flow test, conducted at the nearest hydrant to the proposed development and a 24-hour pressure test.
- C. Test information shall consist of:
 1. Static Pressure and Residual Pressure.
 2. Flow in GPM at Residual Pressure.
 3. Twenty-four-hour pressure chart.

- D. An adequate supply of water for the proposed project must be available prior to the approval of any plans. Flow tests are valid for one year.
- E. The City will perform the test at the Developers expense.
- F. The Developer will be responsible for retaining the services of an outside consultant/contractor to accomplish and submit a design study based on the flow test results and indicating the projected available flow at the highest point in the development in GPM with residual pressure of 20 psi for the total project. This report should provide results indicating adequacy of flow quantities and pressure for the proposed development.

502.2. Preliminary Review

- A. Preliminary plans must be prepared and submitted for review. Questions relating to adequate fire protection, multiple feeds, water supply and proposed locations of connection(s) should be resolved at this step before proceeding with detailed planning. A submittal for preliminary review must include all land to be developed although the land may be developed in several phases or units. Adequacy determinations of the existing water system will be made for the total project.
- B. The project surveyor shall provide a signed statement indicating records of the property have been researched and no abandoned landfills or waste disposal sites are located in the proximity of proposed water line extension.

502.3. Construction Plans

- A. Construction plans shall conform to the following:
 - 1. Sheets should be no larger than 24" X 36"
 - 2. Any proposed off-site cross-county water mains or mains on existing right-of-way should be shown at a scale no smaller than 1:100.
 - 3. Plans must be stamped by licensed professional engineer.
- B. Construction plans shall contain the following:
 - 1. North arrow and graphic scale.
 - 2. Road names and right-of-way.
 - 3. All adjacent property owners, including parcel no., deed book page, etc.
 - 4. Land lot and district
 - 5. Topography with contour lines at minimum two-foot intervals.
 - 6. Location map
 - 7. Lot layout (if subdivision) or building location (if multi-family, commercial or industrial).
 - 8. Proposed location of future sidewalks, roads or road widening.
 - 9. Proposed water main and service lateral, including size and material.
 - 10. Location and size of gate valves and air release valves
 - 11. Location and size of all bends, tees, plugs, etc.

12. Fire hydrant locations.
 13. Proposed meter sizes and locations.
 14. Location and sizes of existing water mains surrounding the project, with nearest line valve in each direction of proposed tie-in.
 15. Detail of connection to existing lines.
 16. Locations of all other existing utilities (sewer, storm, gas, electric, telecom, etc.)
 17. Include detail drawings depicting the configuration of crossings with other utilities (i.e., storm sewers, catch basins, underground cables) and indicating vertical and horizontal clearances.
 18. Clearly indicate easement boundaries on all lines not located inside the public right-of-way.
 19. Plan of fire line meters or detector meters, if applicable.
 20. Any other items incidental to the proposed system.
 21. All plans must display the "811 Call Before You Dig" notice.
- C. The approved construction plans shall not be changed except by written approval of the City or its designated representative.

502.4. As-built and Record Drawings

- A. As-Builts and Record drawings shall conform to the following:
1. As-Built drawings shall be mark-up version of original construction plans.
 2. Record drawings shall match same format as construction plans and reflect the changes from the As-built drawings.
 3. "As-Builts" or "Record Drawing" is to be stamped in large clear print on plans.
- B. As-Built and Record drawings must be submitted to the City and approved before the final plat is recorded.
- C. As-builts must also comply with all requirements as described in Sections 205 and 600 of these Development Standards.

503. Design Criteria

503.1. General

- A. The criteria listed herein is not intended to cover all aspects of design, but rather to organize the required basic guidelines.

503.2. Water Supply

- A. Residential water supply for domestic use shall be in accordance with the following table and at a minimum residual pressure of 20 psi at the highest point in the development.

Instantaneous Water Demands for Residential Areas			
Total Number of Residences Served	GPM Per Residences	Total Number of Residences Served	GPM Per Residence
5	8.0	90	2.1
10	5.0	100	2.0
20	4.3	150	1.6
30	3.8	200	1.3
40	3.4	300	1.2
50	3.0	400	0.9
60	2.7	500	0.8
70	2.5	750	0.7
80	2.2	1,000	0.6

- B. The City may require the following minimum flow/duration quantities prior to development of the property at the highest point in the development.
1. Multi-family: 1,000 GPM for 120 minutes;
 2. Shopping Centers: 1,250 GPM for 120 minutes;
 3. Motels, Light Industry and Schools: 1,500 GPM for 120 minutes;
 4. Heavy Industry, Warehouses, Office Buildings, greater than 200,000 square foot: Minimum 2,000 GPM for 240 minutes;
 5. Residential: 1,000 GPM for 120 minutes.

503.3. Fire Protection

- A. Fire hydrants shall be spaced not more than 500 feet apart with additional fire hydrants located as necessary to permit all portions of buildings to be reached by hose lays of not more than 300 feet in length. (Spacing as traffic travels.) In subdivisions, hydrants will generally be aligned with the property line separating two adjacent lots.
- B. The minimum size water main for fire hydrant installations is an eight-inch (8") main.
- C. Fire lines shall be metered per these specifications.
- D. Hose lay distance for fire truck hoses is defined as being measured along the route a piece of fire apparatus must travel in laying a fire hose from the fire to the fire hydrant.
- E. All plans for development must meet all applicable fire protection codes.

503.4. Water Mains and Appurtenances

- A. Water Mains
 1. Ductile iron or PVC pipe may be used. However, ductile iron pipe shall be used at all street, ditch, and creek crossings, etc.
 2. A minimum cover over the top of the pipe of 36-inches from the proposed paving

subgrade, shoulder or finish grade shall be provided.

3. Existing roads: On existing roads, when able, water lines shall be located on the south and west side of the road, eight feet from the back of curb. Fire hydrants on existing roads shall be located between the water line and the back of curbing.
 4. New Roads: All curbing must be installed before any water lines are installed. Water lines on new streets shall be located on the south and west side of the street. Fire hydrants shall be located between the water main and the back of curbing.
- B. Service Laterals
1. Short side service laterals shall be installed with a uniform slope from the main shallowing to a bury of 12 inches at the water meter setting. Water meter settings are to be located adjacent to the right of way limit.
 2. Long side services shall have a minimum cover of 36 inches under areas of pavement and curbing then shallowing to 12 inches at the water meter.
 3. Service laterals crossing any roads shall be placed inside a minimum of a two-inch diameter PVC casing.
 4. A (W) shall be etched into the curb where each service tap is made for permanent location.
 5. Copper or poly tubing shall be used for all services. There shall be no splices of tubing under any pavement.
 6. Services for subdivisions shall be sized and located as shown on the Standard Detail Drawings.
- C. Residential water meters shall be located at the limits of the street right-of-way. In general, meters will be located near the property line and where possible a double yoke assembly will be utilized at the property line separating two adjacent lots. The project designer is responsible for verifying electric transformer locations and avoiding conflicts. The Developer shall be responsible for installing the meter box and yoke assembly. See standard detail for listing of required components. The City shall install the water meter in the yoke assembly after tap fees have been paid and service applied for.
- D. Vaults and all valve and piping assemblies for Commercial and Industrial meter settings shall be installed by the Developer. Installations for three-quarter inch and one-inch meter settings shall utilize a standard yoke assembly and the required additional backflow device located in a separate box. The City shall provide the meter after tap fees are paid and service applied for. No water service shall be provided until all required backflow devices are in place.
- E. Backflow Preventer. All water meters shall be provided with a backflow preventer. Residential services shall be provided with a dual check backflow preventer installed by the Developer as part of the standard yoke assembly. Additional backflow prevention measures are required for residential services with lawn irrigation sprinkler systems connected. Commercial water services, as a minimum, shall be provided with a double check valve backflow prevention device installed by the Developer and located immediately downstream of the meter setting in a separate vault or utility box. Additional and/or more extensive backflow prevention measures may be required depending on the

type of business, materials handled and plumbing configuration. All customers applying for commercial water service are to contact the Water Department Backflow Prevention Coordinator for a determination of specific requirements concerning backflow prevention devices.

- F. Fire Line Meters shall be designed to meet site-specific conditions. See Standard Details for conceptual layout of meter.
- G. Detector Meter shall be designed to meet site-specific conditions. See Standard Details for conceptual layout.
- H. Water Valves
 - 1. At Intersections. Valves on water mains at intersections shall be located behind the curb. As a general rule, the number of valves shall equal the number of streets in the intersection minus one. The City may require valves in excess of this requirement if the water system layout warrants additional valves.
 - 2. At End of Line. A water valve and a minimum of 36 feet of pipe shall be provided at the end of all lines for phased developments, and at locations where the water main may be extended in the future for water system improvements. The end of the line shall be provided with a temporary plug and thrust collar designed to function in a manner that will allow for the end of the line to be excavated and exposed for tie-on of an extension without taking the main out of service.
 - 3. Along Mains. Maximum spacing of water valves along mains shall be 1,000 feet. These line valves, unless at intersections, shall be located near fire hydrants.
- I. Valve Markers. One concrete valve marker shall be furnished and set at each line valve as required by the City.
- J. Air and Vacuum Release Valves. Air and vacuum release valves shall be located where appropriate as determined by a registered engineer in responsible charge of the project design. All A&V release valve locations are subject to approval of the City. In general, within subdivisions A&V release valves are not necessary as long as services are located at the water main high points.
- K. Polyethylene Encasement. Ductile iron pipe water main shall be provided with polyethylene encasement where the water main either crosses or is in close proximity to a steel gas main.
- L. Easements. Water mains that are located off the public right-of-way shall have a 20-foot permanent easement.

503.5. Line Extension Requirements

- A. Developers are required to extend all mains along their entire property frontage. The size of the extension will be at least the size of the existing main and may be larger if required by the City.
- B. If an existing main must be extended to serve a particular development, the Developer will

be required to pay all costs.

504. Material Specifications

504.1. General

- A. All pipe material, fittings, valves, solder and flux shall be lead free (less than 0.2 percent lead in solder and flux and less than 8.0 percent lead in pipes and fittings). All materials shall be certified for conformance with American National Standards Institute / National Sanitation Foundation Standard 61 (ANSI/NSF61).

504.2. Metal Pipe

A. Fittings

1. Fittings shall conform to ANSI/AWWA C111 A21.11, latest revision, and shall be push-on-type unless otherwise shown.
2. Flanged Fittings shall conform to ANSI/AWWA C110/A21.10, latest revision. The AWWA C110 fitting flanges shall have facing and drilling which match AWWA C115 threaded-on flanges which also match ANSI B16.1 Class 125 flanges except where Class 250 are specifically noted.
3. Mechanical Fittings shall conform to ANSI/AWWA C153/A21.53, latest revision. Bolts shall conform to ANSI B18.2.1, latest revision. Nuts shall conform to ANSI B-18.2.2, latest revision. Bolts and nuts shall conform to ANSI B1.1

B. Joints

1. Push-on Joints shall conform to ANSI/AWWA C111/A21.11, latest revision.
2. Flanged Joints shall conform to ANSI/AWWA C115/ A21.15, latest revision.
3. Mechanical Joints shall conform to ANSI/AWWA C111/A21.11, latest revision. Bolts shall conform to ANSI B18.2.1, latest revision. Nuts shall conform to ANSI B-18.2.2, latest revision. Bolts and nuts shall conform to ANSI B1.1

C. Lining

1. Lining for ductile iron pipe and fittings shall be a cement mortar lining meeting the ANSI/AWWA C104/ A21.4, latest revision, for standard thickness lining. After cement lining, the interior of the pipe shall be given a seal coat of approved bituminous material in accordance with ANSI/AWWA C104/A21.4, latest revision.

D. Exterior Coating

1. Exterior coating shall be an approved bituminous coating one mil thick in accordance with ANSI/AWWA C151/ A21.51, latest revision.

E. Conductive Joints

1. Where conductive joints are indicated on ferrous pipe that are subject to electrical thawing service, metal contact strips molded into the gasket are acceptable.

Conductive gasket shall be capable of carrying 600 amps. These gaskets are not to be used where corrosion monitoring and cathodic protection are a requirement.

F. Bonded Joints

1. Where indicated on ferrous pipe, a metallic bond shall be provided at each joint, including joints made with flexible couplings, caulking, or rubber gaskets, of non-ferrous-metallic piping to effect continuous conductivity. The bond wire shall be Size 1/0 copper conductor suitable for direct burial shaped to stand clear of the joint. The bond shall be of the thermal weld type.

504.3. PVC Pipe

- A. PVC pipe shall be Underwriters' Laboratories approved and listed and must meet all requirements of ASTM D2241 and bear the seal of conformance to NSF61. PVC pipe used for water mains shall be blue in color only. It shall meet or exceed AWWA C900.

B. Pressure Pipe

1. Pipe less than 4 inches shall be Polyethylene Pipe, 200 psi, SDR-7CTS.
2. Pipe 4 inches to 12 inches shall be Class 150 with Dimension Ratio 18 or lower (thicker).
3. Pipe 14" and larger shall be Class 235 C905 DR 18.

C. Outside Diameter

1. Pipe shall have cast iron pipe outside diameter.

D. Joints

1. Pipe shall have elastomeric-gasket integral bell end. Bell section shall have a thickened wall. Gasket groove Wall thickness shall meet or exceed the thickness of the pipe barrel.

E. Fittings

1. Ductile iron shall be mechanical-joint type conforming to ANSI /AWWA C153/A21.53, latest revision, with cement mortar lining and seal coat in accordance with ANSI/AWWA C104/A21.4, latest revision, and one mil thick petroleum exterior coating in accordance with ANSI/AWWA C104/ A21.4, latest revision, unless otherwise shown.

F. Affidavit of Compliance

1. The manufacturer shall furnish an affidavit that all materials delivered comply with the requirements of this standard and supplemental specifications.

G. Couplings and Fittings

1. Couplings and fittings shall be furnished by the pipe manufacturer and shall accommodate the pipe for which they are to be used. They shall have the same minimum pressure rating as the pipe. Coupling method shall allow for expansion or

contraction of each pipe section to be taken up at each end of the pipe. Couplings shall permit five (5) degree deflection (2 degrees on each side) of the pipe with any evidence of infiltration, exfiltration or breaking.

H. Gaskets

1. PVC pipe joint gaskets shall meet the requirements of ASTM F477.

504.4. Gate Valves

A. Gate valves shall be as shown on the Drawings and shall conform to the following Specifications:

1. Resilient-Seated Gate Valves (3 Inches to 12 Inches)
2. Resilient-seated gate valves 3 inches to 12 inches shall conform to AWWA C509 with non-rising stem.
3. Unless otherwise indicated or specified, gate valves shall be designed for a working pressure of not less than 250 psig.
4. Valves shall take full pressure on either face. Valves shall be from one manufacturer and similar sizes shall be identical and parts interchangeable. They shall be constructed with bolted bonnets provided with two O-ring stem seals which can be replaced with the valve under pressure in the full-open position.
5. Valves shall be constructed of materials conforming to AWWA C509. All internal and external surfaces shall be coated with fusion bonded epoxy to a minimum thickness of 8 mils.
6. Valve seats shall be coated with a rubber material conforming to AWWA C509 so that there shall be no rubber to metal contact when the valve is in the fully closed position.
7. Valves shall be hydrostatically tested in accordance with AWWA C509.
8. Valves shall be American, Mueller, Clow or approved equal and shall be furnished with standard hand wheels, chain wheels or nuts as shown on the Drawings and/or as specified.

504.5. Ball Valves (2 Inches and Smaller)

- ##### A. Ball valves 2 inches and smaller shall be designed for a working pressure of not less than 300 psi, domestic made brass, and shall conform to AWWA standard C 800-89.
1. Standard tee head stops in body permit 90 degree turn only.
 2. Padlock wings shall be used on the tee head.

504.6. Butterfly Valves (14 Inches and Larger)

- ##### A. Butterfly valves 14-inches and larger shall be of the tight-closing, rubber seated type, with rubber seat positively locking in place against flow from either direction. No metal-to-

metal seating surfaces will be permitted. Valves shall be bubble-tight at rated pressures with flow in either direction. Butterfly valves shall conform to ANSI/AWWA C504, Class 150B.

1. Valve body shall be high strength cast iron ASTM A126 Class B with 18-8 Type 304 stainless steel body seat. Valves shall have Mechanical Joints per AWWA C111. All MJ accessories (bolts, glands, gaskets) shall be supplied by the valve manufacturer. Valves for below ground service shall be installed using restrained joints.
2. Valve shafts shall be 304 stainless steel and shall consist of a one-piece, extending full size through the entire valve or 18-8 stainless steel stub shaft design keyed to the vane with stainless steel torque plugs.
3. Valve discs shall be solid ductile iron with an epoxy coating making it corrosion resistant. The thickness of the discs shall not exceed 2-1/4 times the shaft diameter.
4. Valve seats shall be natural or synthetic rubber providing 360 degrees uninterrupted seating. The resilient seat shall be adjustable or replaceable in the field without burning or grinding. The seat shall be molded over a stainless steel ring for support and secured to the disc by corrosion resistant, self-locking stainless steel screws.
5. All internal ferrous metal surfaces in the waterway shall be factory coated with a non-toxic, two-component, holiday-free, thermosetting epoxy to a nominal thickness of 4 mils. All external surfaces shall be coated with an epoxy coating conforming to AWWA C-550, with a minimum thickness of 10 mils.
6. All butterfly valves shall be manually operated. Operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position without creeping or fluttering. Operators shall be furnished with externally adjustable mechanical stop limiting devices. Valves shall have a 2-inch square operating nut and shall be installed with extension stems to extend the operating nut in accordance with the project details. The operator shall be integrally mounted on the valve mounting flange and shall have all gearing totally enclosed for buried service. Maximum force for operating nut shall be 40 pounds.
7. All valves shall be M&H model 4500, or approved equal.

504.7. Fire Hydrants

- A. Hydrants shall conform to AWWA C502. Main Valve opening size shall be 4 inches minimum and inside barrel diameter shall be 7 inches minimum with 3 feet minimum bury. Hose connections shall be two 2 inches and one 4 inches. Nipple caps shall be chained to the barrel. Hydrant shall be DRY TOP type protecting operating threads from coming in contact with water. Operating threads will be grease lubricated through easily accessible Alemite fitting in top of operating nut. Direction of opening shall be counterclockwise and be cast on the head of the hydrant. Hose nipples shall be bronze or non-corrosive metal and threads shall be National Standard.

- B. Hydrants shall be traffic type utilizing stem breaking coupling and breakaway traffic flange. (Breakable bolts or nuts are not acceptable.)
- C. Hydrant interior and exterior shall have 2-part epoxy base coat. In addition, exterior above ground line shall have UV resistant polyurethane top coat. Color shall be red.
- D. All below grade bolts shall be stainless steel.
- E. Hydrants shall be American-Darling, Mueller, M&H or approved equal.

504.8. Tapping Sleeves and Valves

- A. Tapping sleeves and valves shall be used for making branch connections to an existing water main. Tapping sleeves shall be provided at the locations indicated on the Drawings and shall be mechanical joint type, Mueller No. H-615, Clow F-5205 or approved equal. Tapping valves shall be mechanical joint type gate valves, Mueller No. 667, Clow F-5093 or approved equal, and shall conform to the requirements of this section.

504.9. Tapping Saddles (Service Saddle)

- A. Tapping saddles shall be used for making service connections on 4" and larger PVC and/or Ductile Iron Pipe. Use Smith Blair Series 317 service saddle, or approved equal, at each point where a 1" or 2" connection is required.

504.10. Air Release Valves

- A. Air Release Valve shall be 2-inch screwed inlet. The air release valve shall be designed to permit automatic escape of large quantities of air from the pipeline when the line is being filled and must also allow accumulating air to escape while the line is in operation and under pressure. The body and cover shall be able to operate at pressures up to 300 psi. The open end of and air relief pipe from automatic valves or from a manually operated valve shall be extended to the top of the pit and provided with a screened downward facing elbow.
- B. Air release valve manufacturer shall be Crispin Model No. PL-10 or VENT O MAT Series RBX, or approved equal.

504.11. Water Service Pipe Material

- A. Pipe shall conform to AWWA Specifications C901-96, Polyethylene Pressure Pipe and Tubing, shall be blue in color and shall be marked with AWWA requirements and the following:
 - 1. Nominal Size
 - 2. ASTM D2837
 - 3. SDR 9
 - 4. PE 3408

5. Working Pressure – 160 psi
 6. Water Service Tubing
 7. National Sanitation Foundation (NSF 14)
- B. Unmarked pipe, without information noted above, will not be accepted. Polyethylene pipe shall comply with ASTM D1248 PE3408 Class III, A, 5, P34. Brass (Domestic Made) or bronze compression type fittings shall be used. Flared connections will not be permitted. Continuous metallic tape over the pipe and tracing wire will be required. No gooseneck will be allowed nor will solvent weld joints be allowed. Corporation and curb stops will be required on all laterals. Minimum nominal size shall be 1 inch.

504.12. Corporation Stops

- A. Corporation stops shall be 1 inch size, or as shown on the Drawings, and shall be Ford F 1000-4-G-NL AWWA/CC, or approved equal.

504.13. Curb Stops

- A. Curb stops located outside of meter box shall be 1 inch size, or as shown on the Drawings, and shall be Ford B44-444-G-NL, or approved equal.

504.14. Post Indicator Valve

- A. Each post indicator valve shall consist of a gate valve which meets these specifications and an indicator post which meets National Fire Protection Association Code, NFPA 13. The gate valve and post indicator shall be compatible. Post indicator shall be painted with one coat of red paint and two coats of paint suitable for exterior finish.

504.15. Post Hydrant

- A. Post hydrant shall have main valve opening of 2-3/16-inches, with all working parts brass. The operating rod shall be non-turning, and all operating parts shall be removable from above ground with no special wrenches. The hydrant shall have a two and one half (2-1/2) inch NFS outlet and a two(2) inch inlet, unless otherwise specified on the Drawings. The hydrant shall be non-freezing, and self-draining with a three (3) inch ductile iron barrel. Post hydrant shall be M&H Post Hydrant Style 33, or approved equal.

504.16. Valve Box

Each valve shall be provided with a valve box. Valve boxes for valves shall be approved standard cast iron, screw type adjustable-shaft boxes having a minimum shaft diameter of five and one-quarter inches adjustable for the necessary depth and a lap of at least 6-inches when in the most extended position. The casting shall be coated with two coats of coal tar pitch varnish. The lids of

all boxes shall bear the word "Water." Boxes shall be Russco Model 562-S, or approved equal, with a five and one-quarter-inch cast iron drop cover. All off-pavement valve boxes shall have concrete collars and valve markers.

504.17. Manholes

A. General

1. Manholes shall be constructed at such points as designated on the Drawings. Riser and top sections shall be installed level and plumb, such that all manhole steps are in alignment. The top of manholes outside of roads, streets and highways shall be built to grades 2 inches above ground surface, unless otherwise shown. Manholes in roads, streets and highways shall be built to grades shown on the Drawings.

B. Precast Concrete Manholes

1. Precast Concrete manholes shall be constructed of reinforced Class "A" Concrete. Walls shall be not thinner than 5 inches, or 1/12 of the inside diameter, which ever is greater. Precast manholes shall meet all requirement of ASTM C478, "Specification for Precast Reinforced Concrete Manhole Sections."
2. Rings shall be custom made with openings to meet the necessary pipe alignment conditions and invert elevations. All inlets and outlets shall be cast in or core drilled. Joints and gaskets shall conform to the applicable provisions of ASTM C443, "Joints for Circular Concrete Sewer and Culvert Pipe using Rubber Gasket" or Ram-Nek Pre-molded Plastic Joint Sealer. The sealing compound shall not leak at the joints (while being tested, if required, at 10 psi) for a period of 24 hours. Bell and spigot surfaces shall be smooth, accurately formed, and provide a loose, sliding fit, with a clearance between the bell and spigot of not more than 1/6 inch. Precast manholes shall be bedded on not less than 6 inches of compacted crushed stone at the Contractor's expense. The crushed stone shall extend not less than 6 inches outside the walls of the manhole and under the entire length of pipe within the excavation for the manhole.

504.18. Meter Box (3/4" and 1")

- A. Meter boxes shall have plastic upper section and cast-iron lower section with cast iron lid. The lid shall have precast "Water Meter" text, have locking mechanism and have precast hole with removable plug for electronic meter transmitter. The meter box shall have a straight inlet and straight outlet. Use Ford Long Yokebox LYL144-233-NL for 3/4" meters, Ford Long Yokebox LYL144-444-NL for 1" meters, or approved equals.
- B. Meter box grade adjuster may be utilized when needed to meet final grade, however grade adjusters will not be accepted for new construction projects. Grade adjuster and meter box shall be by the same manufacturer.

504.19. Polyethylene Encasement

- A. Polyethylene encasement of pipes and fittings shall be installed on all Ductile Iron Pipe. The polyethylene encasement shall have a nominal thickness of eight (8) mils and shall conform to AWWA C105.

504.20. Yard Hydrants

- A. Yard hydrant shall have large cushion type plunger, positive shut-off, automatic drain feature to prevent freezing, with a depth of bury of four (4) feet. Yard hydrant shall have a 1" NPT inlet and a brass nozzle with 3/4" hose threads. Yard hydrants shall be Woodford Freezeless IOWA Model Y1, or approved equal.

504.21. Backflow Preventer

- A. The backflow preventer shall be identical in size to pipe. Total head loss through the complete backflow assembly shall not exceed 70 kPa 10.1 psi at rated flow.
 - 1. Double Check Valve Assembly: The backflow preventer shall consist of two check valves independently operating, spring loaded, "Y" check valves rated for 175 psig service at 60 degrees C 140 degrees F, with one isolation gate valve and testing cocks. Port size shall be 1 inch and be ASME B1.20.1 threaded. The check valve assembly shall be rated for 1.03 MPa 150 psig working pressure at 65 degrees C 150 degrees F. The assembly shall meet the requirements of AWWA C510.
 - 2. Reduced Pressure Zone Assembly: A Reduced Pressure Zone Assembly shall be installed at each potential health hazard location to prevent backflow due to back siphonage and/or backpressure. The assembly shall consist of an internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs. Seats and seat discs shall be replaceable in both check modules and the relief valve. There shall be no threads or screws in the waterway exposed to line fluids. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves, four resilient seated test cocks and an air gap drain fitting. The assembly shall meet the requirements of: USC Manual 8th Edition[†]; ASSE Std. 1013; AWWA Std. C511; CSA B64.4.

504.22. Sampling Station

- A. Sampling Station shall have a 3/4-inch un-threaded nozzle. All stations shall be enclosed in a lockable, non-removable, aluminum-cast or stainless steel housing. When opened, the station shall require no key for operation and the water will flow in an all brass waterway. All parts shall be brass and be removable from above ground with no digging. A copper vent tube will enable each station to be pumped free of standing water to prevent freezing

and to minimize bacteria growth. The exterior piping will be galvanized and shall be Model Eclipse No. 88 as manufactured by Kupferle Foundry or approved equal.

504.23. Insulated Enclosures

- A. Insulated enclosures shall consist of a fiberglass shell, insulated with urethane foam, provide security and freeze protection and shall provide drains sized for full port discharge, testing and maintenance access, vandal protection and optional freeze protection. The enclosure shall be GREEN in color. Insulated enclosures shall be manufactured by EzBox - Jacksonville, Florida, or approved equal.

504.24. Tracing Wire

- A. Tracing wire shall be single strand #12 AWG, Vinylon - A THWN or THHN or gasoline and oil resistant II VW 600V or AWM. Tracing wire shall be continuous with all water mains, fire hydrants, post hydrants, sample stations. Tracing wire for water laterals shall be a single strand from the main to the end of the service lateral terminating in the meter box. Tracing wire shall be a single strand installed from the main to all Utility Marking Post line markers with sufficient length at the marker to be wrapped around the marker several times.

504.25. Concrete Valve Marker

- A. Concrete valve marker shall be 4"x4" square by 4'-6" in length with 4'-0" #3 rebar cast in 4,000 psi concrete. All corners shall have a 3/4" chamfer. A 2" brass marker plate with anchor shall be embedded in the top. The brass plate shall have a directional arrow pointing to valve with the distance to the nearest foot and shall be labeled "Water Valve". The concrete valve marker shall be set 24" in the finish grade and shall be painted BLUE.

504.26. Utility Marking Post

- A. Utility parking post shall be placed every 500 feet or as shown on the Drawings above the utility and at fittings and labeled accordingly. The marking post shall be rigid enough to be easily installed in most soil conditions and durable to withstand repeated impacts. The marking post shall be a three (3) inches minimum in width, three sided and remain flexible from -40 F to +140F with UV stabilizers. The warning label shall contain the following: international No Dig symbol, federal law warning, WATER PIPELINE BELOW with letter size and stroke to comply with the Federal Office of Pipeline Safety Specifications, City's name, phone number and State one-call number. Markers shall be Rhino Triview, or approved equal.

504.27. Joint Restraints

- A. All restraints shall be used in accordance with engineering and manufacturers specifications. Thrust block is not allowed. Joint restraints shall be:
1. Ford 1390 Series, Mega-Lug, EBBA Series 1100 for Ductile Iron 4" and larger
 2. EBBA Series 2000 PV for PVC Pipe 4" and larger
 3. Flexlock, T-lock, Uni-Flange, or approved equal

505. Execution

505.1. Licensing and Safety:

All contractors who work on sewer systems that will be owned by the City must be licensed in accordance with State of Georgia law and local ordinance. Compliance with applicable safety regulations is the responsibility of each company engaged in the work; the city assumes no responsibility for the actions of others on the job site. It is the responsibility of those installing sanitary sewers, lift stations and related appurtenances to conform to OSHA regulations, 29 CFR Part 1926, Subpart P, Paragraph 1926.650 through 1926.653. Publications from OSHA can be obtained by contacting OSHA Publications Distribution, Washington, D.C.

505.2. Construction Permits:

- A. No construction shall be allowed until a construction permit has been issued by the City.
- B. The contractor shall submit one copy of the approved construction plans which have been stamped approved. The contractor shall furnish his name and address, telephone number. He shall also furnish the name of the person in charge of the project and any subcontractors and the name and telephone number of a responsible person who can be contacted in case of emergencies during nonworking hours.
- C. The contractor shall furnish his construction schedule and shall notify the City 24 hours prior to doing any work. Once the contractor begins work, he shall proceed in a workmanlike manner and shall complete the work in a reasonable time without undue off days and periods of inactivity which make it hard for the City to keep up with his activity.

505.3. Changes from Approved Plans:

Any major changes from the approved plans will require that the engineer submit revised drawings along with a request explaining the reason for the change prior to construction of the change. Any deviation from City standards will be considered a major change as will any change that will affect capacity, longevity, operation or maintenance of the facility. Any deviation from approved materials will not be accepted without prior approval.

505.4. Handling:

Pipe and fittings shall, unless otherwise directed, be unloaded at the point of delivery, hauled to

and distributed at the site of the project by the Contractor. They shall at all times be handled with care to avoid damage. In loading and unloading, they shall be lifted by hoists or slid or rolled on skidways in such a manner as to avoid shock. Under no circumstances shall they be dropped. Pipe handling on skidways must not be skidded or rolled against pipe already on the ground. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

505.5. Trench Excavation:

- A. Trenches shall have a minimum width of 24 inches or the diameter of the outside of the bell of the water main plus 12 inches, (whichever is greater), and the depth thereof shall be such that there shall be a minimum of 42 inches of cover measured below the roadway surface, natural ground, or proposed grade to the top of the pipe. In cases where water lines cross sanitary sewers, there shall be a minimum of two feet vertical separation between the water and sewer mains. In cases where water mains parallel sewer mains there shall be a minimum of ten feet horizontal separation maintained between the mains. Trenches shall be dug so that the pipe can be laid to the alignment and depth required, and the trench shall be of such width and shall be braced and drained so that the workmen may work therein safely and efficiently. No chocking under the pipe will be permitted. All joints shall be as specified herein. Excavation must be made under the bell of each pipe so that the entire length of the pipe will lie uniformly on the bottom of the trench and the pipe weight shall not rest on the bells. Trenches shall be free of water during the work. Water lines shall have a minimum cover of 42 inches. All changes in grade shall be made gradually. At points of interference with storm sewers and cross drains, pipe will be run under the conflicting utility if the minimum cover cannot be maintained by going over the top of the pipe. In laying pipe across water courses, railroad crossings, or depressions of any kind, the minimum depth here specified shall be maintained at the bottom of the depression. Where necessary, the line shall be lowered at valves so that the top of the valve stem is approximately one foot below the finished grade. The trench shall be deepened to provide a gradual approach to all low points of the line.
- B. Wherever rock is encountered in the excavation, it shall be removed by suitable means. If blasting is used for removal of rock, the contractor shall take all proper safety precautions. He shall comply with all rules and regulations for the protection of life and property that may be imposed by any public body having jurisdiction relative to the handling, storing and use of explosives. Before blasting, the Contractor shall cover the excavation with heavy timbers and mats in such a manner as to protect the adjacent property owners from damage. All rock encountered shall be removed six inches below the bottom grade of the trench and the trench built back to the correct grade with suitable material tamped into place. Sides of the trench shall be trimmed of projecting rock that will interfere with backfilling operations. The Contractor shall be wholly responsible for any damage resulting from blasting. Rock excavation by blasting shall be at least 75 feet in advance of pipe laying.

- C. After the pipe has been laid, backfilling shall be performed in two distinct operations. In general, all backfill beneath, around and to a depth of 24 inches above the top of the pipe shall be placed in six inch layers for the full width of the trench and thoroughly compacted by hand with vibratory equipment. Care shall be taken so that the pipe is not laterally displaced during backfilling operations. The backfill lifts shall be placed by an approved method in accordance with that hereinafter specified. Backfill materials shall be the excavated materials without bricks, stone, foreign matter or corrosive materials, where not otherwise specified or indicated on the plans.
- D. Backfill under permanent concrete or bituminous pavement and as elsewhere specified or indicated on the plans shall be as shown in the Standard Detail Drawings for trenches in paved areas. Mechanical vibrating equipment shall be used to achieve the required compaction.
- E. Backfill under gravel or crushed stone surfaced roadways and low-type bituminous surfaced roadways shall be approved suitable excavated material placed in 12 inch layers and thoroughly compacted for the full depth and width of the trench, conforming to the compaction, density compaction method and materials as specified in "D" above.
- F. Backfill in unpaved areas shall be compacted with mechanical vibrating equipment to 95 percent as determined by the Standard Proctor Test. Trenches shall be compacted so they will not settle. If settlement occurs, trenches are to be refilled, re-compacted and re-graded. Backfill material from pipe bedding to ground surface shall be excavated earth free from large stones and other debris.
- G. Contractor shall fully restore and replace all pavement, surface structures, grassing, landscaping, etc., removed or disturbed as part of the work to a condition equal to that before the work began. All pavement removal shall be replaced per Standard Detail Drawings.
- H. Where sheeting is used in connection with the work, it is in no case to be withdrawn before the trench is sufficiently filled to prevent damage to banks, road surfaces, adjacent pipes, adjacent structures or adjacent property, public or private.

505.6. Rock Excavation:

Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws and regulations governing blasting and the use of explosives. Rock excavation near existing pipelines or other structures shall be conducted with the utmost care to avoid damage. Injury or damage to other structures and properties shall be promptly repaired by the Contractor to the satisfaction of the City and property owner.

Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

Size of Pipeline Inches	Depth of Excavation Below Bottom of Pipe, Inches
6 and Less	6
8 to 18	8
18 to 30	10
Over 30	12

The undercut space shall then be brought up to grade by backfilling with Size #57 crushed stone material or approved equal.

505.7. Pipe Installation

- A. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work.
- B. Pipe shall be installed in accordance with AWWA C605.
- C. All pipe shall be laid straight, true to line and grade. Bell and coupling holes shall be dug in the trench and the pipe shall have a continuous bearing with the trench bottom between bell or coupling holes. No shimming or blocking up of the pipe shall be allowed. When the work is not going on, all pipe openings shall be securely closed by the insertion of the proper size plug and caulking so that dirt and debris will not be washed into the pipe in case of rain.
- D. In making the joints with ductile iron pipe, the spigot end of the pipe and the inside of the bell shall be thoroughly cleaned and the gasket inspected to see that it is properly placed; lubricant shall be applied to the spigot end of the pipe and it shall be inserted into the bell of the adjoining pipe to the stop mark on the pipe.

505.8. Thrust Restraint for Pressure Lines:

- A. Reaction Blocking.
 1. Underground piping laid around curves and at all unsupported changes of direction, all tees, wyes, crosses, plugs and other like fittings shall be solidly and properly blocked with concrete against solid earth to take the reaction of the main pressure and to prevent lateral movement of the pipe or fittings when under pressure. Reaction blocking shall be installed at all locations requiring same and where tie rods and clamps are not called for in the plans. Concrete for reaction blocking shall have a minimum compressive strength of 3,000 psi at 28 days. The blocking, unless otherwise shown, shall be so placed that the pipe and fitting joints will be accessible for repair. In addition to the concrete blocking specified herein, all mechanical joint fittings shall be installed with Mega-Lug retainer glands.
 2. Reaction blocking shall be constructed as per AWWA Standard C600 Section 3.8, latest revision. It shall be constructed in conformance with the Standard Detail Drawings for Reaction Blocking.

- B. Retainer Glands: Mechanical joint fittings on Ductile Iron Pipe shall be installed with retainer glands. Retainer glands are to be Mega-Lug retainer glands as manufactured by EBBA Iron.
1. Clean the socket and the plain end. Lubrication and additional cleaning should be provided by brushing both the gasket and the plain end with soapy water or an approved pipe lubricant meeting the requirements of ANSI C111 or AWWA A21.11 just prior to slipping the gland and gasket onto the plain end for joint assembly. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket.
 2. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.
 3. Push the gland toward the socket and center it around the pipe with the gland lip against the gasket. Insert bolts and hand tighten nuts. Make deflection after joint assembly but before tightening bolts.
 4. Tighten the bolts to the normal range of bolt torque specified in AWWA C600 while at all times maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
 5. Tighten the torque limiting twist off nuts in a clock-wise direction until all wedges are in firm contact with the pipe surface. Continue tightening in an alternate manner until all of the nuts have been twisted off.
- C. All valves, plugs, caps, bends 113 degrees or greater and tees shall be provided with restrained joints.

505.9. Fire Hydrant Installation

- A. Fire hydrants shall be placed at the locations shown on the plans or as directed by the City and shall be installed on a minimum main size of eight-inch. All fire hydrants shall be installed with a resilient seat gate for isolation from the main. Gate valves for fire hydrants shall be connected directly to the main by means of a "Locked Hydrant Tee." Fire hydrants shall be connected to the isolation valve with a locked hydrant adapter. Installations where locked hydrant tees or locked hydrant adapters cannot be utilized, either due to distance from the main or size, shall be restrained with retainer glands and threaded rods. Care shall be exercised that set screws and retainer glands are tightened sufficiently to secure the hydrants before pressure is put on the main. Not less than 7 cubic feet of course, #57 stone shall be placed around the base of the hydrants, as shown in the Standard Detail W001. Before placing the hydrants, care shall be taken to see that all foreign material is removed from within the body. The stuffing boxes shall be tightened and the hydrant valve opened and closed to see that all parts are in first class working condition. All hydrant openings shall be kept capped, except when hydrant is being worked on.
- B. Existing fire hydrants shall not be operated without permission of the City.

- C. When a fire hydrant has been constructed but is not yet in service, the Contractor shall provide and attach to the fire hydrant, flags or collars indicating that the fire hydrant is not in service. Said flags or collars shall remain on the fire hydrant until it is put into service. An alternative may also be a black trash bag with tape to secure it on the fire hydrant.
- D. Whenever an existing fire hydrant is taken out of service, whether temporarily or permanently, it shall be equipped with a flag or collar indicating that it is not in service. The Contractor shall provide and install flags or collars as required and shall notify the Fire Department whenever the operating status of any fire hydrant changes.
- E. FIRE HYDRANTS SHALL NOT BE OPERATED WITH ANY TOOL EXCEPT A SPECIFICALLY DESIGNED FIRE HYDRANT WRENCH. If the Contractor observes any other contractor or person operating a fire hydrant with an unapproved fire hydrant wrench, he shall report that fact to the City immediately. It is the Contractors responsibility to ensure that all new facilities are maintained in new condition until final completion of the project and acceptance by the City. Fire hydrants with damaged operating nuts shall not be accepted.

505.10. Water Service Connection

- A. Service lines shall be connected to 4-inch and larger mains with a corporation stop. Connections to mains smaller than 4-inches shall be made with a rigid connection. Plugged tees or crosses for future connections shall be installed where shown on the Drawings. A house service connection shall be provided to vacant lots and the exact location marked on the curb with a "W". The mark shall be made on the vertical face of the curb and shall be a minimum of 1/4-inch deep made with a branding iron. Where services are provided at locations without curb, a 2"x4" 30-inch long pressure treated flag stake painted white shall locate the end of the lateral. Minimum cover of 30-inches shall be provided until a short transition to the service is stubbed out of the ground.
- B. Water service laterals installed under roadways shall be installed a minimum of 30 inches below the road (laterals shall not be installed in the base of the road). Water service laterals shall be installed one foot short of the property line of all lots along street and right-of-ways in which water main is constructed.

505.11. Brass Nipples and Brass Pipe Fittings (Domestic Made)

- A. Threads shall be cleanly cut with sharp tools and the jointing procedure shall conform with the best practice. Before jointing, all scale shall be removed from pipe by some suitable means. After cutting, all pipe shall be screwed together with an application for graphite and engine oil, Teflon tape, or other sealing compound applied to all threads and once a joint has been screwed on it shall not be backed off unless the threads are re-cleaned and new compound or Teflon tape applied. Unions shall be installed at every connection to the supply line.

505.12. Water Valve Installation

- A. Valves shall be set plumb, and shall have cast iron valve boxes. The valve boxes shall be placed directly over the valve and set plumb, the top of the box being brought to the surface of the ground. Provide valve extensions on all valves with operating nuts more than three feet in depth. Valve extensions shall bring the operating nut to within 18 inches of the surface and shall be keyed into the valve nut. After the boxes are in place, earth shall be filled in the trench and thoroughly tamped around the box. After all settlement has taken place, a precast concrete collar shall be installed for each valve box.
- B. Fittings shall be properly restrained to ensure that they will not be blown off or broken loose under the greatest possible working pressure (see Standard Detail Drawings). All fittings shall be mechanical joint and shall be installed with Mega-Lug retainer glands and concrete blocking unless specified otherwise. In situations where there is insufficient undisturbed earth to act as a bearing surface or where otherwise directed by the City, fittings shall be restrained by the use of threaded rods or other method acceptable to the City.
- C. Prior to blocking any joint or fitting with concrete, that joint or fitting shall be wrapped with polyethylene film in such a manner that the concrete will not stick directly to the pipe but that the load bearing capacity of the blocking will not be affected. Care shall be taken to prevent the concrete from covering bolts. Polyethylene film shall be installed at other points along the water main where so directed by the City.
- D. Each main line water valve shall be marked by cutting a letter "V" in the horizontal surface at the back of the curb. The "V" shall be turned to point toward the valve which may be either in the street or in the grass behind the curb. The letter height shall be four inches to six inches.
- E. Concrete valve markers shall be set for main line water valves with an even number of feet between the center line of the valve and the center line of the disc in the top of the marker, and the distance in feet between the valve and marker shall be stamped in the marker at the time of setting.

505.13. Connection to Existing Water System

- A. The Contractor shall furnish necessary materials and perform all excavation, dewatering, shoring, backfilling, etc., necessary to make the connection of a new main to the existing water main. The Contractor shall notify the Engineer and City a minimum of 48 hours in advance of construction. The Contractor shall be responsible for coordinating his construction with City.

505.14. Damage to Water System

- A. Damage to any part of the water system by the Contractor, or subcontractors, that is repaired by the City shall be charged to the Contractor on the basis of time and material, plus 30 percent for overhead and administration.

505.15. Polyethylene Encasement

- A. Polyethylene encasement shall conform to ANSI/AWWA C107/A21.5, latest revision for high density, cross-laminated polyethylene film. Polyethylene encasement shall be used where noted on the contract drawings or directed by the Engineer on all ductile iron piping, fittings, valves and appurtenances and installed according to the requirements of ANSI/AWWA C105/A21.5, Sec. 4.4, Method A.

505.16. Identification and Tracing Wire

- A. Mylar tape shall be installed 18 inches below the finished grade over the top of the water mains. The tape shall be 2 inches wide, of blue color and have imprinted on the tape "Caution - Water Line Below." The tape shall be laid the entire length of the trench.
- B. No. 12 AWG solid plastic-coated copper wire shall be installed on top of all water mains where non-metallic pipe is used and attached by means of securing the wire on top of the water main with a 12-inch long by 2-inch wide piece of duct tape. Attach the wire to the main every ten (10) feet.
- C. Wire shall be bonded at splices with 3M DBY-6 Direct Bury Splice Kit at every connection.
- D. The wire shall be laid the entire length of the trench and shall be continuous. The Contractor shall demonstrate continuity in wire through the entire length of the project. At every valve manhole the wire shall be run through the pipe opening, up to the ring and cover, secured at the ring by means of grouting the ring to the top of the manhole. The wire shall continue in the same loop back to the opposite pipe opening, through it and continuing in one continuous loop along the main.
- E. At every fire and post hydrant, the wire shall be run from the main to the hydrant tee, to the gate valve, wrapped around the gate valve once, then run to the bottom of the hydrant flange, up the hydrant, wrapped around it once at the finish grade, then back to the main in one continuous loop, and continuing along the water main.
- F. At every water service lateral, the wire shall be run from the main and corporation stop to the curb stop and attached to the polyethylene pipe by a piece of duct tape wrapped around the wire and tubing. The wire shall be connected to the tracer wire at the main with a single strand from the water main to the curb stop or into the meter box.
- G. At every sampling station, the wire shall be run from the main service connection up to the bottom inside of the sampling station, then back in one continuous loop to the water main, then continuing with the utility along the water main.

- H. The City will test all tracer wire prior to acceptance.

505.17. Shop Drawings

- A. Shop drawings shall be submitted on each manufactured item supplied under this Section along with other information as specified herein.

505.18. Cleanup

- A. Prior to requesting the "completion of construction" inspection, the Contractor shall remove and dispose of in an acceptable manner all shipping timbers, shipping bands, spacers, excess materials, broken material, crates, boxes and any other material brought to the job site.
- B. Any work areas within public right-of-way or property outside of the development that were damaged by construction shall be repaired or replaced with the same kind of material as existed prior to the damage occurring. All easement areas shall be cleared of trees, stumps and other debris and left in a condition such that the easement can be maintained by bush-hog equipment.
- C. All shoulders, ditches, culverts, and other areas impacted by construction shall be at the proper grades and smooth in appearance.
- D. All boxes, vaults, manholes, etc. shall be brought to grade.
- E. A uniform stand of grass or mulch for erosion protection, as defined in the Manual For Erosion and Sediment Control In Georgia, is required over all construction easements and sanitary sewer easements prior to the City's acceptance of the sewer. Use a grass mixture consisting of at least 50 percent fescue.

505.19. As-built Drawings

- A. The City will require As-built Drawings seventy-two 72 hours before final inspection will be made. The Contractor shall keep on the work site one set of clean Drawings to which at the end of every day the necessary information will be marked by the Contractor's superintendent. All deviations from the Drawings shall be stationed and clearly marked. As-built drawings shall include measurements between each valve, bends, permanent land markers, manholes, laterals locations from property corners, fire hydrants & manholes.
- B. As-builts must also comply with all requirements as described in Sections 205 and 600 of these Development Standards.

506. Testing and Inspections

506.1. General

- A. All water lines and appurtenances shall be inspected by the Engineer and the Contractor. All defects will be noted and a list thereof transmitted to the Contractor. The City reserves the right to require the Contractor to televise any lines which fail any test.
- B. The developer's contractor will be responsible for the quality, accuracy and workmanship of his completed work.
- C. City personnel will visit the job site on a periodic basis and will make spot checks as they deem appropriate. The City shall have the right to review and inspect all construction and may reject any work that does not meet quality control standards.
- D. Authorized representatives of the City, which may include city employees, the city engineer, state or federal agencies, shall have access to the site for inspection at any time.
- E. Cost for all testing shall be paid for by the developer.

506.2. Communications During Construction:

- A. A preconstruction conference will be required for all projects. The Developer has sole responsibility for scheduling. The Developer, design professional, contractor, and subcontractor(s) are required to meet with the City and all private utilities in this conference. The contractor will notify the city in writing two days before starting construction. The contractor will provide notification by phone any time the work is to be vacated and will provide notice by phone prior to resuming work. The contractor shall request the final inspection.
- B. The city inspector may have informal verbal communications with the contractor foreman or superintendent at any time during construction. The city inspector will not direct the actions of contractor's workmen.

506.3. Concealed Work:

The city inspector may direct that the contractor notify the city and receive inspection approval prior to concealing certain work such as manhole foundations, pipe bedding, tees, bends, service lines, or other appurtenances. At the City's discretion, the City may require work to be uncovered which was not inspected prior to backfilling.

506.4. Hydrostatic Testing

- A. All pressure and leakage test shall be performed in accordance with the latest edition of AWWA C600. Leakage test shall be conducted simultaneously with the pressure test. The duration of the test shall be 2 hours and during the test the main or section of main under test shall be subjected to a pressure of 150 psi based on the lowest point in the line or section under test, and connected at that elevation to the test gauge. Test pressure shall not vary more than 5 psi for the duration of the test. Testing allowance shall be defined as the quantity of makeup water that must be supplied into the newly laid pipe or any valved

section thereof to maintain pressure within 5 psi of the test pressure after the pipe has been filled with water and the air has been expelled. Testing allowance shall not be measured by a drop in pressure in a test section over a period of time. Testing allowance is defined as the quantity of water to be supplied into the newly laid pipe or any valved section thereof, necessary to maintain the specified leakage test pressure after the air has been expelled and the pipe has been filled with water at the test pressure. No pipe installation will be accepted until the testing allowance is less than the number of gallons per hour as determined by the formula.

$$L = \frac{S \times D \times P}{133,200}$$

Where:

L = testing allowance (makeup water) in gallons per hour

S = the length of pipe tested in linear feet.

D = the nominal diameter of the pipe in inches

P = the average test pressure during the hydrostatic test in psi (gauge)

- B. Should any test of pipe laid disclose leakage greater than the above specified, the Contractor shall at his own expense locate and repair the defective joints until leakage is within the specified testing allowance. All visible leaks shall be repaired regardless of the allowance used for testing. Line shall be retested until Testing Allowance requirement are within the allowable leakage. All additional testing shall be at the Contractors expense.

506.5. Cleaning and Disinfecting of New Mains

- A. All water mains, as well as those taken out of service for inspection, repair or other activities that might lead to contamination of water shall be disinfected before they are placed in or returned to service. The water passing through them must show by laboratory tests safe results before the system can be placed in service. Disinfection of all water lines and the disposal of the heavily chlorinated water, following the disinfection, shall be in accordance with AWWA C651, latest revision. Approved methods for the accomplishment of these are as follows:
- B. The tablet method of disinfection which consist of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water when installation is completed is not allowed.
- C. Clean the interior of all pipe by brushing, swabbing or washing out all debris before laying. Stop up all branches and other openings with wooden plugs or heads until either capped or connected. The use of a cross connection device during flushing and disinfection to protect the active part of the water system shall be required. Before the main is chlorinated, it shall be filled to eliminate air pockets and shall be flushed to remove particulates. A flushing velocity of not less than 2.5 feet per second shall be maintained in pipe sizes less than 24-inches in diameter. For larger diameter mains, an alternative to flushing, such as broom-sweeping of the main, is acceptable prior to chlorinating the main.

- D. Install sufficient number of sample points to give representative sampling on the newly installed lines. The hydrants should be at least 18 inches higher than main and must discharge toward the ground.
- E. Quality of water used during the disinfection procedure shall meet the required drinking water standards.
- F. Flush the new pipe lines for a full pipe open end flush until the water runs clear at the end of all mains and laterals. This should be done after the pressure test and before disinfection. Each valved section of the newly laid pipe should be flushed separately with potable water.
- G. Disinfect the pipe lines with chlorine. The preferable point of application of the chlorinating agent is at the beginning of the pipe line extension, or any valved section of it, and through a corporation cock inserted in the horizontal axis of the newly laid pipe. A 3/4" – 2" bypass service line, complete with corporation stop and double check valve should be used to fill the new water main. Water from the existing distribution system should be controlled to flow very slowly into the newly laid pipe during the application of the chlorine. Partially open all hydrants or valves on the newly laid line under treatment to prevent the building up of water pressure and to bleed out any air in the lines. The chlorine solution used for disinfection of water mains shall have a free chlorine residual concentration not less than 25 mg/l. This heavily chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants shall be operated to ensure disinfection of the appurtenances.
- H. Allow the treated water to remain in the pipe line for at least 24 hours, the treated water in all portions of the main shall have a residual of not less than 10 mg/l free chlorine. Re-chlorinate if required results are not obtained on all samples. After the applicable retention period, the heavily chlorinated water must not be disposed in a manner that will harm the environment. Neutralizing chemicals, such as Sulfur Dioxide, Sodium Bisulfite, Sodium Sulfite or Sodium Thiosulfate can be used to neutralize the chlorine residual remaining in the water to be wasted. Flush all mains and lines until all the heavily chlorinated water has been removed.
- I. Test water samples to make sure all chlorine has been flushed out or until the concentration of chlorine in the newly laid lines is no higher than that of a sample taken on the supply line. After final flushing and before the water main is placed into service, water samples shall be collected from the main and tested for microbiological quality in accordance with the Georgia Rules for Safe Drinking Water, Chapter 391-3-5. The laboratory results must show the absence of coliform organisms in the water. Re-flush and re-disinfect the lines, as necessary, until satisfactory bacteriological results are obtained.
- J. AMOUNT OF CHLORINE NECESSARY FOR DISINFECTION
 - 1. Chlorine required to produce 25 mg/l concentration in 100 feet pipe by diameter. See table below:

Pipe Diameter (inches)	100% Chlorine		1% Chlorine Solution	
	(lbs)	(g)	(gal)	(L)
4	0.013	5.9	0.16	0.6
6	0.030	13.6	0.36	1.4
8	0.054	24.5	0.65	2.5
10	0.085	38.6	1.02	3.9
12	0.120	54.4	1.44	5.4
16	0.217	98.4	2.60	9.8

2. Note: 1 % chlorine solution may be prepared with sodium hypochlorite (contains 5% to 15% available chlorine) or calcium hypochlorite (contains approximately 65% available chlorine by weight). To prepare 1% chlorine solution using calcium hypochlorite, add one (1) pound (454 grams) of calcium hypochlorite in approximately 8 gallons of water.

K. Amounts and types of chemicals advised to be used for neutralizing various residual chlorine concentrations on 100,000 gallons of water:

Residual Chlorine Concentration	Chemicals							
	Sulfur Dioxide (SO ₂)		Sodium Bisulfate (NaHSO ₃)		Sodium Sulfide (Na ₂ SO ₃)		Sodium Thiosulfate (Na ₂ S ₂ O ₃ .5H ₂ O)	
	lb	Kg	lb	Kg	lb	Kg	lb	Kg
mg/l								
1	0.8	0.36	1.2	0.54	1.4	0.64	1.2	0.54
2	1.7	0.77	2.5	1.13	2.9	1.32	2.4	1.09
10	8.3	3.76	12.5	5.67	14.6	6.62	12.0	5.44
50	41.7	18.91	62.6	28.39	73.0	33.11	60.0	27.22

L. The Engineer will arrange for the City inspection. Lines will not be placed in operation until City’s approval and Engineer directs Contractor to do so.

M. A hydrant flow test will be performed after the lines are placed in service as directed by the Engineer. Results of the test will be reported in writing to the City by the Engineer.

506.6. Final Inspection and Conditional Acceptance:

- A. Prior to final inspection of the water system the developer shall have previously completed the pressure and disinfection tests. After the developer makes written request for final inspection, the city will schedule a final inspection. The contractor and the developer will be present during this final inspection. This final inspection will generally include spot checks of hydrants, valves and other appurtenances and a complete overview of the project.
- B. After any discrepancies are corrected and approved as-built drawings are submitted, the city will issue a letter certifying conditional acceptance of the water system. This letter shall commence the start of the 18-month warranty period which is required of the contractor.
- C. On projects having phased development, this letter will clearly identify portions of the project being accepted.
- D. At the end of 18 months, the subdivision inspection team will again re-inspect the entire development. When all discrepancies have been corrected, the city will issue an acceptance letter and will begin perpetual maintenance and operation of the water system.

506.7. Maintenance Bond or Letter of Credit:

The developer shall post a maintenance bond or Letter of Credit of 25 percent of the total project cost on the facility for an 18-month period after completion and conditional acceptance of the facility by the City for all projects whose cost exceeds \$20,000.00. Bonds are to be written where the City must release the bond in writing. Bond expiration dates for release are not acceptable.

506.8. Maintenance until Final Acceptance:

It shall be the developer's obligation to provide all maintenance for an 18-month period after acceptance of the project by the City. At the end of the 18-month maintenance period the City shall inspect the water system, and upon correction by the developer of all deficiencies noted by the City, the City will accept the water system for maintenance.

END OF SECTION 500

600. AS-BUILT CAD STANDARDS

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601. Introduction

All as-built plans submitted to the City must be provided in electronic computer aided design (CAD) format. The following standards must be followed for all plans. Final Plats will not be approved and/or Certificates of Occupancy will not be issued until the standards are met.

602. General Requirements

- A. All as-built drawings must be referenced to the City's control network. All drawings must contain four-reference survey markers (pins) tied to the City's monument network. Each marker should have coordinates established on the drawing. A copy of the City's survey monument locations can be found on the City's website at: www.grantvillega.org or may be obtained in person at Grantville City Hall.
- B. All features depicted in the as-built drawings must be surveyed after construction. The City may at its discretion spot check coordinates to ensure accuracy.
- C. The following feature types are acceptable: Line, Polyline, and Polygon. Any other features such as Leaders, Blocks, etc. should not be present on the standard City CAD feature layers.
- D. The City will provide a template (or seed) drawing files upon request.

603. Layering

- A. Layer names for required layers must match City standard layer names.

- B. All required layers listed in the City’s CAD layers must contain only the features that are described for that layer. For example, the BOUNDARY_LINE layer must only contain the boundary line and not such features as north arrows or parcels.
- C. All required layers must be present in the drawing except for features that do not pertain to a particular project. For example, some commercial projects or apartment complexes may not contain sewer taps as part of the construction and should not be included in the drawing.
- D. All layers must be clearly differentiated from each other.
- E. Two layers having the names “WATER_LINE” and “WATER_LINES” should not exist in the same drawing.
- F. SEWER_LINE_TEXT and SEWER_TEXT shall not exist in the same drawing.
- G. All text must appear on separate layers from the layers they annotate. For example, text describing a sewer line must be on the SEWERLINE_TEXT layer, not the SEWERLINE layer.
- H. Text leaders should be placed on the text layer, not the feature layer. For example, the leader for the diameter of a water pipe should be on the WATER_LINE_TEXT layer, not the WATER_LINE layer.

Standard Layers	
Layer Name	Layer Description
Survey_Marker	Permanent Survey Marker or Property Corner Pin
Survey_Marker_Text	Permanent Survey Marker or Property Corner Pin Description / Text
San_Sewer_Manholes	Sanitary Sewer Manholes
San_Sewer_Pipes	Sanitary Sewer Pipes
San_Sewer_Taps	Sanitary Sewer Tap at Right of Way or Stub Out Location
San_Sewer_Laterals	Sanitary Sewer Lateral
San_Sewer_Text	Water System Descriptions / Text
Water_Features	Water Valves, Water Meters, Fire Hydrants, Tees, Caps, etc.
Water_Pipes	Water Mains
Water_Laterals	Water Laterals
Water_Text	Water System Descriptions / Text
Storm_Features	Catch Basins, Headwalls, Drop Inlets, Outlet Structures, etc.

Storm_Pipes	Storm Drain Pipes and Culverts
Storm_Text	Storm Drain Descriptions / Text
Road_Polygon	Roadway Polygons
Road_Centerline	Roadway Centerline
Road_Text	Roadway Descriptions / Text
Property_Boundary	Closed Property Boundary Polygons
Property_Easement_Boundary	Closed Easement Boundary Polygons
Property_Text	Property / Easement Descriptions / Text
Impervious_Surface	Impervious Surface Features
Impervious_Surface_Text	Impervious Surface Descriptions / Text

604. Annotations

- A. Any non-standard water and sewer lines must be annotated as such. Line diameter, material, ownership, etc. that does not conform to standard practice should be noted in the corresponding annotation layer.
- B. All annotation for polyline (polygon) features must be bounded by the polyline it annotates.

605. Filing, Naming and Revisions

- A. File names should correspond exactly to the subdivision or project name and should be consistent from one version to the next. The file name should contain the drawing revision date (in YYYYMMDD format) as part of the name. There should be no blank spaces in the name, only underscores. An example file name for the May 7, 2013 revision for the third phase of the Apple Valley subdivision is "Apple_Valley_Phase_3_050713".
- B. File revision dates should only be updated by the contractor/developer.

606. Deliverable Format

- A. All files shall be delivered on single disk media. CDs or USB flash drives are acceptable media. Other formats may be acceptable, but the preparer of the plan should consult the City Engineer prior to submittal.
- B. All drawings (.dwg files) shall be delivered in the current version of AutoCAD.
- C. All tables shall be delivered in the current version of Microsoft Excel format.

- D. All deliverables will be labeled with the file name, company name, contact name, and phone number. A transmission letter stating this information along with a statement requesting as-built review shall also accompany the disk.

607. Sanitary Sewer Specifications

607.1. Survey Accuracy Requirements for Sanitary Sewer Infrastructure

- A. Coordinate data for sanitary sewer manholes shall be established at the center of the top of the lid. Accuracy requirements shall be a horizontal accuracy of < 0.5 ft and a vertical accuracy of < 0.1 ft.
- B. Coordinate data for sanitary sewer lines shall be established through the use of the sanitary sewer manhole coordinate data. Invert elevations shall be established by direct measurement of the distance from the lid elevation to the invert of each pipe. Vertical accuracy of < 0.1 ft shall apply to all sanitary sewer inverts.
- C. Coordinate data for sanitary sewer taps at the right-of-way or stub out shall be a horizontal accuracy of < 0.5 ft. Coordinate data for the connection of the tap to the sewer line shall be based on computed coordinates utilizing the distance from the upstream or downstream manholes and the sewer line geometry. The vertical coordinate (i.e., elevation) shall not apply to sanitary sewer taps.

607.2. Digital Drawing Specifications

The following specifications shall apply to the development of all digital as-built drawings pertaining to the sanitary sewer system.

- A. Sewer Lines shall be drawn with proper directionality: lines must be drawn from the upstream manhole to the downstream manhole.
- B. All Sewer Lines shall be drawn from the center point of the upstream manhole to the center point of the downstream manhole with a single line. No gaps should exist between the sewer lines. Lines must not continue for more than one manhole.
- C. Manholes shall be drawn consistently with a circle centered exactly on the sewer line endpoints.
- D. Sewer tap locations shall be drawn with a single line from the location of the intersection of the right-of-way or stub out (if applicable) to a point intersecting the sewer line.
- E. All Manholes shall be labeled with a unique identifier (Sanitary Sewer Manhole #1, SSMH_1, etc.)
- F. All Sewer Lines shall be labeled with a unique identifier (Sanitary Sewer Pipe #1, SSPipe_1, etc.), pipe diameter (8 inch, etc.) and pipe material (PVC, DIP, etc.)
- G. All sewer taps shall be labeled with a unique identifier (Sanitary Sewer Tap #1, SSTap_1, etc.)

607.3. Table Specifications

The following specifications shall apply to the development of all digital as-built attribute data pertaining to the sanitary sewer system.

- A. A table with the following attribute data for each manhole
 - 1. Unique identifier matching the identifier in the as-built drawing
 - 2. Northing (y) coordinate
 - 3. Easting (x) coordinate
 - 4. Lid Elevation (z) coordinate
 - 5. Manhole diameter measured in feet
 - 6. Manhole Material (Pre-Cast Concrete, Brick, etc.)
 - 7. Grade Height measured in feet (height of lid above adjacent grade)
 - 8. Manhole depth measured in feet
 - 9. Manhole Lid Type (Traffic Bearing, Bolt Down, etc.)

Example Table								
MH ID	Northing	Easting	Top Elev.	Diameter	Material	Grade Height	Depth	Lid
SSMH #1	1251008.52	2213889.92	914.58	4	Precast Concrete	2.0	6.10	Traffic
SSMH #2	1251410.95	2213486.14	912.88	4	Precast Concrete	1.4	7.10	Traffic
SSMH #3	1251413.63	2213247.90	915.43	4	Precast Concrete	1.0	8.00	Traffic
SSMH #4	1251358.94	2213213.00	916.77	4	Precast Concrete	0.0	7.90	Traffic

- B. A table with the following attribute data for each sewer line
 - 1. Unique identifier matching the identifier in the as-built drawing
 - 2. Unique identifier matching upstream manhole identifier in the as-built drawing
 - 3. Upstream Measure Down - Distance from the upstream manhole lid top to invert of pipe as measured in feet
 - 4. Upstream Invert – Elevation (z) of the invert of the upstream end of the pipe
 - 5. Unique identifier matching downstream manhole identifier in the as-built drawing
 - 6. Downstream Measure Down - Distance from downstream manhole lid top to invert of pipe as measured in feet
 - 7. Downstream Invert – Elevation (z) of the invert of the downstream end of the pipe
 - 8. Pipe diameter measured in inches

- 9. Pipe Material (PVC, DIP, etc.)
- 10. Pipe Length measured in feet
- 11. Pipe Slope measured in feet per foot (ft/ft)

Example Table										
Pipe ID	Upstr. MH ID	Upstr. Measure Down	Upstr. Invert	Downstr. MH ID	Downstr. Measure Down	Downstr. Invert	Pipe Diameter	Pipe Material	Pipe Length	Pipe Slope
Pipe #1	SSMH #1	6.1	906.78	Pump Station	10.2	905.06	8	PVC	291	0.0058
Pipe #2	SSMH #2	7.1	908.33	SSMH #1	6.05	906.83	8	PVC	238	0.0062
Pipe #3	SSMH #3	8	908.76	SSMH #2	7.1	908.33	8	PVC	64	0.0066

- C. A table with the following attribute data for each tap
- 1. Unique identifier matching the identifier in the as-built drawing
 - 2. Address of the property the tap serves
 - 3. Sewer Pipe that the tap connects to

Example Table		
Tap ID	Address Served	Sewer Pipe ID
SS Tap 1	100 Any Street	Pipe #1
SS Tap 2	105 Any Street	Pipe #1
SS Tap 3	110 Any Street	Pipe #2

608. Water System Specifications

608.1. Survey Accuracy Requirements for Sanitary Sewer Infrastructure








- A. Coordinate data for fire hydrants, valves and water meters shall be established at the center of the top of the fire hydrant, valve cover or water meter. Accuracy requirements shall be a horizontal accuracy of < 0.5 ft and a vertical accuracy of < 0.1 ft.

- B. Coordinate data for water line tees, caps, bends and reducers shall be established at a point on the ground surface directly above the tee, cap, bend or reducer as determined by a utility locate. Accuracy requirements shall be a horizontal accuracy of < 0.5 ft and a vertical accuracy of < 0.1 ft. Alternatively, tees, caps, bends and reducers can be surveyed directly prior to back filling. If this alternative method is utilized, a note should be added to the drawing indicating that these features were surveyed as such.
- C. Coordinate data for water lines shall be established at points on the ground surface directly above the water line as determined by a utility locate and data collected for valves, meters, tees, caps, bends and reducers. Coordinates should be gathered for points along the water line averaging every 50-feet or closer if appropriate. Accuracy requirements shall be a horizontal accuracy of < 0.5 ft and a vertical accuracy of < 1 ft. Alternatively, water lines can be surveyed directly prior to back filling. If this alternative method is utilized, a note should be added to the drawing indicating that these features were surveyed as such.

608.2. Digital Drawing Specifications

The following specifications shall apply to the development of all digital as-built drawings pertaining to the sanitary sewer system.

- A. All water lines shall be drawn from valves, tees, caps, etc. to the next valve, tee, cap etc. and be continuous between these features. No gaps should exist between water lines
- B. Water meters, valves, hydrants, reducers, caps, etc. shall be drawn consistently with approved symbology centered exactly at the coordinates provided for the feature.
- C. Water line laterals shall be drawn from the location of the water meter to a point intersecting the water line.
- D. All water meters, valves, hydrants, reducers, caps, etc. shall be labeled with a unique identifier (water meter #1, WM_1, etc.)
- E. All water lines shall be labeled with a unique identifier (Water Line #1, WL_1, etc.), pipe diameter (8 inch, etc.) and pipe material (PVC, DIP, etc.)

Approved Water Symbology						
						
Water Meter	Water Line Valve	Water Line Reducer	Water Line Bend	Water Line Tee	Water Line Cap	Fire Hydrant

608.3. Table Specifications

The following specifications shall apply to the development of all digital as-built attribute data pertaining to the sanitary sewer system.

- A. A table with the following attribute data for each water meter
1. Unique identifier matching the identifier in the as-built drawing
 2. Northing (y) coordinate
 3. Easting (x) coordinate
 4. Elevation (z) coordinate
 5. Address of the property the meter serves

WM_ID	Northing	Easting	Elevation	Service Address
WM #1	1251008.52	2213889.92	914.58	100 Any Street
WM #2	1251410.95	2213486.14	912.88	105 Any Street
WM #3	1251413.63	2213247.90	915.43	110 Any Street
WM #4	1251358.94	2213213.00	916.77	115 Any Street

- B. A table with the following attribute data for each water valve
1. Unique identifier matching the identifier in the as-built drawing
 2. Northing (y) coordinate
 3. Easting (x) coordinate
 4. Elevation (z) coordinate
 5. Valve Type
 6. Water line size measured in inches

WV_ID	Northing	Easting	Elevation	Valve Type	Valve Size
WV #1	1251008.52	2213889.92	914.58	Gate Valve	8-inch
WV #2	1251410.95	2213486.14	912.88	Gate Valve	8-inch
WV #3	1251413.63	2213247.90	915.43	Ball Valve	6-inch
WV #4	1251358.94	2213213.00	916.77	Ball Valve	6-inch

- C. A table with the following attribute data for each fire hydrant
1. Unique identifier matching the identifier in the as-built drawing
 2. Northing (y) coordinate

3. Easting (x) coordinate
4. Elevation (z) coordinate

FH_ID	Northing	Easting	Elevation
FH #1	1251008.52	2213889.92	914.58
FH #2	1251410.95	2213486.14	912.88
FH #3	1251413.63	2213247.90	915.43
FH #4	1251358.94	2213213.00	916.77

D. A table with the following attribute data for each water line cap

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Elevation (z) coordinate
5. Water line size measured in inches

WC_ID	Northing	Easting	Elevation	Cap Size
WC #1	1251008.52	2213889.92	914.58	8-inch
WC #2	1251410.95	2213486.14	912.88	8-inch
WC #3	1251413.63	2213247.90	915.43	8-inch
WC #4	1251358.94	2213213.00	916.77	8-inch

E. A table with the following attribute data for each water line reducer

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Elevation (z) coordinate
5. Water line size measured in inches for the larger water line
6. Water line size measured in inches for the smaller water line

WR_ID	Northing	Easting	Elevation	Large Water Line Size	Small Water Line Size
WR #1	1251008.52	2213889.92	914.58	10-inch	8-inch
WR #2	1251410.95	2213486.14	912.88	10-inch	8-inch
WR #3	1251413.63	2213247.90	915.43	10-inch	8-inch

WR #4	1251358.94	2213213.00	916.77	10-inch	8-inch
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F. A table with the following attribute data for each water line tee

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Elevation (z) coordinate
5. Tee Size as measured in inches

TEE_ID	Northing	Easting	Elevation	Tee Size
TEE #1	1251008.52	2213889.92	914.58	8-8-8
TEE #2	1251410.95	2213486.14	912.88	8-8-6
TEE #3	1251413.63	2213247.90	915.43	8-8-8-8
TEE #4	1251358.94	2213213.00	916.77	8-6-8-6

G. A table with the following attribute data for each water line bend

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Elevation (z) coordinate
5. Bend Angle measured in degrees
6. Bend Size measured in inches

Bend_ID	Northing	Easting	Elevation	Bend Angle	Bend Size
Bend #1	1251008.52	2213889.92	914.58	45 deg	8-inch
Bend #2	1251410.95	2213486.14	912.88	22.5 deg	8-inch
Bend #3	1251413.63	2213247.90	915.43	45 deg	6-inch
Bend #4	1251358.94	2213213.00	916.77	45 deg	6-inch

H. A table with the following attribute data for each water line

1. Unique identifier matching the identifier in the as-built drawing
2. Pipe diameter measured in inches
3. Pipe Material (PVC, DIP, etc.)
4. Pipe Length measured in feet

Pipe ID	Pipe Diameter	Pipe Material	Pipe Length
WL #1	8	PVC	291
WL #2	8	PVC	238
WL #3	8	PVC	64




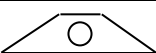


609. Stormwater Infrastructure Drainage




609.1. Survey Accuracy Requirements for Storm Drainage Infrastructure

- A. Coordinate data for storm drain surface structures shall be established at the center of the top of the access lid (catch Basins, junction boxes), center of the top of the grate (drop inlets, hooded grate inlets) or the invert of the pipe (headwalls, flared end sections). Accuracy requirements shall be a horizontal accuracy of < 0.5 ft and a vertical accuracy of < 0.1 ft.
- B. Coordinate data for storm drain pipes / culverts shall be established through the use of the storm drain surface structure coordinate data. Invert elevations shall be established by direct measurement of the distance from the lid or grate elevation to the invert of each pipe. Vertical accuracy of < 0.1 ft shall apply to all storm drain pipe / culvert inverts.

609.2. Digital Drawing Specifications

- A. The following specifications shall apply to the development of all digital as-built drawings pertaining to the sanitary sewer system.
 1. Storm lines shall be drawn with proper directionality: lines must be drawn from the upstream structure to the downstream structure with a single line.
 2. All storm lines shall be drawn from the coordinates of the upstream structure to the coordinates of the downstream structure. No gaps should exist between the storm lines. Lines must not continue for more than one structure.
 3. Headwalls, Drop Inlets, Catch Basins, etc. shall be drawn consistently with approved symbology centered exactly at the coordinates provided for the feature.
 4. All structures shall be labeled with a unique identifier (Catch Basin #1, CB_1, HW 19, etc.)
 5. All storm lines shall be labeled with a unique identifier (Storm Pipe #1, StmPipe_1, etc.), pipe diameter (36 inch, etc.) and pipe material (BCCMP, RCP, HDPE, etc.)

Approved Storm Drain Symbology					
					
Drop Inlet	Hooded Grate Inlet	Single Wing Catch Basin	Double Wing Catch Basin	Raised Lid Yard Inlet	Junction Box

		
Headwall	Flared End Section	Outlet Structure

609.3. Table Specifications

The following specifications shall apply to the development of all digital as-built attribute data pertaining to the storm drain system.

- A. A table with the following attribute data for each drop inlet
 - 1. Unique identifier matching the identifier in the as-built drawing
 - 2. Northing (y) coordinate
 - 3. Easting (x) coordinate
 - 4. Grate Elevation (z) coordinate
 - 5. Manhole diameter measured in feet
 - 6. Manhole Material (Pre-Cast Concrete, Brick, etc.)
 - 7. Manhole depth measured in feet
 - 8. Grate Width measured in feet
 - 9. Grate Length measured in feet

DI_ID	Northing	Easting	Grate Elevation	Manhole Diameter	Manhole Material	Manhole Depth	Grate Width	Grate Length
DI #1	1251008.52	2213889.92	914.58	4	Precast Concrete	6.10	2	3
DI #2	1251410.95	2213486.14	912.88	4	Precast Concrete	7.10	2	3
DI #3	1251413.63	2213247.90	915.43	4	Precast Concrete	8.00	2	3
DI #4	1251358.94	2213213.00	916.77	4	Precast Concrete	7.90	2	3

B. A table with the following attribute data for each hooded grate inlet

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Grate Elevation (z) coordinate
5. Manhole diameter measured in feet
6. Manhole Material (Pre-Cast Concrete, Brick, etc.)
7. Manhole depth measured in feet
8. Grate Width measured in feet
9. Grate Length measured in feet
10. Hood Depth measured in feet
11. Hood Width measured in feet

HGI ID	Northing	Easting	Grate Elev.	Manhole Diameter	Manhole Material	Manhole Depth	Grate Width	Grate Length	Hood Depth	Hood Width
HGI #1	1251008.52	2213889.92	914.58	4	Precast Concrete	6.10	2	3	0.5	3
HGI #2	1251410.95	2213486.14	912.88	4	Precast Concrete	7.10	2	3	0.5	3
HGI #3	1251413.63	2213247.90	915.43	4	Precast Concrete	8.00	2	3	0.5	3
HGI #4	1251358.94	2213213.00	916.77	4	Precast Concrete	7.90	2	3	0.5	3

C. A table with the following attribute data for each catch basin

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Grate Elevation (z) coordinate
5. Manhole diameter measured in feet
6. Manhole Material (Pre-Cast Concrete, Brick, etc.)
7. Manhole depth measured in feet
8. Grate Width measured in feet
9. Grate Length measured in feet
10. Hood Depth measured in feet
11. Hood Width measured in feet

CB_ID	Northing	Easting	Lid Elevation	Manhole Diameter	Manhole Material	Manhole Depth	Catch Basin	Hood Depth	Hood Width
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							Type		
CB #1	1251008.52	2213889.92	914.58	4	Precast Concrete	6.10	Double Wing	3	0.5
CB #2	1251410.95	2213486.14	912.88	4	Precast Concrete	7.10	Single Wing	3	0.5
CB #3	1251413.63	2213247.90	915.43	4	Precast Concrete	8.00	Raised Lid Yard Inlet	3	0.5
CB #4	1251358.94	2213213.00	916.77	4	Precast Concrete	7.90	Single Wing	3	0.5

D. A table with the following attribute data for each junction box

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Lid Elevation (z) coordinate
5. Manhole diameter measured in feet
6. Manhole Material (Pre-Cast Concrete, Brick, etc.)
7. Grade Height measured in feet (height of lid above adjacent grade)
8. Manhole depth measured in feet
9. Junction Box Lid Type (Traffic Bearing, Bolt Down, etc.)

JB_ID	Northing	Easting	Lid Elevation	Manhole Diameter	Manhole Material	Grade Height	Manhole Depth	Junction Box Lid
JB #1	1251008.52	2213889.92	914.58	4	Precast Concrete	2.0	6.10	Traffic
JB #2	1251410.95	2213486.14	912.88	4	Precast Concrete	1.4	7.10	Traffic
JB #3	1251413.63	2213247.90	915.43	4	Precast Concrete	1.0	8.00	Traffic
JB #4	1251358.94	2213213.00	916.77	4	Precast Concrete	0.0	7.90	Traffic

E. A table with the following attribute data for each headwall

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Invert Elevation (z) coordinate

HW_ID	Northing	Easting	Invert Elevation
HW #1	1251008.52	2213889.92	914.58
HW #2	1251410.95	2213486.14	912.88
HW #3	1251413.63	2213247.90	915.43
HW #4	1251358.94	2213213.00	916.77

F. A table with the following attribute data for each flared end section

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Invert Elevation (z) coordinate

FES_ID	Northing	Easting	Invert Elevation
FES #1	1251008.52	2213889.92	914.58
FES #2	1251410.95	2213486.14	912.88
FES #3	1251413.63	2213247.90	915.43
FES #4	1251358.94	2213213.00	916.77

G. A table with the following attribute data for each outlet structure

1. Unique identifier matching the identifier in the as-built drawing
2. Northing (y) coordinate
3. Easting (x) coordinate
4. Elevation (z) coordinate

OS_ID	Northing	Easting	Elevation
OS #1	1251008.52	2213889.92	914.58
OS #2	1251410.95	2213486.14	912.88
OS #3	1251413.63	2213247.90	915.43
OS #4	1251358.94	2213213.00	916.77

H. A table with the following attribute data for each storm line

1. Unique identifier matching the identifier in the as-built drawing
2. Unique identifier matching upstream structure identifier in the as-built drawing

3. Upstream Measure Down - Distance from the upstream structure elevation to invert of pipe measured in feet
4. Upstream Invert – Elevation (z) of the invert of the upstream end of the pipe
5. Unique identifier matching downstream structure identifier in the as-built drawing
6. Downstream Measure Down - Distance from downstream structure elevation to invert of pipe measured in feet
7. Downstream Invert – Elevation (z) of the invert of the downstream end of the pipe
8. Pipe Shape (Box, Elliptical, Circular, etc.)
9. Pipe height measured in inches
10. Pipe width measured in inches
11. Pipe Material (BCCMP, RCP, HDPE, etc.)
12. Pipe Length measured in feet
13. Pipe Slope measured in feet per foot (ft/ft)

Pipe ID	Upstr. ID	Upstr. Measure Down	Upstr. Invert	Down str. ID	Downstr. Measure Down	Downstr. Invert	Pipe Shape	Pipe Height	Pipe Width	Pipe Material	Pipe Length	Pipe Slope
Pipe #1	DI #1	6.1	906.78	JB #3	10.2	905.06	Circular	24	24	BCCMP	291	0.0058
Pipe #2	CB #2	7.1	908.33	FES #1	6.05	906.83	Ellipse	36	24	BCCMP	238	0.0062
Pipe #3	HW #1	0	908.76	HW #2	0	908.33	Box	60	84	RCP	64	0.0066

610. Roadway Specifications

610.1. Survey Accuracy Requirements for Roadway Infrastructure

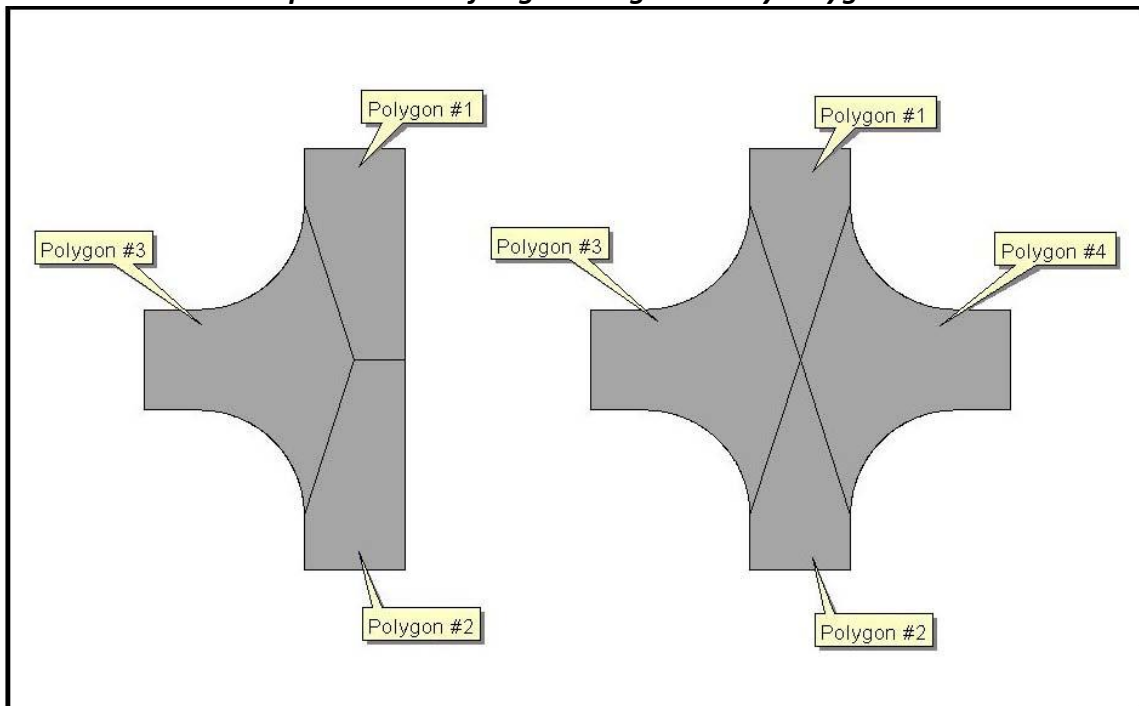
Accuracy requirements shall be a horizontal accuracy of < 0.5 ft for all roadway polygons and centerlines.

610.2 Digital Drawing Specifications

- A. The following specifications shall apply to the development of all digital as-built drawings pertaining to new roadways.
 1. Roadway centerlines shall be drawn from intersection to intersection and should not continue beyond the intersection points
 2. Roadway polygon edges should be drawn from back of curb to back of curb
 3. Intersecting road polygons should meet at the point of roadway centerline intersection
 4. All edges on polygons must be snapped together at the vertices. Gaps in polygon boundaries will not be accepted
 5. Roadway polygons should be completely enclosed

6. All roadway centerlines shall be labeled with the road name

Proper Method of Segmenting Roadway Polygons



611. Property Boundary / Easement Specifications

611.1. Digital Drawing Specifications

The following specifications shall apply to the development of all digital as-built drawings pertaining to property and easement boundaries.

- A. Each property, lot, easement or greenspace parcel must be an enclosed polygon
- B. Each enclosed polygon shall be labeled with a unique identifier (lot number, etc.)
- C. All edges on polygons must be snapped together at the vertices. Gaps in polygon boundaries will not be accepted

611.2. Table Specifications

The following specifications shall apply to the development of all digital as-built attribute data pertaining to the parcels, easements and greenspaces.

- A. A table with the following attribute data for each drop Inlet
 1. Unique identifier matching the identifier in the as-built drawing
 2. Northing of the center of the parcel
 3. Easting of the center of the parcel
 4. Parcel address (if applicable)

5. Lot number (if applicable)
6. Subdivision name

ID	Northing	Easting	Parcel Address	Lot Number	Subdivision Name
Lot #1	1251008.52	2213889.92	100 Any Street	1	Georgia Heights
Lot #2	1251410.95	2213486.14	110 Any Street	2	Georgia Heights
Lot #3	1251413.63	2213247.90	120 Any Street	3	Georgia Heights
Lot #4	1251358.94	2213213.00	130 Any Street	4	Georgia Heights

612. Impervious Surface Specifications (Non-Single Family Residential Development Only)

612.1. Survey Accuracy Requirements for Impervious Surfaces

Accuracy requirements shall be a horizontal accuracy of < 0.5 ft for all impervious surfaces.

612.2. Digital Drawing Specifications

The following specifications shall apply to the development of all digital as-built drawings pertaining to impervious surfaces.

- A. Impervious surface edges should be drawn utilizing continuous polylines.
- B. All end points on polylines must be snapped together at the vertices. Gaps in polylines boundaries will not be accepted.

END OF SECTION 600

APPENDIX A

STANDARD DETAILS



CITY OF GRANTVILLE, GEORGIA

Prepared: April 2023

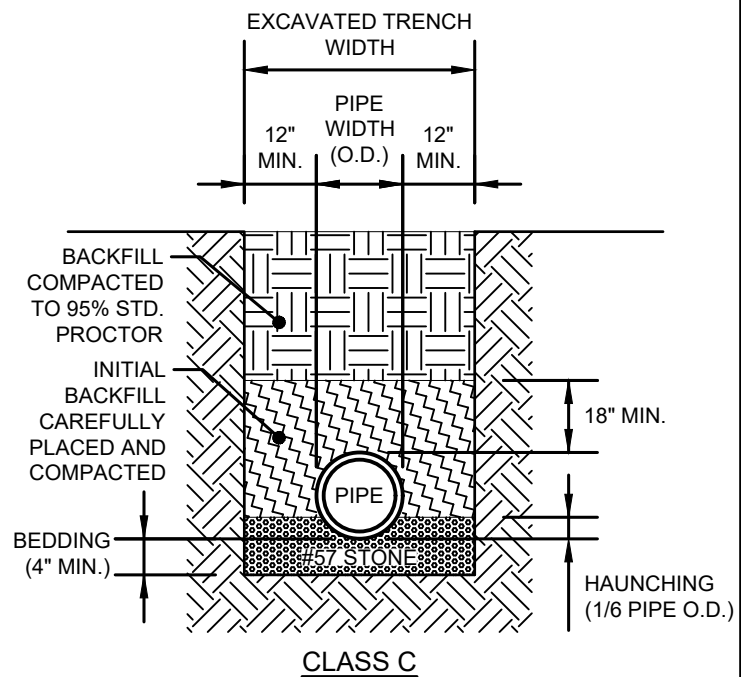
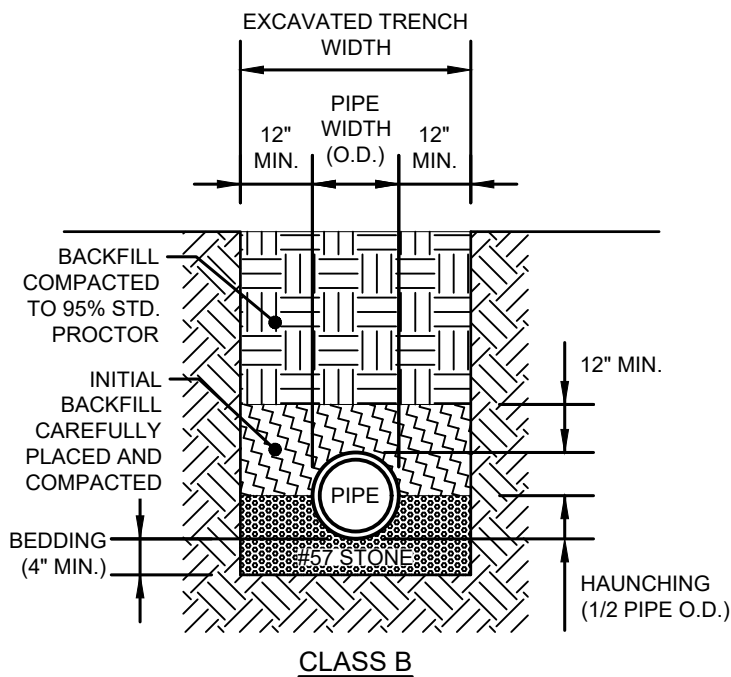
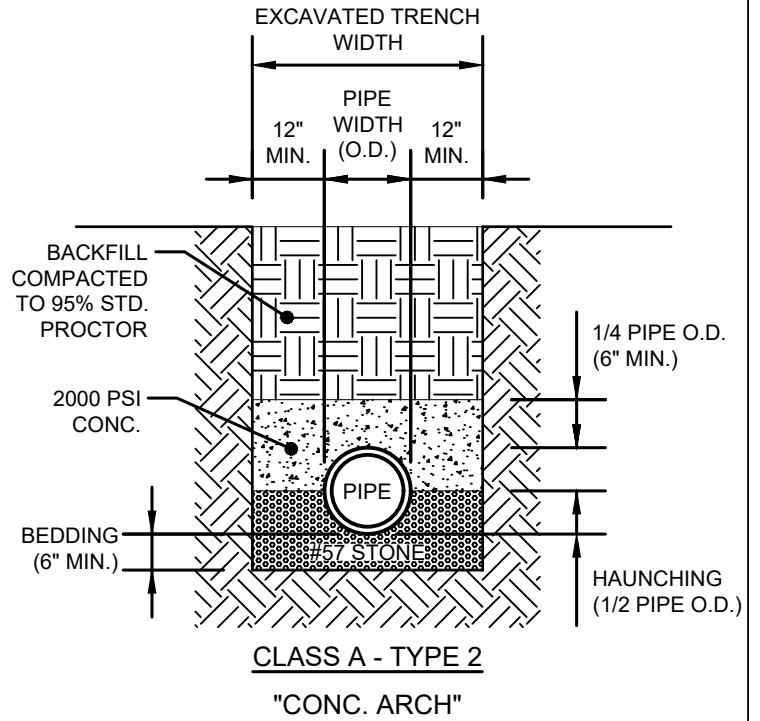
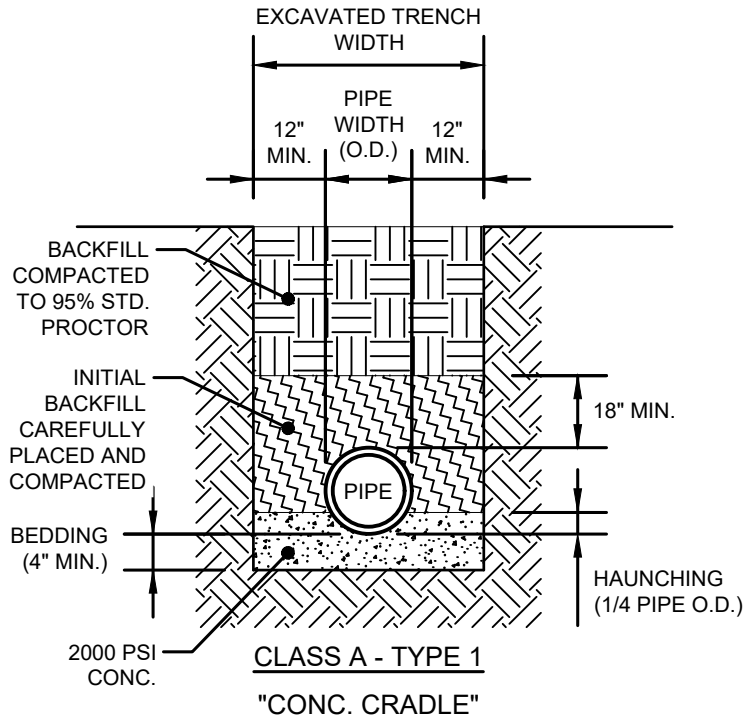
TABLE OF CONTENTS

Detail No.	Description	Revision Date
<u>PIPE</u>		
P001	Concrete Pipe Bedding	March 2023
P002	Ductile Iron Pipe Bedding	March 2023
P003	PVC or HDPE Pipe Bedding	March 2023
P004	Concrete Thrust Block	March 2023
P005	Inline Reaction Block	March 2023
P006	Concrete Anchor Block	March 2023
P007	Concrete Pier	March 2023
P008	Typical Pipe Installation at Cross Drain	March 2023
P009	Jack and Bore	March 2023
P010	Tracer Wire Installation	March 2023
P011	Tracer Wire Utility Marker	March 2023
P012	Utility Marker	March 2023
P013	Locator Ball Installation	March 2023
<u>ROAD</u>		
R001	Road and Right-of-Way	March 2023
R002	Road Widening	March 2023
R003	Curb and Gutter	March 2023
R004	Residential Driveway Apron	March 2023
R005	Commercial Driveway Apron	March 2023
R006	Cul-De-Sac	March 2023
R007	Asphalt Pavement Patch	March 2023
R008	Concrete or Gravel Patch	March 2023
R009	Sidewalk	March 2023
R010A	Sidewalk Wheelchair Ramp	March 2023
R010B	Sidewalk Wheelchair Ramp Continued	March 2023
R011	Utility Placement in Subdivision	March 2023
R012	Catch Basin	March 2023
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S002	Doghouse Manhole	March 2023
S003	Shallow Manhole	March 2023
S004	Typical Manhole Invert Plan	March 2023
S005	Force Main Connection Manhole Invert	March 2023
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S007	Frame and Cover	March 2023
S008	Watertight Frame and Cover	March 2023

S009	Manhole Step	March 2023
S010	Air Release Valve	March 2023
S011	Existing Force Main Tie-in	March 2023
S012	Manhole Abandonment	March 2023
S013	Sewer Line Abandonment	March 2023
S014	Sewer Connection to Existing Structure	March 2023
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S016	Standard Sewer Service	March 2023
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S018	Typical Pump Station Layout	March 2023
S019	Typical Pump Station Wet Well and Valve Pit Plan	March 2023
S020	Typical Pump Station Wet Well and Valve Pit Section	March 2023
S021	Typical Pump Station Electrical Riser	March 2023
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WATER

W001	Fire Hydrant Assembly	March 2023
W002	Gate Valve Assembly	March 2023
W003	Water Valve Marker	March 2023
W004	Water Meter Assembly	March 2023
W005	Water Service (Short Side)	March 2023
W006	Water Service (Long Side)	March 2023
W007	Backflow Preventer (1 1/2" and Larger)	March 2023
W008	Fire Main and Domestic Water Connection	March 2023
W009	Fire Department Connection	March 2023
W010	Water Main Termination	March 2023
W011	Typical Water Main Placement	March 2023
W012	Filling New Water Main	March 2023



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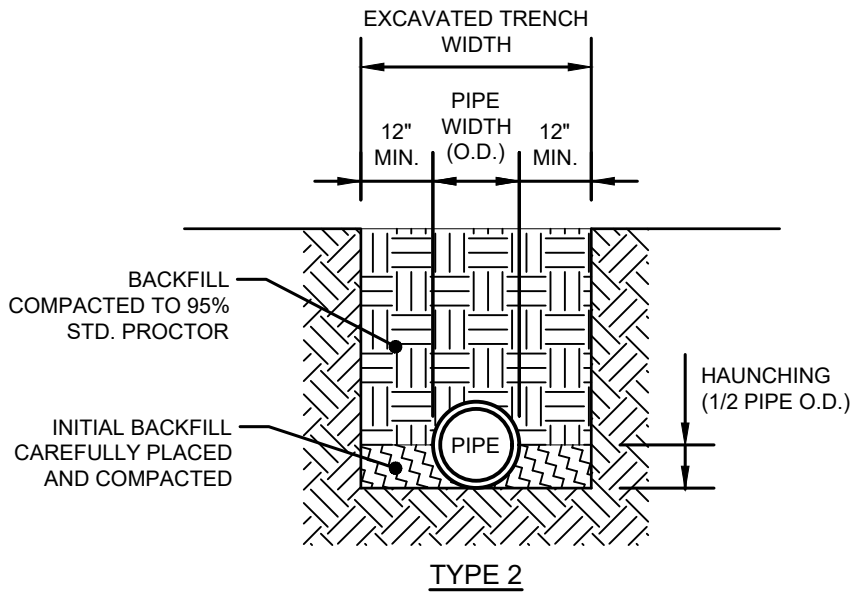
CONCRETE PIPE BEDDING

STANDARD DETAILS

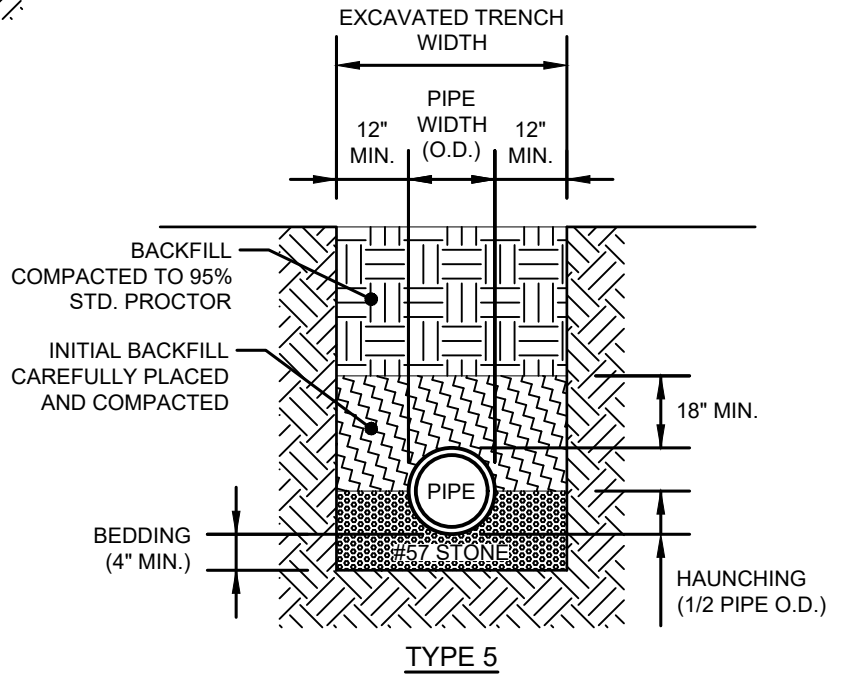
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DETAIL NO.
P001

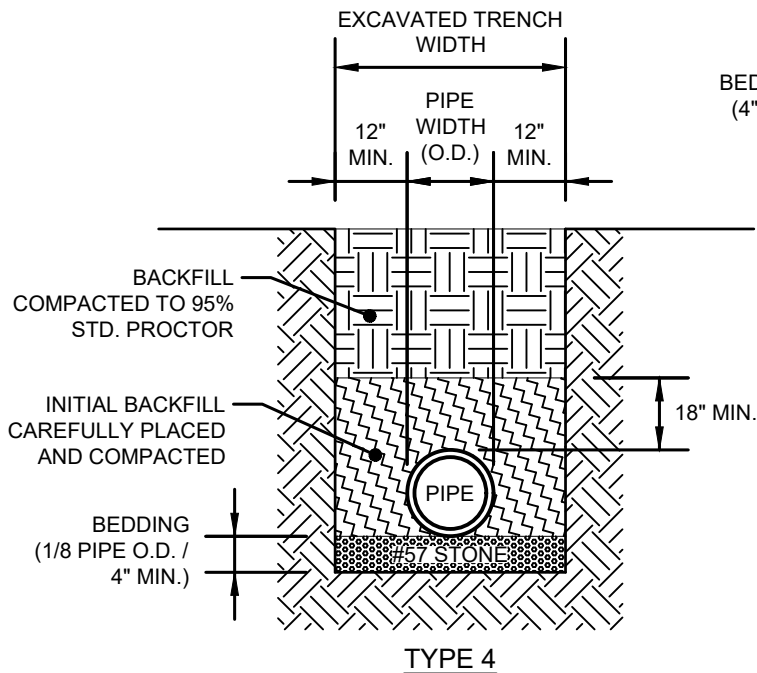
DATE:
MARCH 2023



TYPE 2



TYPE 5



TYPE 4

NOTE:
 BEDDING FOR DUCTILE IRON PIPE SHALL
 CONFORM TO ANSI/AWWA C150/A21.50.



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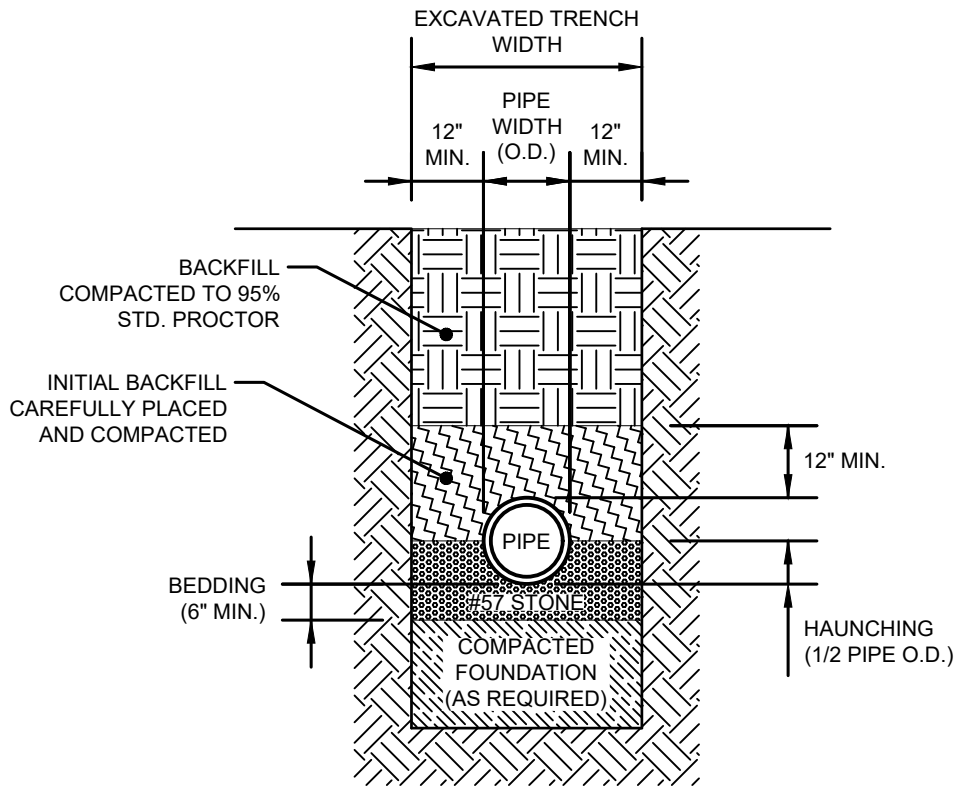
DUCTILE IRON PIPE BEDDING

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
 P002

DATE:
 MARCH 2023



NOTE:
 BEDDING FOR HDPE SHALL CONFORM TO REQUIREMENTS OF ASTM D2321, LATEST EDITION, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS" AND ASTM D2774, LATEST EDITION, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING".



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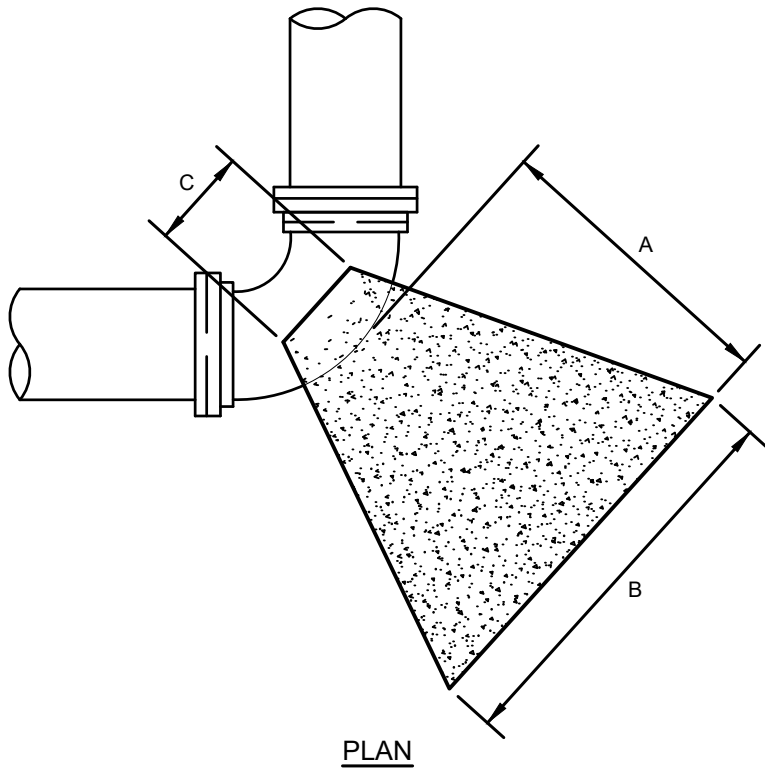
PVC OR HDPE PIPE BEDDING

STANDARD DETAILS

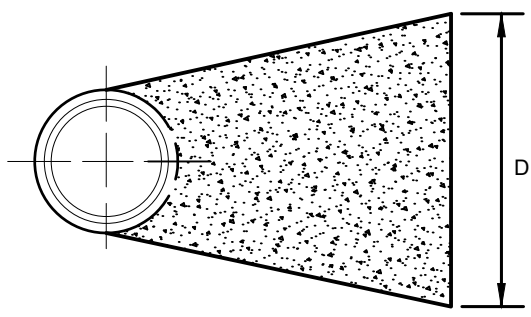
NOT TO SCALE

DETAIL NO.
 P003

DATE:
 MARCH 2023



PLAN



SECTION

MINIMUM DIMENSIONS FOR CONCRETE BLOCKING					
BEND	PIPE SIZE	A	B	C	D
11 1/4°	6"	12"	12"	7"	12"
	8"	12"	15"	7"	12"
	12"	12"	24"	11"	24"
	16"	24"	36"	15"	24"
	20"	24"	36"	19"	36"
22 1/2°	6"	12"	18"	7"	12"
	8"	12"	24"	7"	24"
	12"	24"	36"	11"	24"
	16"	24"	48"	15"	36"
	20"	36"	60"	19"	36"
45°	6"	18"	24"	7"	18"
	8"	24"	36"	7"	24"
	12"	24"	48"	11"	36"
	16"	36"	60"	15"	48"
	20"	48"	72"	19"	60"
90°	6"	18"	30"	7"	24"
	8"	24"	36"	7"	36"
	12"	48"	72"	11"	48"
	16"	48"	84"	15"	60"
	20"	96"	96"	19"	84"
TEES & PLUGS	6"	18"	24"	7"	24"
	8"	24"	36"	7"	24"
	12"	24"	48"	11"	48"
	16"	36"	60"	15"	60"
	20"	48"	84"	19"	72"
24"	60"	96"	22"	84"	

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.
2. THRUST BLOCK SHALL BE POURED AGAINST UNDISTURBED SOIL.
3. BOLTS AND NUTS SHALL BE PROTECTED FROM CONCRETE COVERAGE.
4. ABOVE DIMENSIONS ASSUME 150 PSI TEST PRESSURE. FOR GREATER TEST PRESSURE, ENGINEER SHALL SUBMIT DESIGN CALCULATIONS AND SHOW SIZES.



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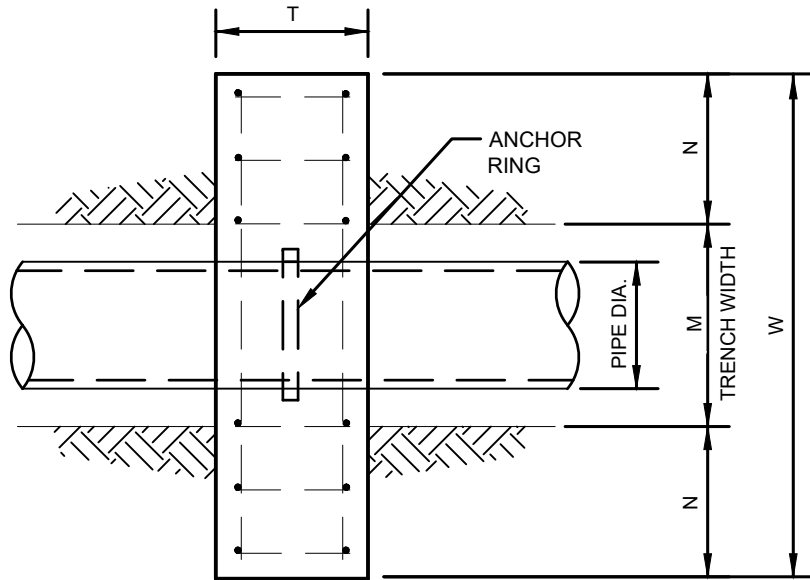
CONCRETE THRUST BLOCK

STANDARD DETAILS

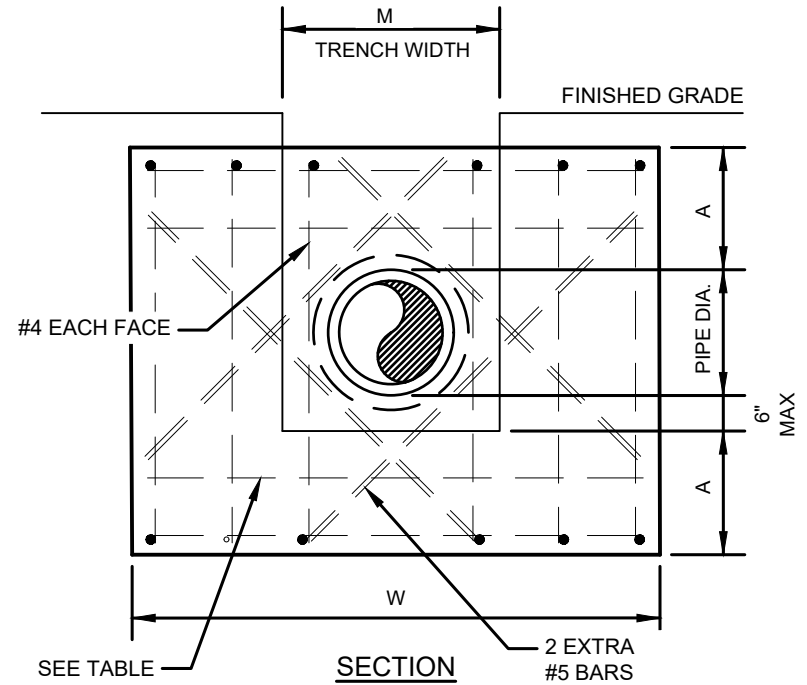
NOT TO SCALE

DETAIL NO.
P004

DATE:
MARCH 2023



PLAN



SECTION

PRESSURE: 200 P.S.I.				SOIL: 2500 P.S.F.		
CONCRETE BLOCKING						
DIA.	A	H	M	N	W	T
24"	2'-6"	7'-0"	4'-0"	2'-6"	9'-0"	1'-6"
16"	1'-6"	4'-4"	3'-4"	1'-8"	6'-4"	1'-0"

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.
2. CONCRETE SHALL BE POURED AGAINST UNDISTURBED SOIL.

DIA.	BLOCKING REINFORCEMENT			ANCHOR RING		
	HOR. (MAIN) REINF.		VERT. REINF. (TEMP.)	DIA. (IN.)	WIDTH (IN.)	THICK. (IN.)
	TOP	BOTTOM				
24"	3-#7 EF	3-#7 EF	#4 AT 9" EF	32	3	1
16"	2-#6 EF	2-#6 EF	#4 AT 12" EF	21	2	1



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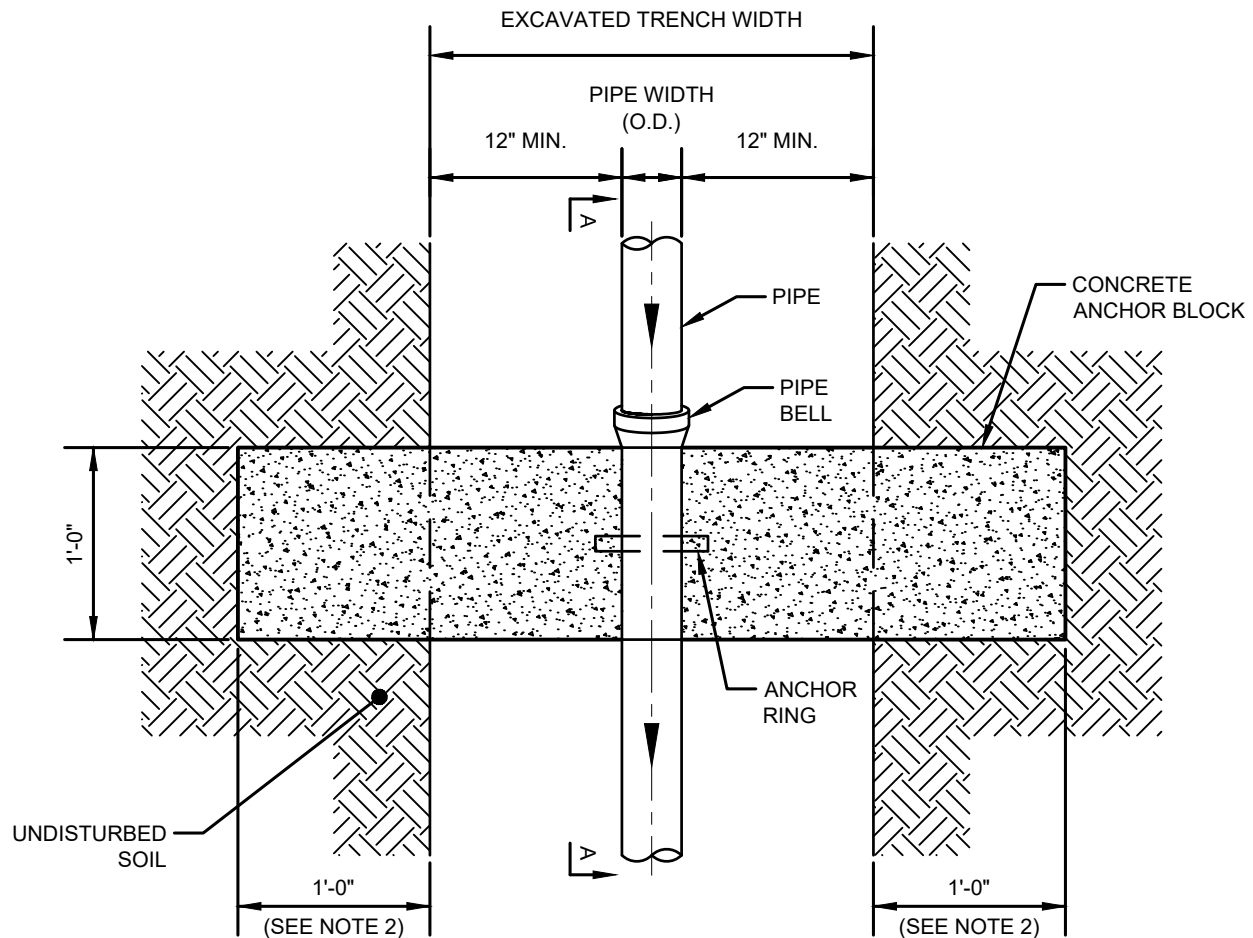
INLINE REACTION BLOCK

STANDARD DETAILS

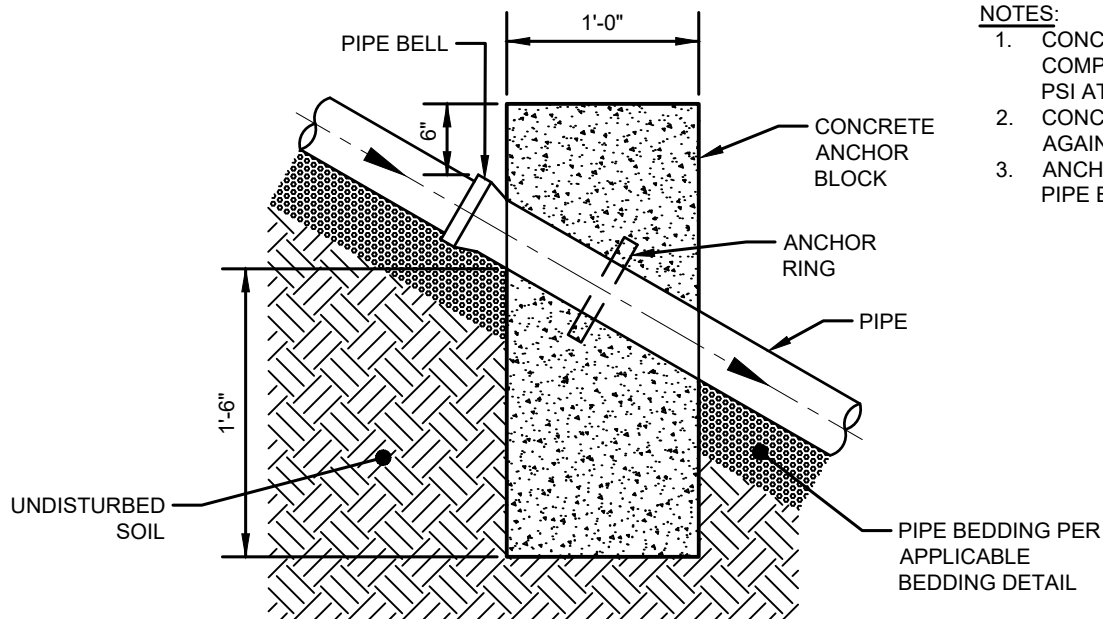
NOT TO SCALE

DETAIL NO.
P005

DATE:
MARCH 2023



PLAN



SECTION A-A

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.
2. CONCRETE SHALL BE POURED AGAINST UNDISTURBED SOIL.
3. ANCHOR BLOCK SHALL NOT COVER PIPE BELL CONNECTION.



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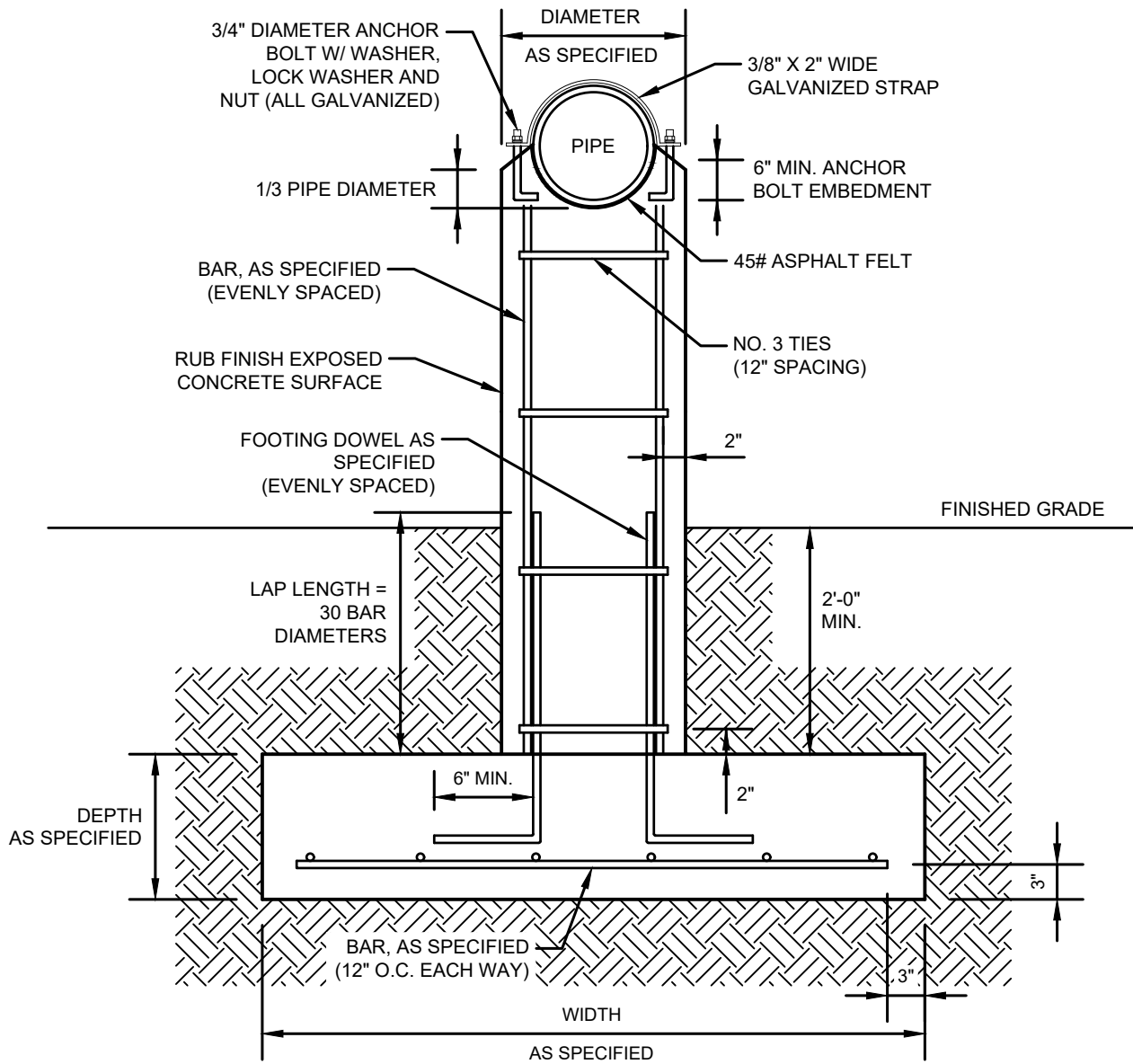
CONCRETE ANCHOR BLOCK

DETAIL NO.
P006

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



CONCRETE PIERS		
PIPE SIZE (INCHES)	PIER DIAMETER (INCHES)	PIER REINFORCING STEEL (EVENLY SPACED)
8	16	6 : NO. 5 BAR, NO. 3 TIE AT 12" O.C.
10	18	6 : NO. 5 BAR, NO. 3 TIE AT 12" O.C.
12	20	6 : NO. 5 BAR, NO. 3 TIE AT 12" O.C.
14	22	6 : NO. 6 BAR, NO. 3 TIE AT 12" O.C.
16	24	6 : NO. 6 BAR, NO. 3 TIE AT 12" O.C.

CONCRETE FOOTINGS			
PIER DIAMETER (INCHES)	FOOTING WIDTH AND DEPTH (INCHES)	FOOTING REINFORCING STEEL (EVENLY SPACED, 12" MAX. EACH WAY)	FOOTING DOWELS (EVENLY SPACED)
16	40 X 40 X 12	NO. 5 BAR	NO. 5 BAR
18	42 X 42 X 15	NO. 5 BAR	NO. 5 BAR
20	44 X 44 X 15	NO. 5 BAR	NO. 5 BAR
22	46 X 46 X 18	NO. 6 BAR	NO. 6 BAR
24	48 X 48 X 20	NO. 6 BAR	NO. 6 BAR



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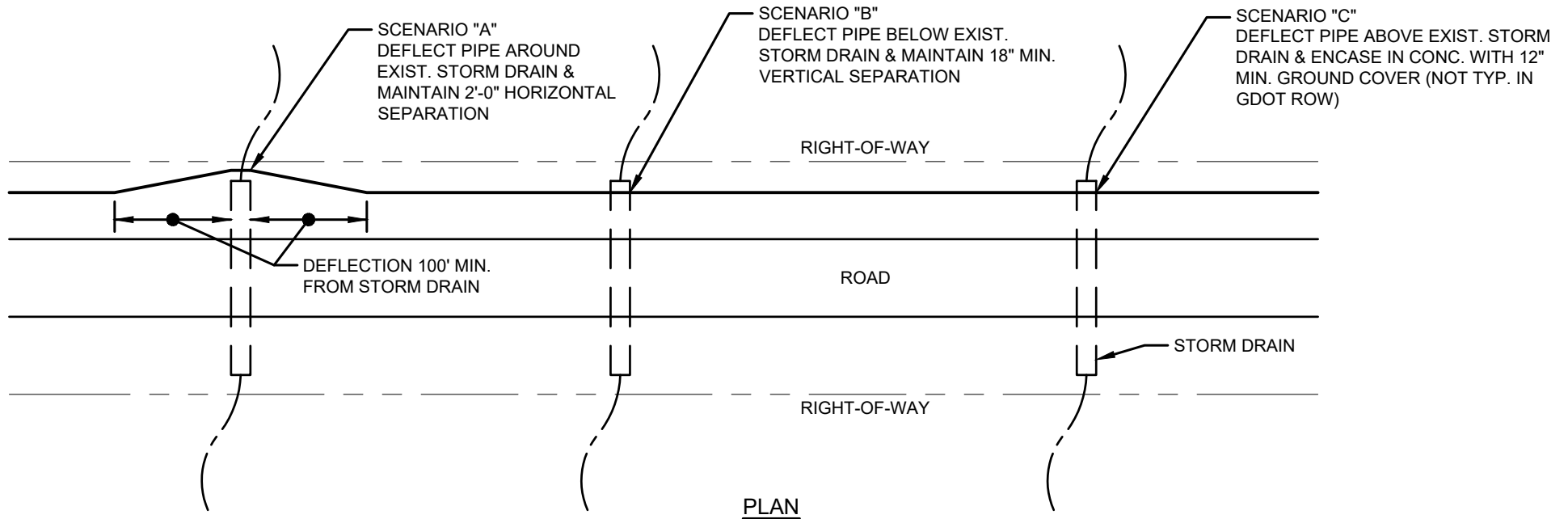
CONCRETE PIER

STANDARD DETAILS

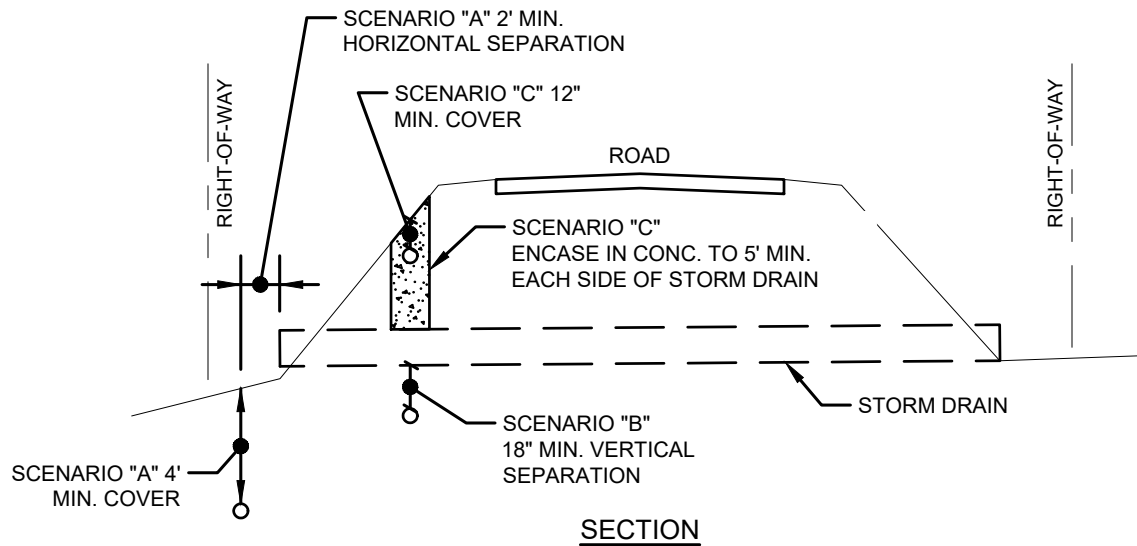
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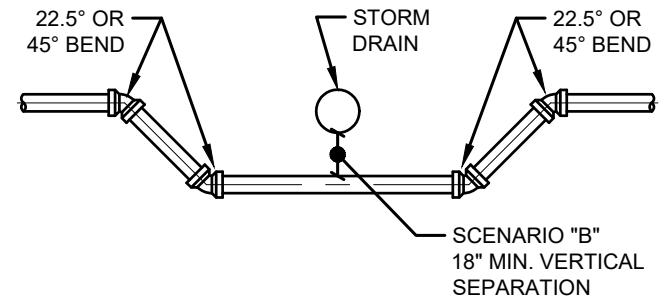
DATE: MARCH 2023



PLAN



SECTION



PIPE FITTING DETAIL

NOTES:

1. PIPE FITTINGS NOT REQUIRED IF SEPARATION CAN BE ACHIEVED USING PIPE MANUFACTURER APPROVED PIPE DEFLECTION INSTALLATION METHODS.



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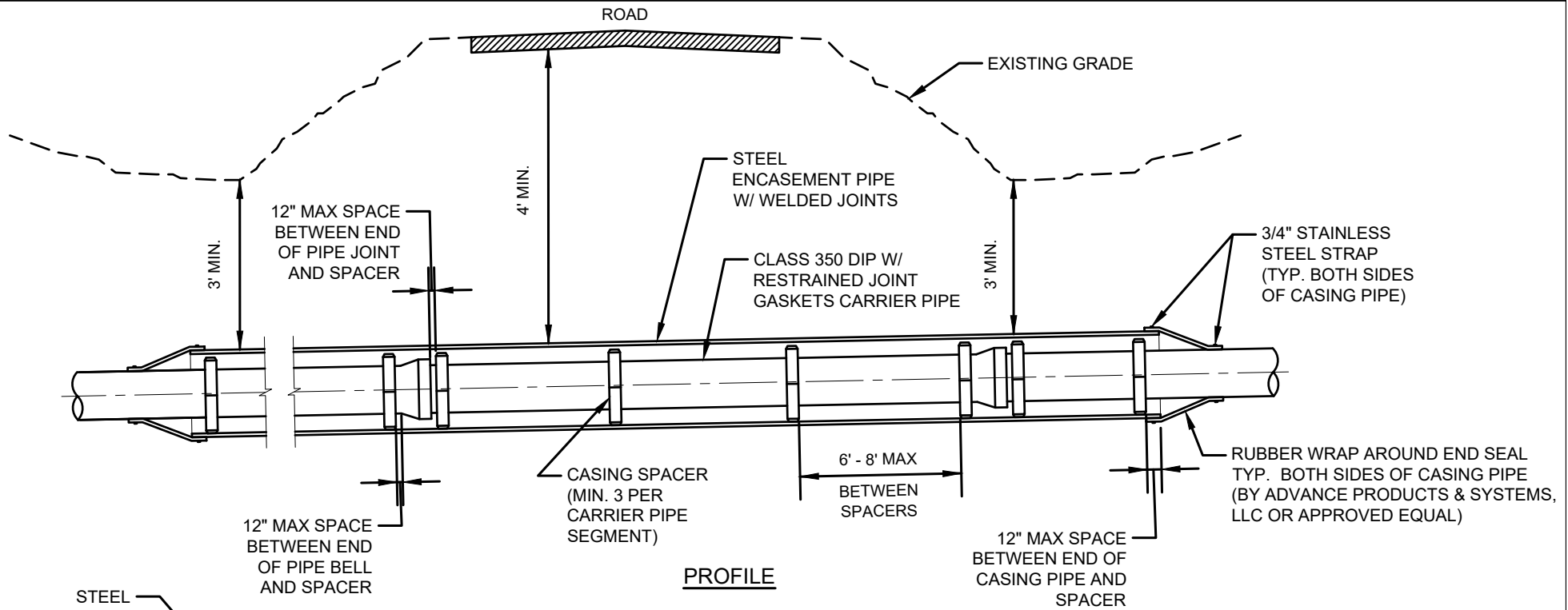
TYPICAL PIPE INSTALLATION
AT CROSS DRAIN

STANDARD DETAILS

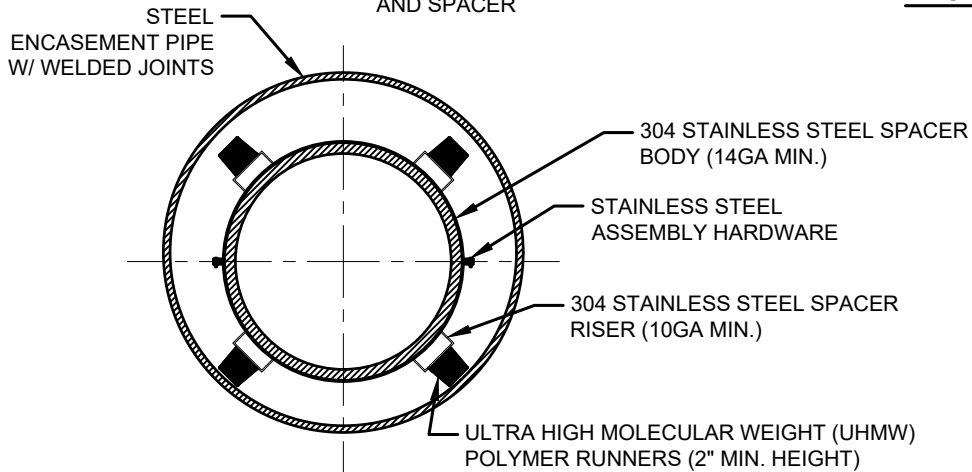
NOT TO SCALE

DETAIL NO.
P008

DATE:
MARCH 2023



PROFILE



CROSS SECTION

PIPE SIZE-CARRIER (DIAMETER)	PIPE SIZE-CASING (DIAMETER) (MIN.)	MINIMUM PIPE THICKNESS (INCHES)	
6"	16"	1/4	0.2500
8"	18"	1/4	0.2500
10"	20"	5/16	0.3125
12" - 14"	24"	3/8	0.3750
16" - 18"	30"	7/16	0.4375
20"	36"	1/2	0.5000
24"	42"	1/2	0.5000
30"	48"	1/2	0.5000

NOTES:

1. STEEL CASING PIPE TO HAVE 35,000 PSI MIN. YIELD STRENGTH.
2. STEEL CASING PIPE SHALL MATCH SIZE AND THICKNESS CALLED OUT IN THIS DETAIL, UNLESS NOTED OTHERWISE IN PLANS.
3. CARRIER PIPE SHALL BE CLASS 350 DUCTILE IRON WITH RESTRAINED JOINT GASKETS, UNLESS NOTED OTHERWISE IN PLANS.



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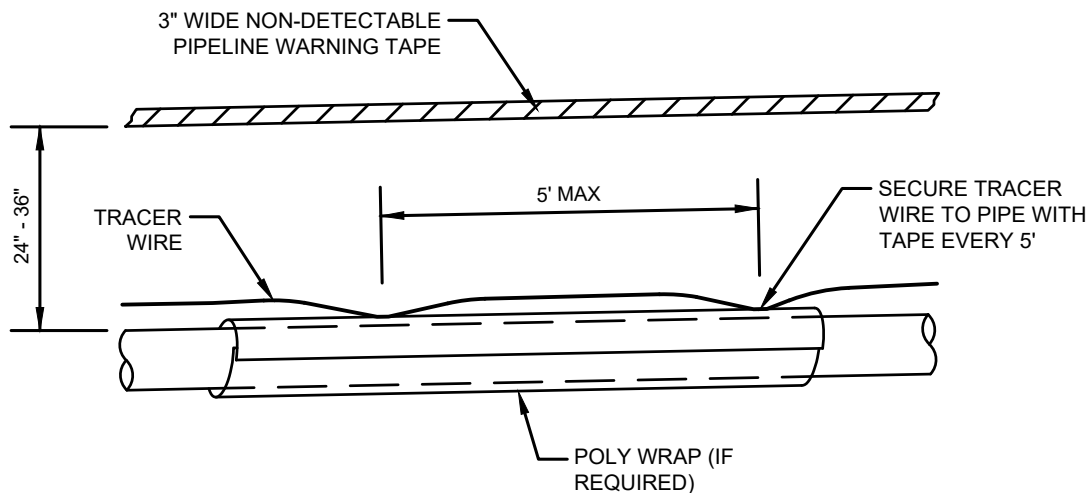
JACK AND BORE

STANDARD DETAILS

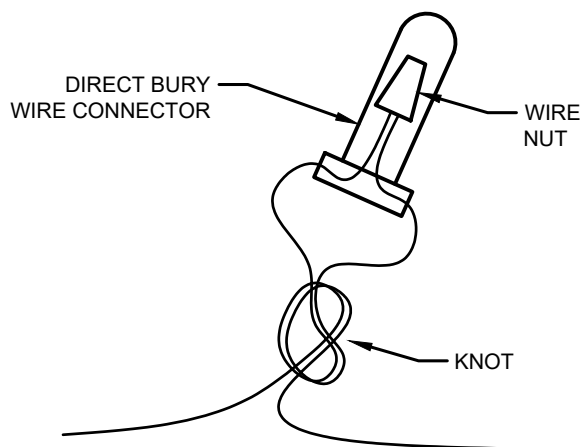
NOT TO SCALE

DETAIL NO.
P009

DATE:
MARCH 2023



WIRE TAPING & WARNING TAPE



DIRECT BURY WIRE CONNECTION

NOTES:

1. TRACER WIRE SHALL BE INSTALLED IN A CONTINUOUS RUN ALONG THE TOP OF THE PIPE.
2. SECURE TRACER WIRE TO TOP OF PIPE OR POLY WRAP (IF REQUIRED) EVERY 5 FEET WITH TAPE.
3. INSTALL 3" WIDE NON-DETECTABLE PIPELINE WARNING TAPE 24"-36" ABOVE PIPE. FOR SEWER PIPING, USE GREEN TAPE INDICATING BURIED SEWER LINE. FOR WATER PIPELINES, USE BLUE TAPE INDICATING BURIED WATER LINE.
4. BRING TRACER WIRE TO SURFACE AT EACH VALVE BOX, INCLUDING FIRE HYDRANT VALVES, AND TIE OFF INSIDE VALVE BOX WITHIN 6" OF LID FOR EASY ACCESS.
5. TAKE CARE TO NOT DAMAGE THE WIRE INSULATION. REPAIR DAMAGED WIRE INSULATION WITH ELECTRICAL TAPE.
6. USE 12 GAUGE MINIMUM TRACER WIRE, DURATRACE OR APPROVED EQUAL.
7. WHEN BORING, ATTACH WIRE TO THE LEAD END OF THE PIPE AND AVOID KINKING AND TANGLING DURING INSTALLATION.
8. WHEN DIRECTIONAL BORING, 3 WIRES SHALL BE PULLED WITH THE PIPE, IN CASE OF WIRE DAMAGE DURING INSTALL.
9. INSTALL A COPPERHEAD INDUSTRIES SNAKE PIT TRACER WIRE ACCESS BOX, OR APPROVED EQUAL, AT CONNECTION POINT TO EXISTING PIPE AND AT DEAD END(S) OF THE PIPELINE.



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TRACER WIRE INSTALLATION

STANDARD DETAILS

NOT TO SCALE

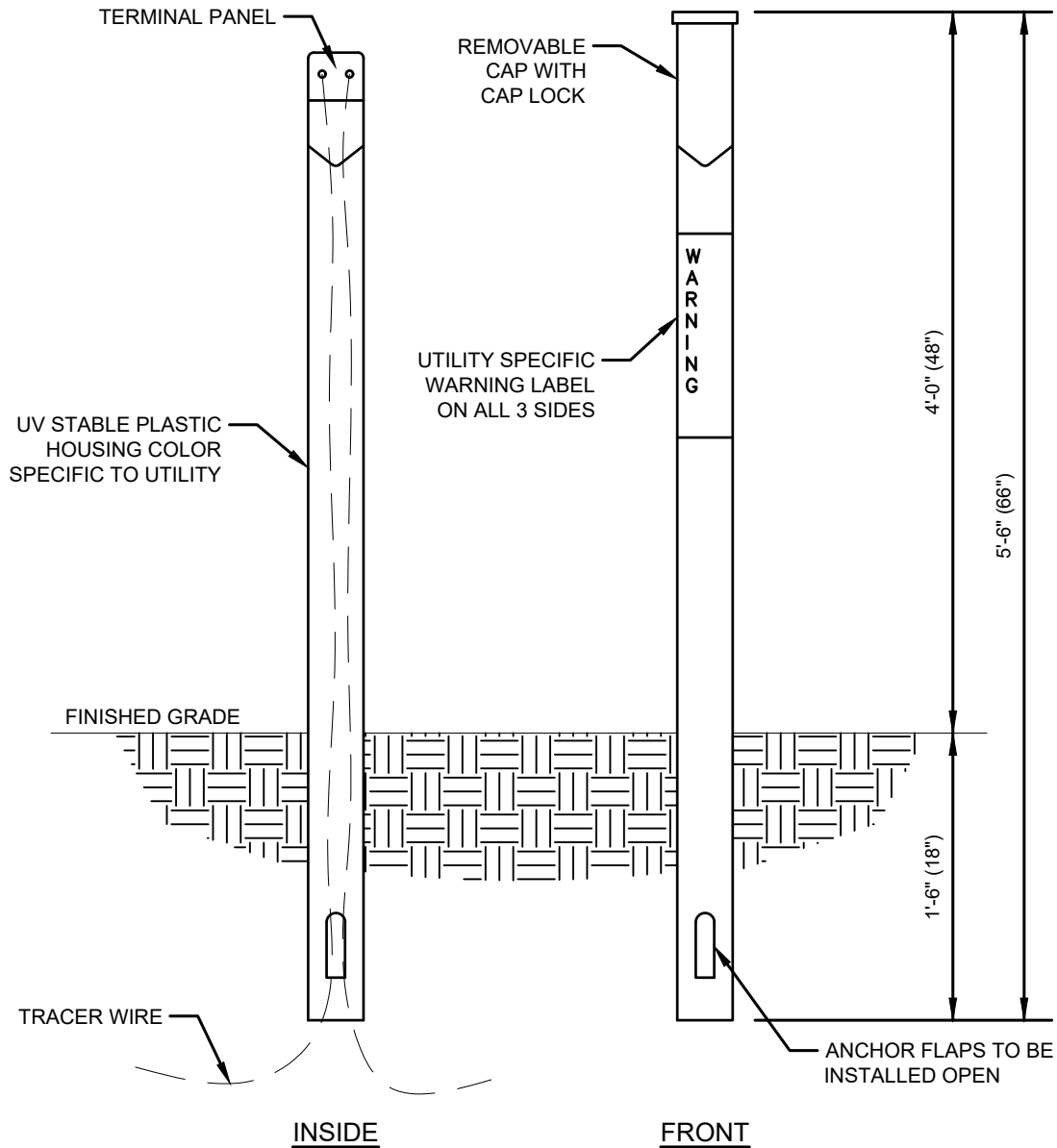
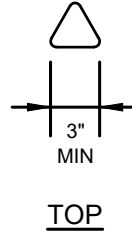
DETAIL NO.
P010

DATE:
MARCH 2023

UTILITY SPECIFIC COLOR CODING	
COLOR	UTILITY
BLUE	WATER (POTABLE)
GREEN	SEWER
RED	ELECTRIC
YELLOW	GAS
ORANGE	TELECOMMUNICATION
PURPLE	WATER (NON-POTABLE/REUSE)

NOTES:

1. USE RHINO TRIVIEW TEST STATION, OR APPROVED EQUAL.
2. SECURE ALL TRACER WIRES TO TERMINAL PANEL USING CRIMP RING CONNECTOR, BOLT, WASHER AND LOCKING FLANGE NUT.
3. INSTALL SHUNTS OR JUMPER WIRES BETWEEN TRACER WIRE TERMINATIONS ON TERMINAL PANEL.



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TRACER WIRE UTILITY MARKER

STANDARD DETAILS

NOT TO SCALE

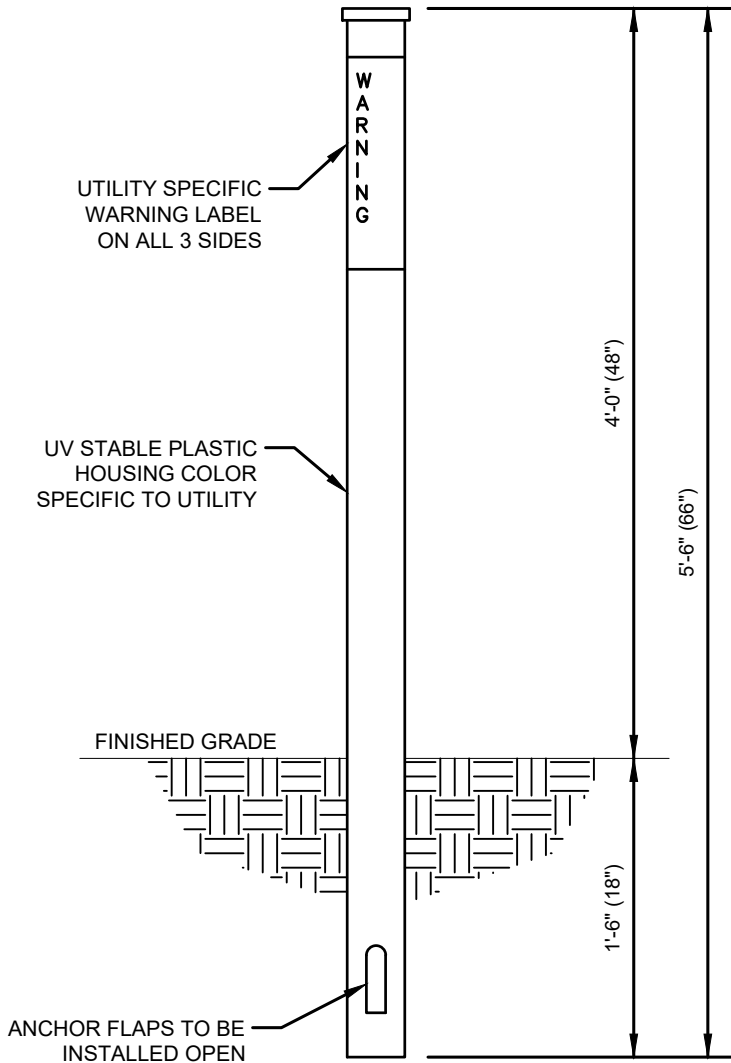
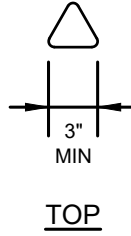
DETAIL NO.
P011

DATE:
MARCH 2023

UTILITY SPECIFIC COLOR CODING	
COLOR	UTILITY
BLUE	WATER (POTABLE)
GREEN	SEWER
RED	ELECTRIC
YELLOW	GAS
ORANGE	TELECOMMUNICATION
PURPLE	WATER (NON-POTABLE/REUSE)

NOTES:

1. USE RHINO TRIVIEW MARKER POST, OR APPROVED EQUAL.



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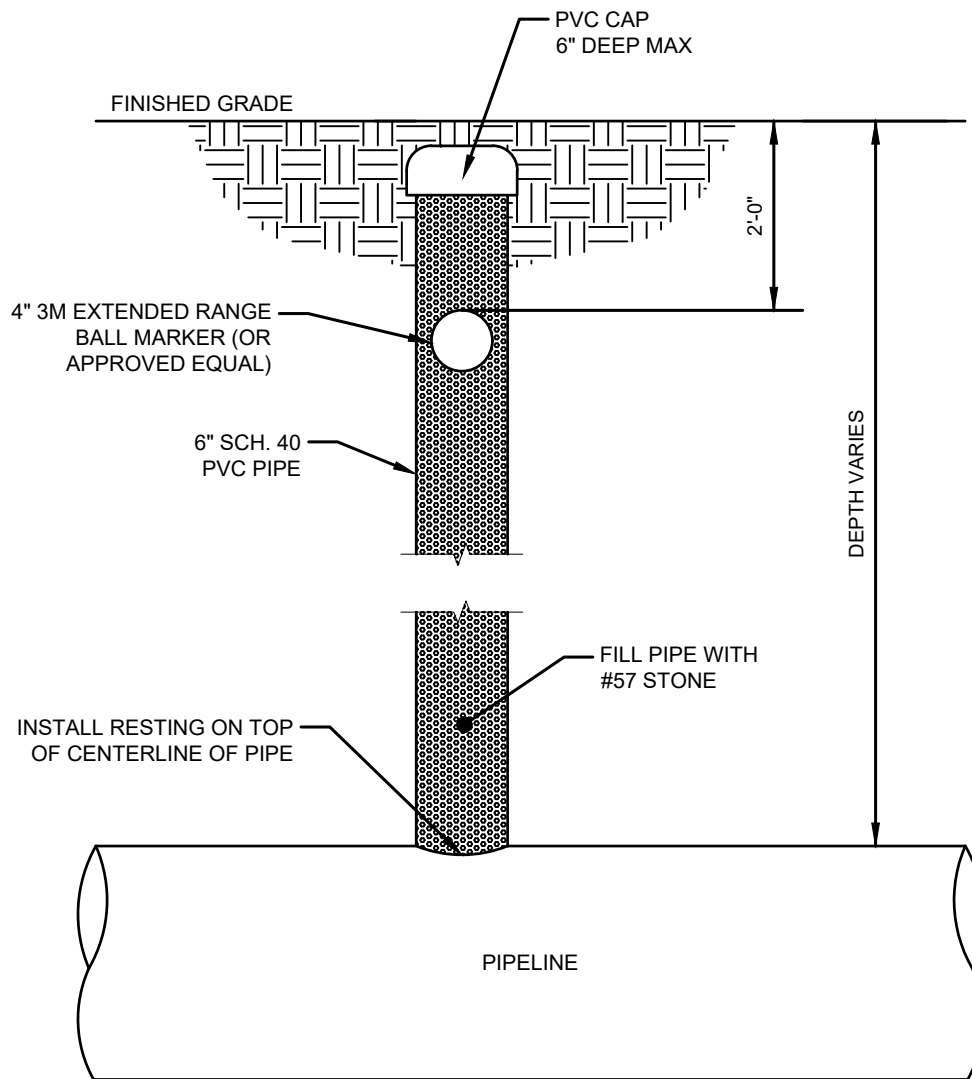
UTILITY MARKER

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
P012

DATE:
MARCH 2023



NOTES:

1. LOCATOR BALL TO BE PLACED AT ALL FITTINGS, CONNECTIONS TO EXISTING LINES, AND AT 3RD JOINT OF PIPE ON STRAIGHT RUNS.
2. INSTALL ON RUNS OF PIPE AT INTERVALS AS SHOWN ON DRAWINGS.
2. DO NOT INSTALL UNDER CONCRETE OR PAVEMENT.



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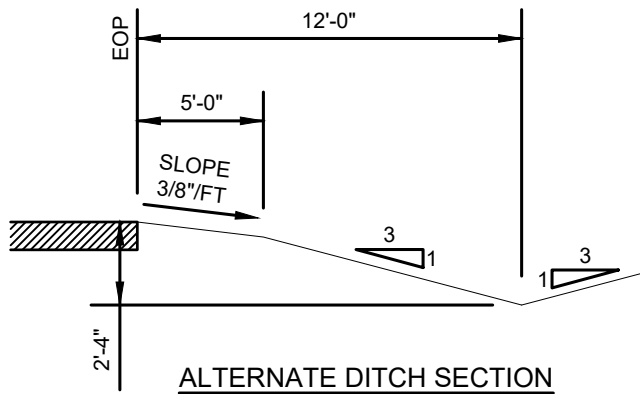
LOCATOR BALL INSTALLATION

STANDARD DETAILS

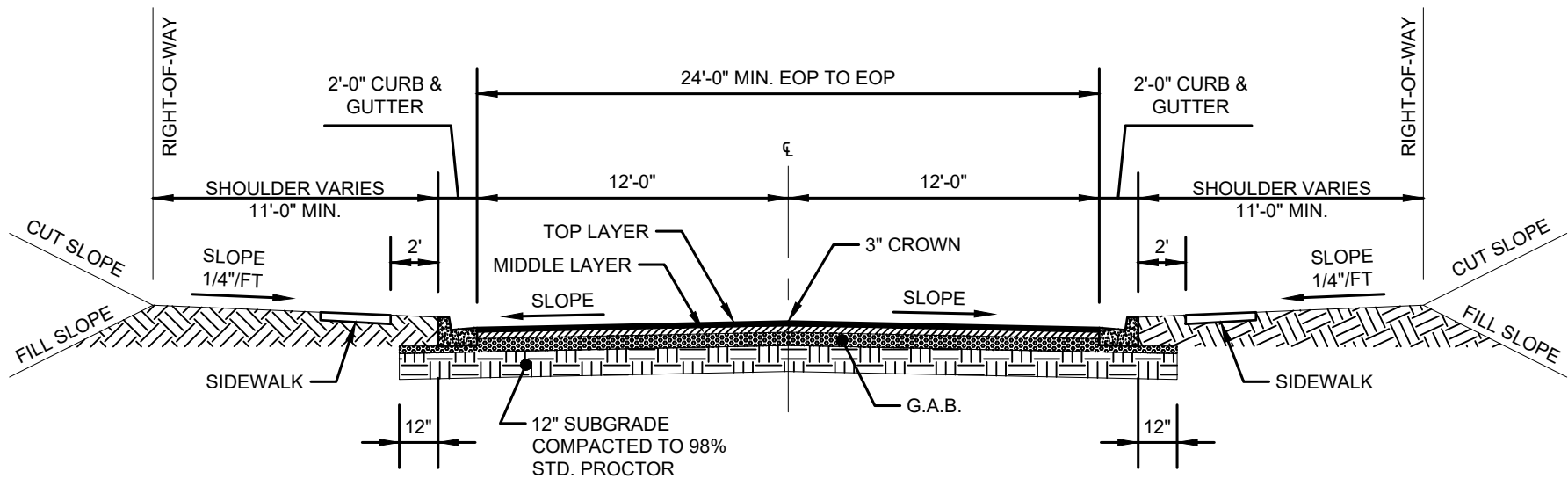
NOT TO SCALE

DETAIL NO.
P013

DATE:
MARCH 2023



PAVEMENT STRUCTURAL COMPOSITION			
ROAD CLASSIFICATION	BASE	MIDDLE LAYER	TOP LAYER
	GRADED AGGREGATE BASE (GAB)	19.5mm ASPHALTIC CONCRETE BINDER	9.5mm ASPHALTIC CONCRETE WEARING SURFACE
MAJOR THOROUGHFARE	8"	3"	1 1/2"
COLLECTOR "A" STREET	8"	2"	1 1/2"
COLLECTOR "B" STREET	6"	2"	1 1/2"
LOCAL (MINOR) STREET	6"	2"	1 1/2"



- NOTES:**
1. ANY AREAS OF INADEQUATELY COMPACTED FILL OR UNSUITABLE MATERIAL OF ANY NATURE SHALL BE REMOVED AND REPLACED WITH SUITABLE FILL IN WELL COMPACTED LAYERS TO AT LEAST 95% OF MAXIMUM DENSITY (AASHTO T-99), BEFORE ANY TYPE OF PAVING IS APPLIED.
 2. CONTRACTOR SHALL NOT BEGIN TO APPLY PAVING WITHOUT A RELEASE FROM THE CITY, AND WILL BE HELD RESPONSIBLE FOR REPLACING ANY PAVING, BASE, AND SUBGRADE WHICH MAY FAIL BECAUSE OF INADEQUATE SUBGRADE CONDITIONS, AS WELL AS FOR ORDINARY PAVING DEFICIENCIES.
 3. IF A DELAY IN PAVING IS EXPECTED BY THE DEVELOPER OR THE CITY, THE STONE BASE MATERIAL SHALL BE PRIMED AT THE RATE OF 0.25 GALLON PER SQUARE YARD WITH R.C. 70 CUT BACK ASPHALT THE SAME DAY IT IS COMPACTED.
 4. A BITUMINOUS TACK COAT SHALL BE APPLIED BETWEEN EACH LIFT OF ASPHALTIC CONCRETE. TACK COAT SHALL BE ASPHALT CEMENT, VISCOSITY GRADE AC-10, AC-15, AC-20 OR AC-30. APPLICATION RATE SHALL BE 0.05 GAL/SY.



CITY OF
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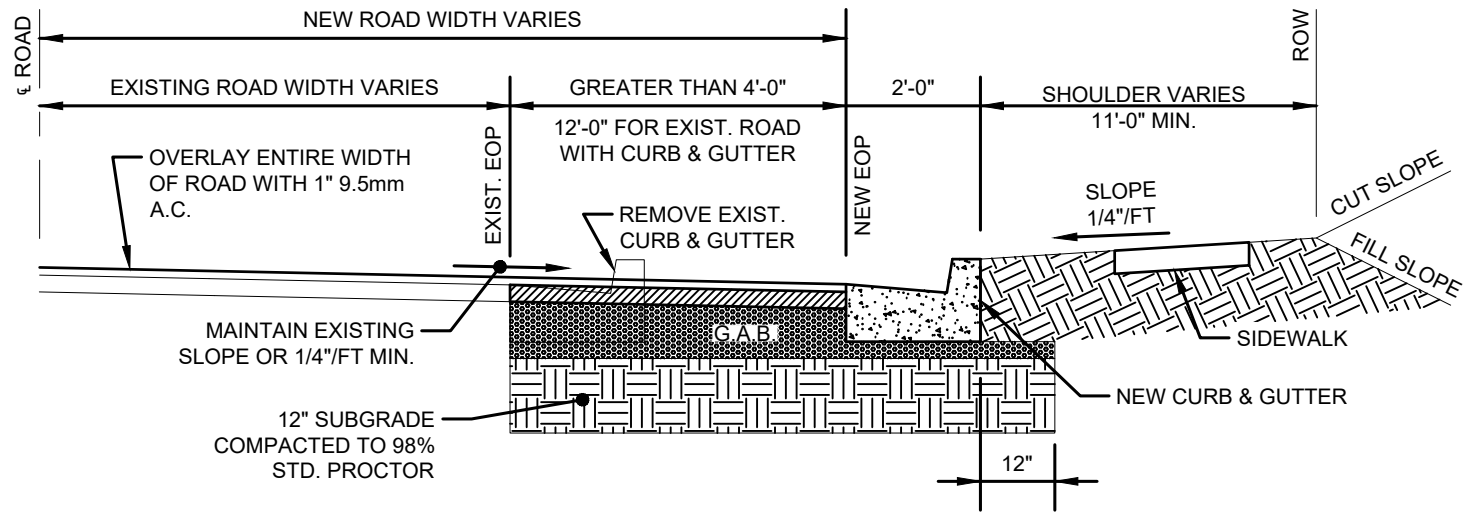
ROAD AND RIGHT-OF-WAY

STANDARD DETAILS

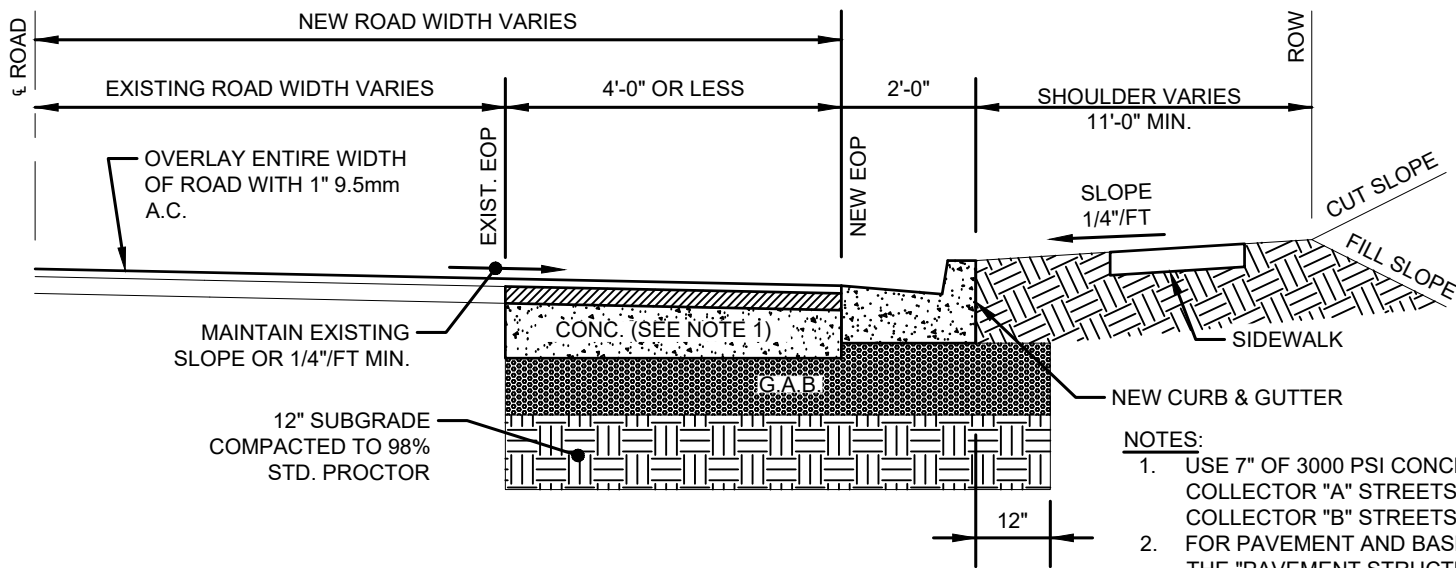
NOT TO SCALE

DETAIL NO.
R001

DATE:
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TYPICAL DECELERATION LANE OR ROAD WIDENING GREATER THAN 4'



ROAD WIDENING 4' OR LESS

NOTES:

1. USE 7" OF 3000 PSI CONCRETE FOR MAJOR THOROUGHFARES AND COLLECTOR "A" STREETS AND USE 5" OF 3000 PSI CONCRETE FOR COLLECTOR "B" STREETS AND MINOR STREETS.
2. FOR PAVEMENT AND BASE DIMENSIONS AND MATERIALS, REFER TO THE "PAVEMENT STRUCTURAL COMPOSITION" TABLE ON DETAIL R011.



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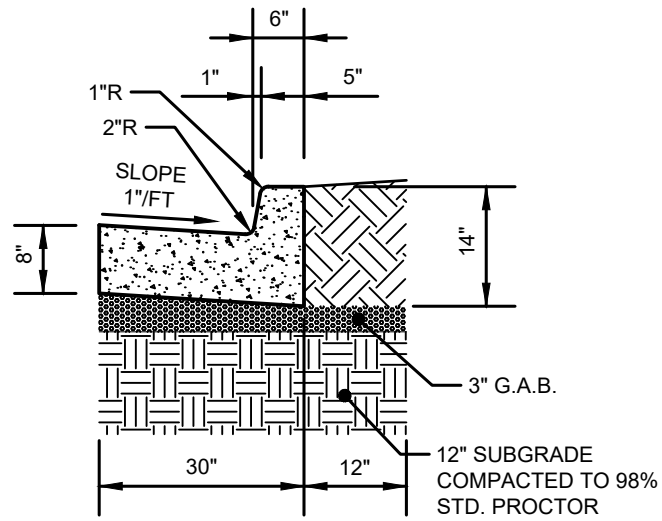
ROAD WIDENING

STANDARD DETAILS

NOT TO SCALE

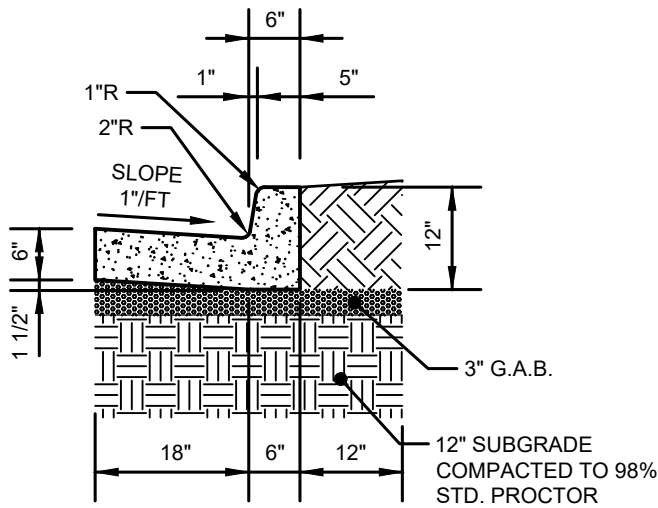
DETAIL NO.
R002

DATE:
MARCH 2023



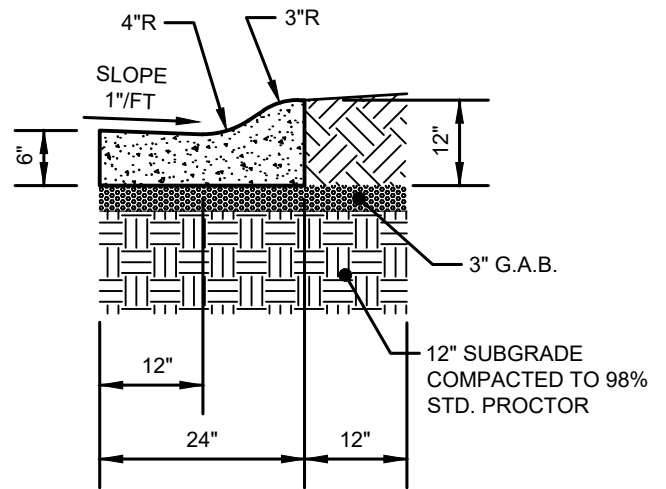
TYPE 1

COMMERCIAL OR INDUSTRIAL



TYPE 2

RESIDENTIAL



TYPE 3

RESIDENTIAL

NOTES:

1. CURB AND GUTTER SHALL BE CONSTRUCTED OF FIBER REINFORCED 3,000 PSI CONC.
2. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS FIBER JOINT FILLER AND SHALL BE REQUIRED AT EACH CONNECTION TO A STRUCTURE, CURB RETURNS AND AT A MINIMUM OF 250 FT ON CENTER.



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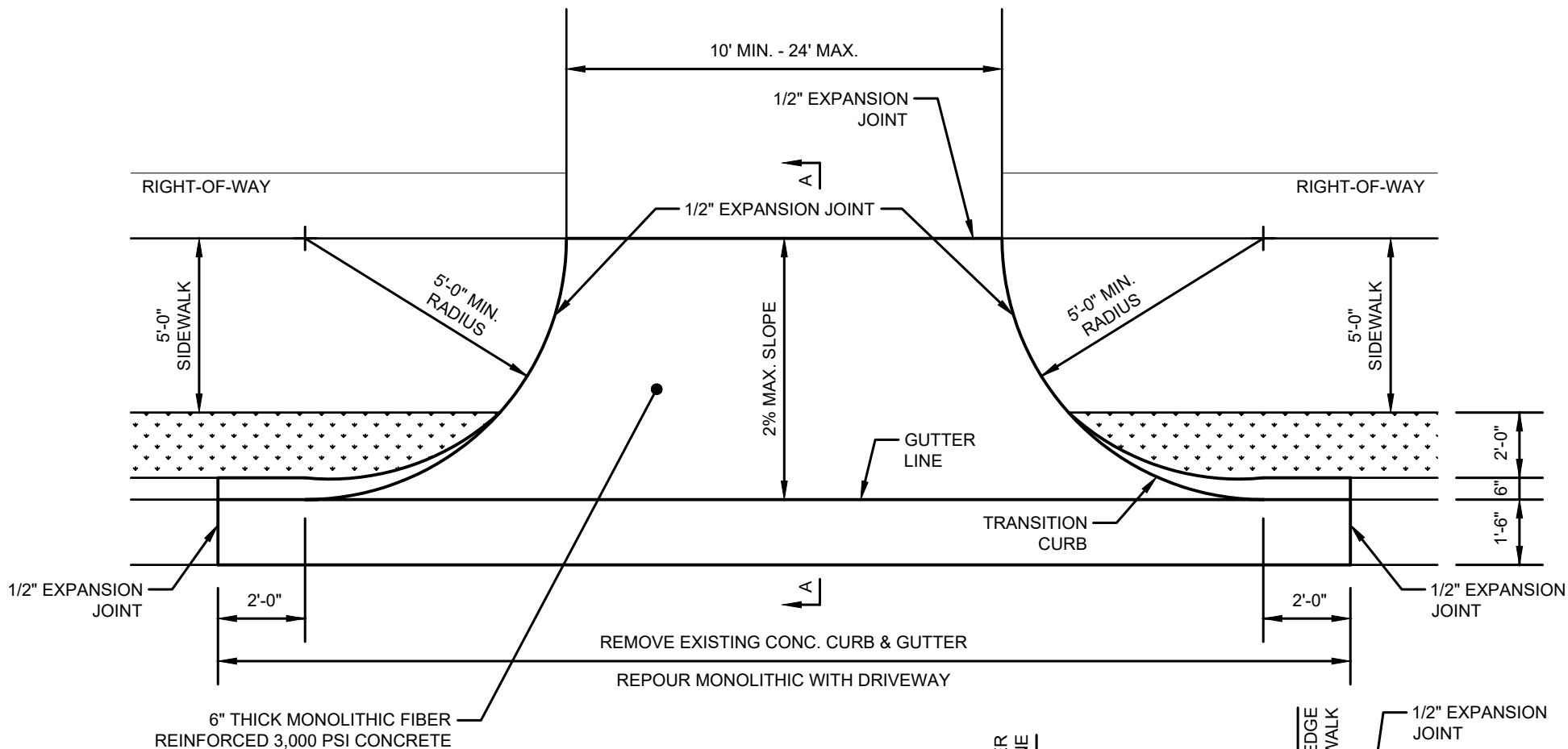
CURB AND GUTTER

DETAIL NO.
R003

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE

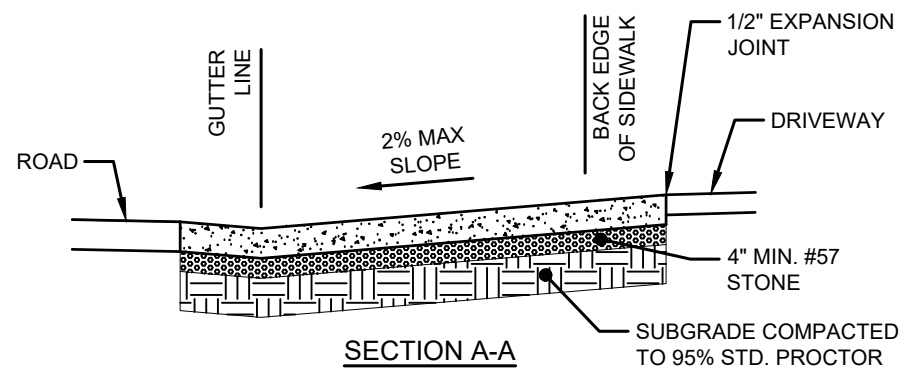


REMOVE EXISTING CONC. CURB & GUTTER
 REPOUR MONOLITHIC WITH DRIVEWAY

6" THICK MONOLITHIC FIBER REINFORCED 3,000 PSI CONCRETE

NOTES:

1. DRIVEWAY, CURB AND GUTTER SHALL BE CONSTRUCTED OF FIBER REINFORCED 3,000 PSI CONC.
2. SAW/CUT 1 1/2" DEEP JOINTS IN 12"x12" SYMMETRIC PATTERN, AS REQUIRED FOR CONC. APRON LARGER THAN 12"x12', AND AT EACH CHANGE IN GRADE.
3. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS FIBER JOINT FILLER AND SHALL BE REQUIRED AT EACH CONNECTION TO EXISTING CURB AND GUTTER, DRIVEWAY OR SIDEWALK.



SECTION A-A



CITY OF GRANTVILLE, GEORGIA

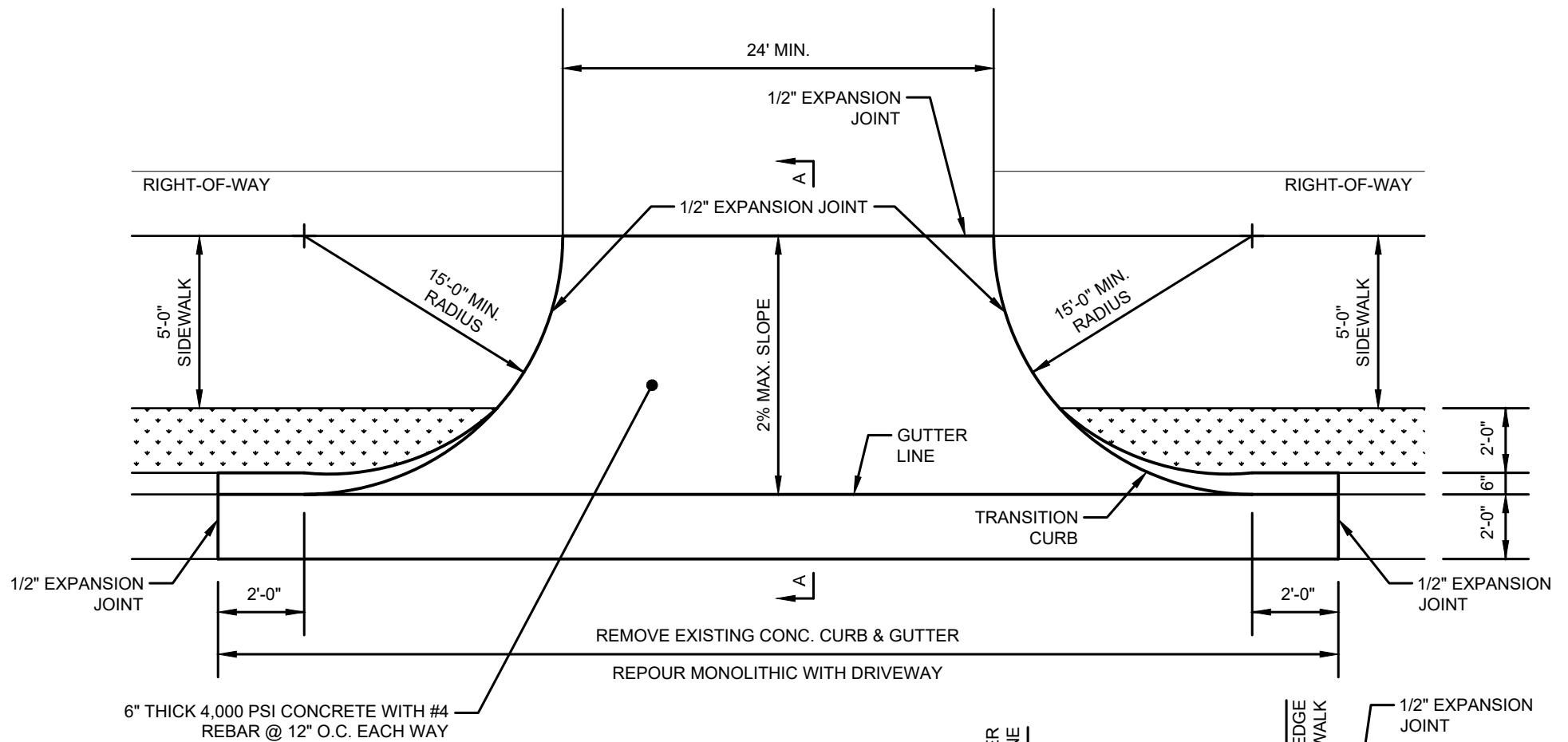
RESIDENTIAL DRIVEWAY APRON

STANDARD DETAILS

NOT TO SCALE

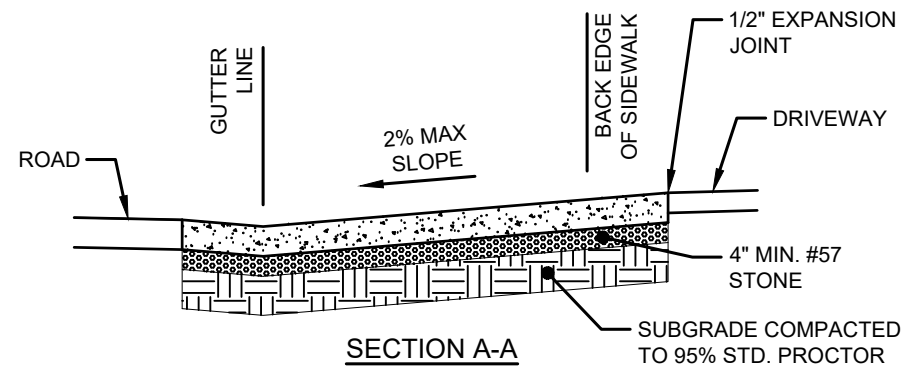
DETAIL NO. R004

DATE: MARCH 2023



NOTES:

1. DRIVEWAY, CURB AND GUTTER SHALL BE CONSTRUCTED 4,000 PSI CONC.
2. SAW/CUT 1 1/2" DEEP JOINTS IN 12'x12' SYMMETRIC PATTERN, AS REQUIRED FOR CONC. APRON LARGER THAN 12'x12', AND AT EACH CHANGE IN GRADE.
3. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS FIBER JOINT FILLER AND SHALL BE REQUIRED AT EACH CONNECTION TO EXISTING CURB AND GUTTER, DRIVEWAY OR SIDEWALK.



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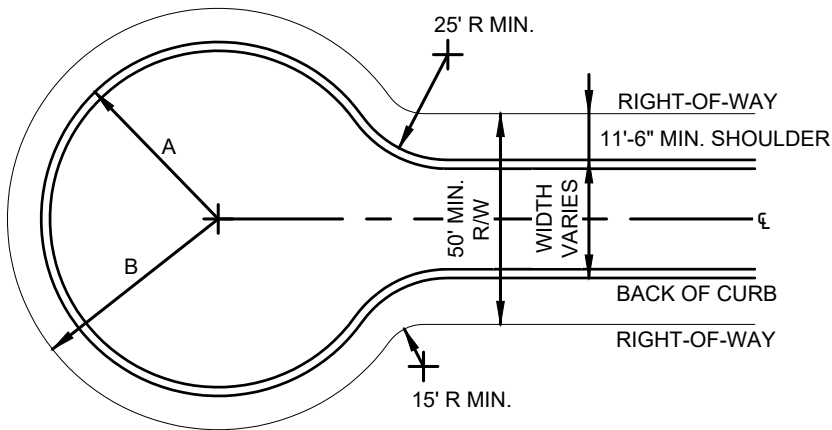
COMMERCIAL DRIVEWAY APRON

STANDARD DETAILS

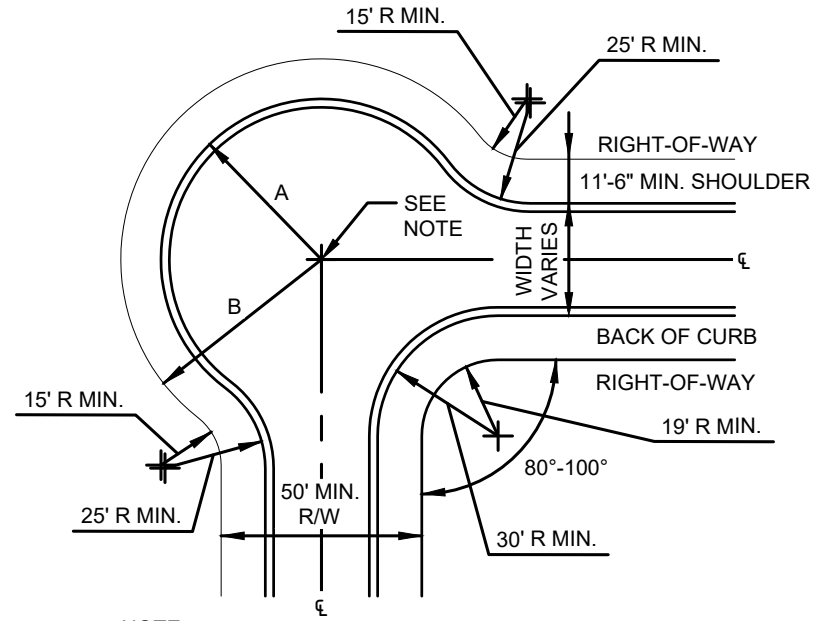
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DETAIL NO.
R005

DATE:
MARCH 2023

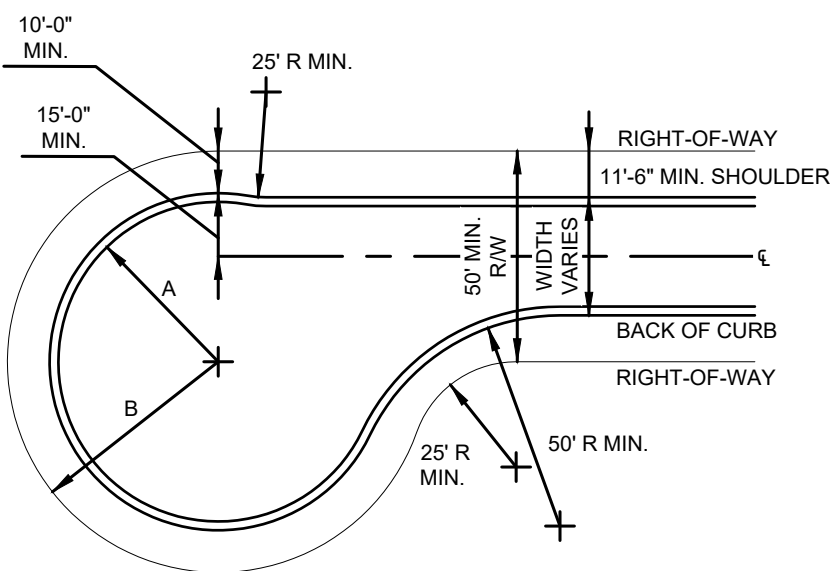


STANDARD CUL-DE-SAC



NOTE:
CENTER OF RADIUS LOCATED ON OR OUTSIDE INTERSECTION OF STREET CENTERLINES

EYEBROW CUL-DE-SAC



NOTE:
LEFT HAND TEARDROP SHOWN
RIGHT HAND TEARDROP IS MIRROR IMAGE

TEARDROP CUL-DE-SAC

MINIMUM DIMENSIONS		
	RESIDENTIAL	NON-RESIDENTIAL
A	40'	50'
B	50'	60'



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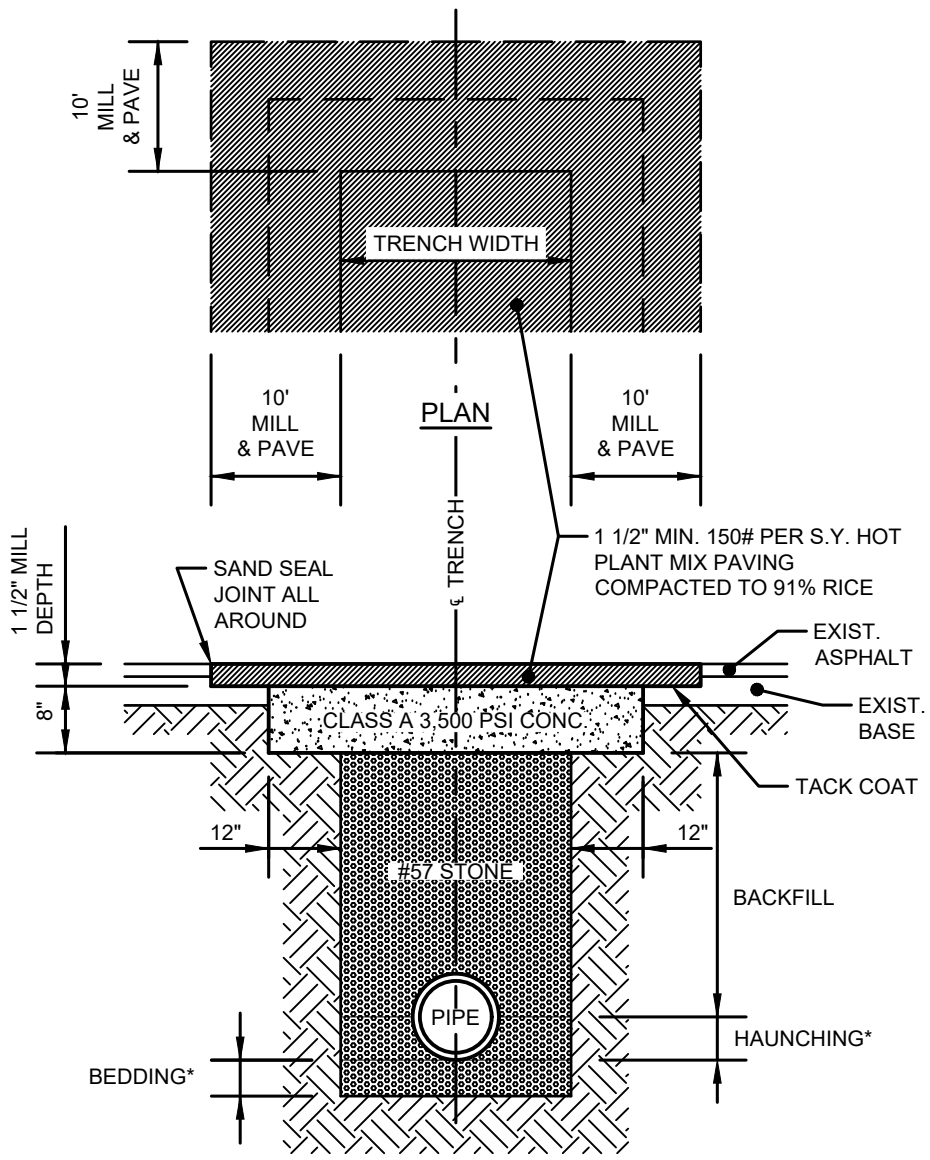
CUL-DE-SAC

STANDARD DETAILS

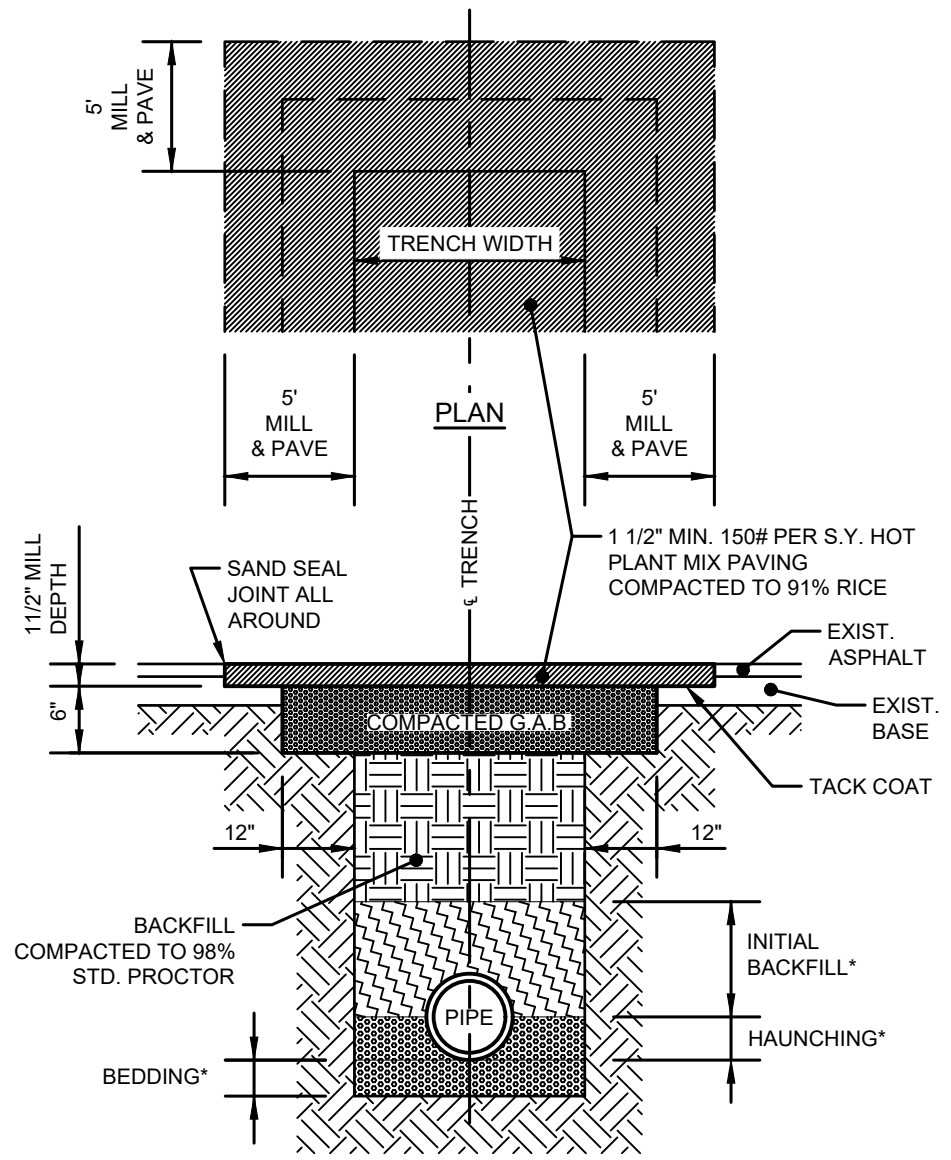
NOT TO SCALE

DETAIL NO.
R006

DATE:
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SECTION
ASPHALT ROAD



SECTION
ASPHALT DRIVEWAY

* DEPTH AND MATERIAL AS REQUIRED BY BEDDING DETAIL



CITY OF GRANTVILLE, GEORGIA

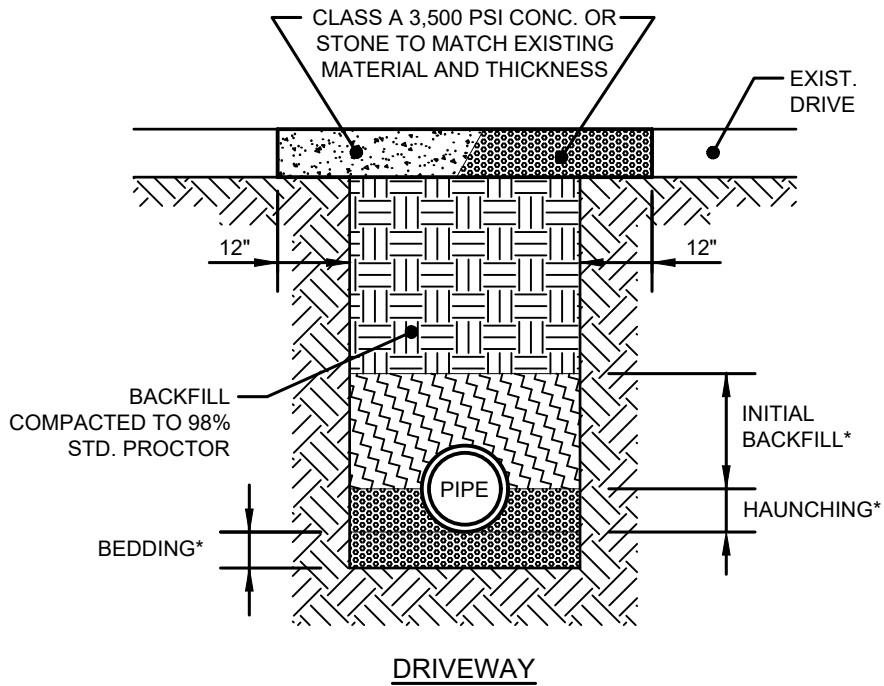
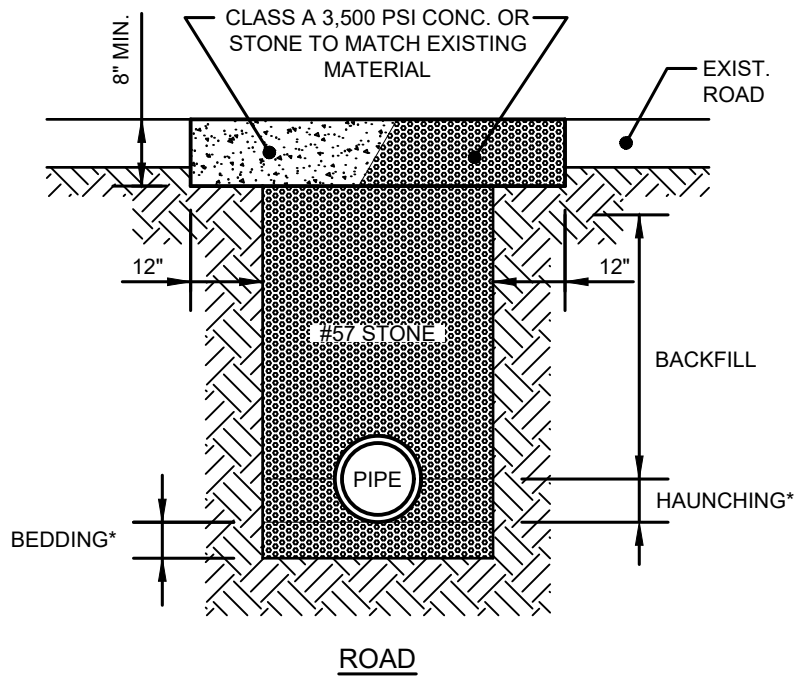
ASPHALT PAVEMENT PATCH

STANDARD DETAILS

NOT TO SCALE

DETAIL NO. R007

DATE: MARCH 2023



* DEPTH AND MATERIAL AS REQUIRED BY BEDDING DETAIL



CITY OF
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GEORGIA

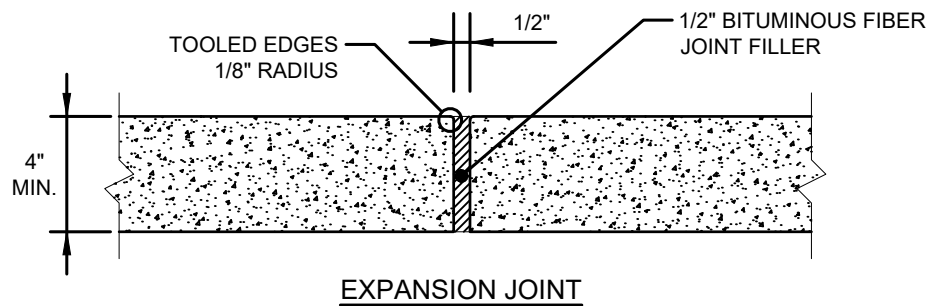
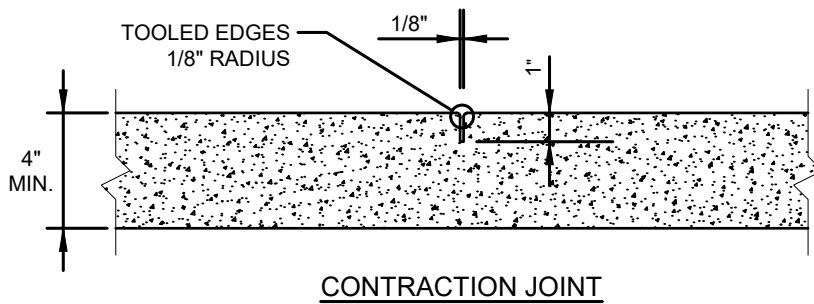
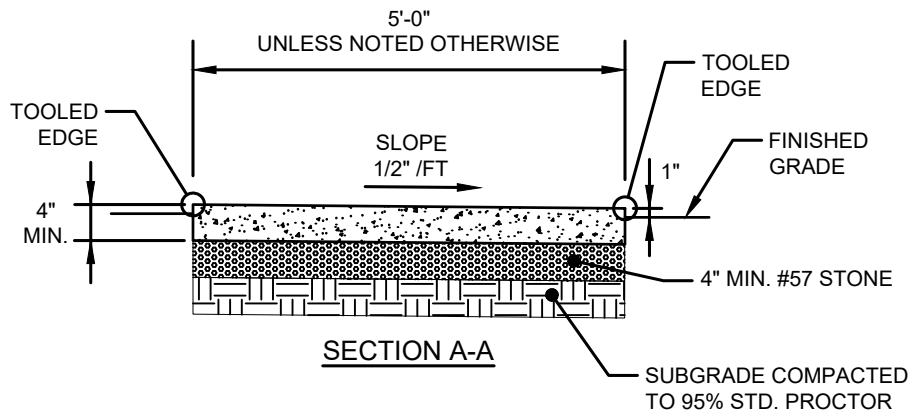
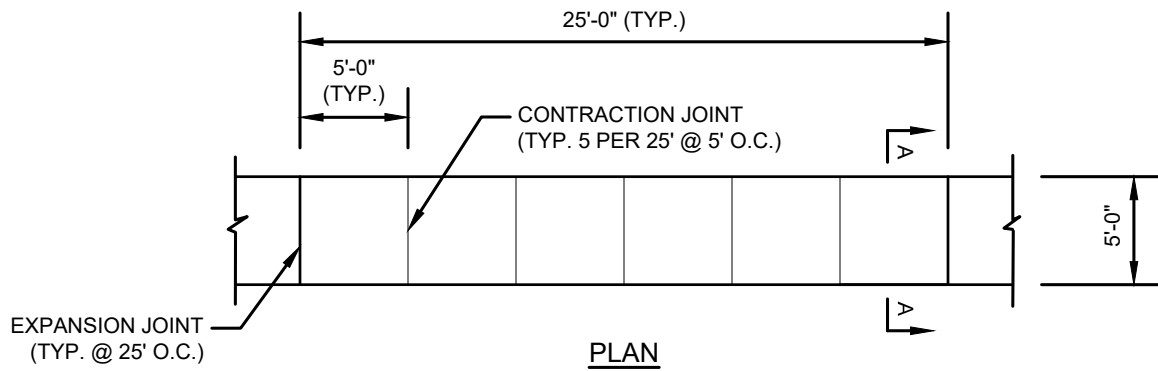
CONCRETE OR GRAVEL PATCH

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
R008

DATE:
MARCH 2023



NOTES:

1. SIDEWALK AND RAMPS SHALL BE CONSTRUCTED OF 4" MIN. THICK, 3000 PSI CONC.
2. SIDEWALK INSTALLATION SHALL MEET THE REQUIREMENTS OF THE "UNIFORM FEDERAL ACCESSIBILITY STANDARDS" (UFAS), AND THE "AMERICAN DISABILITY ACT OF 1991", AND THE "GEORGIA ACCESSIBILITY CODE" LATEST EDITION.
3. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS FIBER JOINT FILLER AND ARE REQUIRED AT ALL BREAKS IN GRADE ON ALL RAMPS, BETWEEN CURB AND SIDEWALK, AND BETWEEN THE SIDEWALK AND DRIVEWAYS OR ANY OTHER STRUCTURE.



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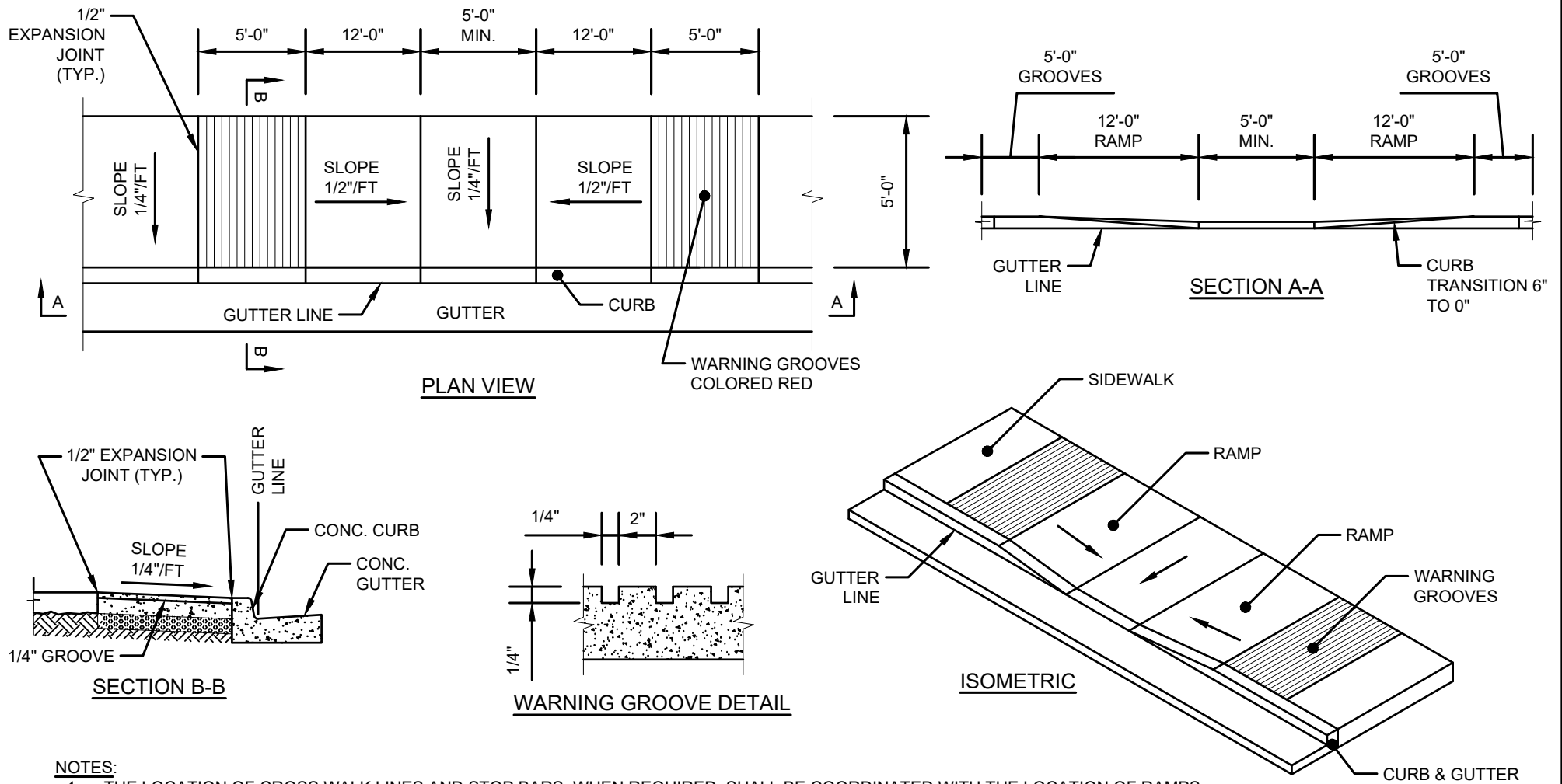
SIDEWALK

DETAIL NO.
R009

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



NOTES:

1. THE LOCATION OF CROSS WALK LINES AND STOP BARS, WHEN REQUIRED, SHALL BE COORDINATED WITH THE LOCATION OF RAMPS.
2. SIDEWALK AND RAMPS SHALL BE CONSTRUCTED OF 4" MIN. THICK, 3000 PSI CONC.
3. SIDEWALK INSTALLATION SHALL MEET THE REQUIREMENTS OF THE "UNIFORM FEDERAL ACCESSIBILITY STANDARDS" (UFAS), AND THE "AMERICAN DISABILITY ACT OF 1991", AND THE "GEORGIA ACCESSIBILITY CODE" LATEST EDITION.
4. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS FIBER JOINT FILLER AND ARE REQUIRED AT ALL BREAKS IN GRADE ON ALL RAMPS, BETWEEN CURB AND SIDEWALK, AND BETWEEN THE SIDEWALK AND DRIVEWAYS OR ANY OTHER STRUCTURE..
4. FOR WARNING GROOVES CONCRETE COLOR, USE DRY-SHAKE DUST ON COLOR HARDENER AS MANUFACTURED BY LAMBERT CORPORATION, 20 N. COBURN AVE., ORLANDO, FL 23805, PHONE: 407-841-2940, UNDER THE NAME LAMBERT COLORBRITE, OR APPROVED EQUAL.



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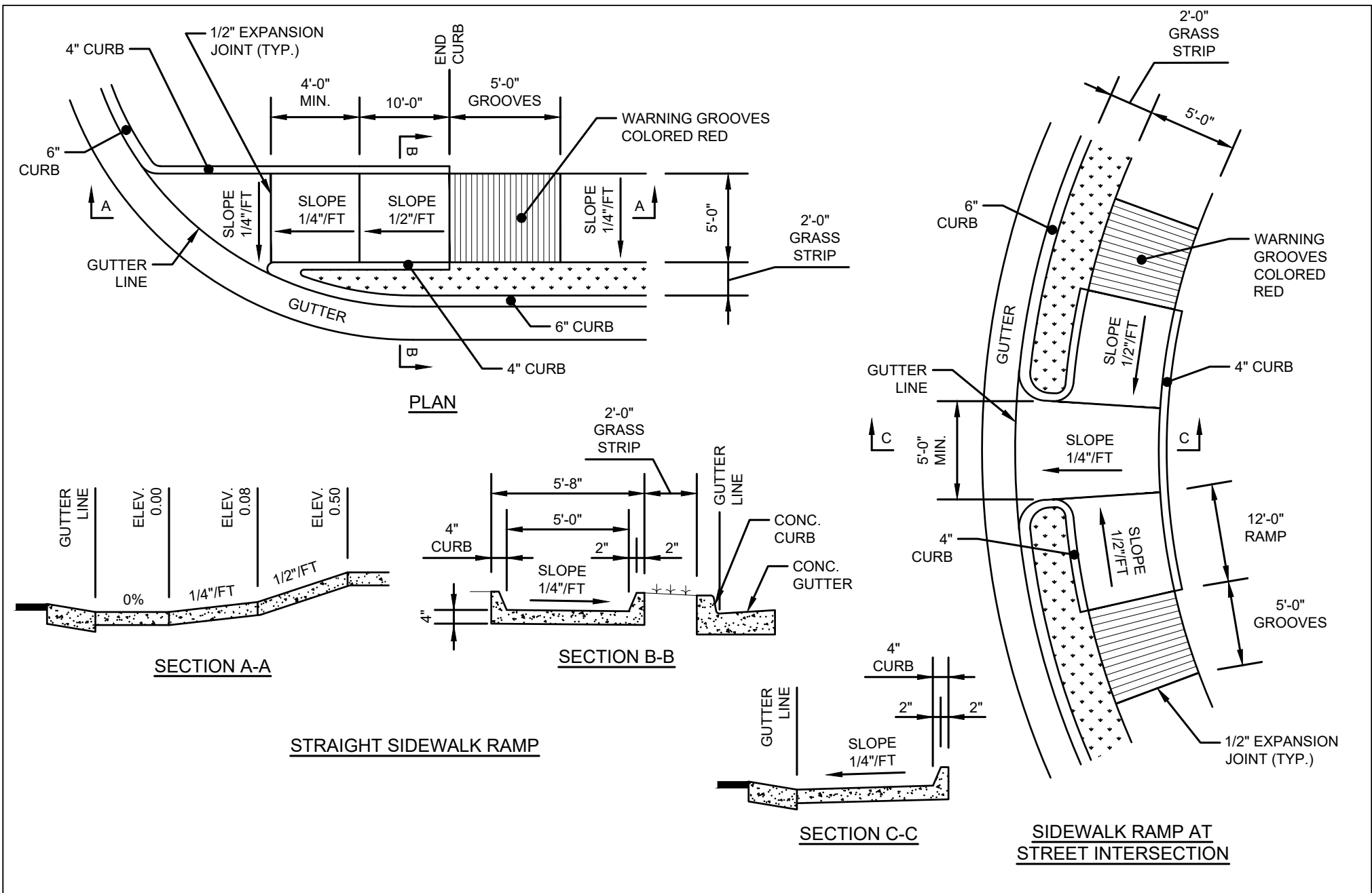
SIDEWALK WHEELCHAIR RAMP

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
R010A

DATE:
MARCH 2023



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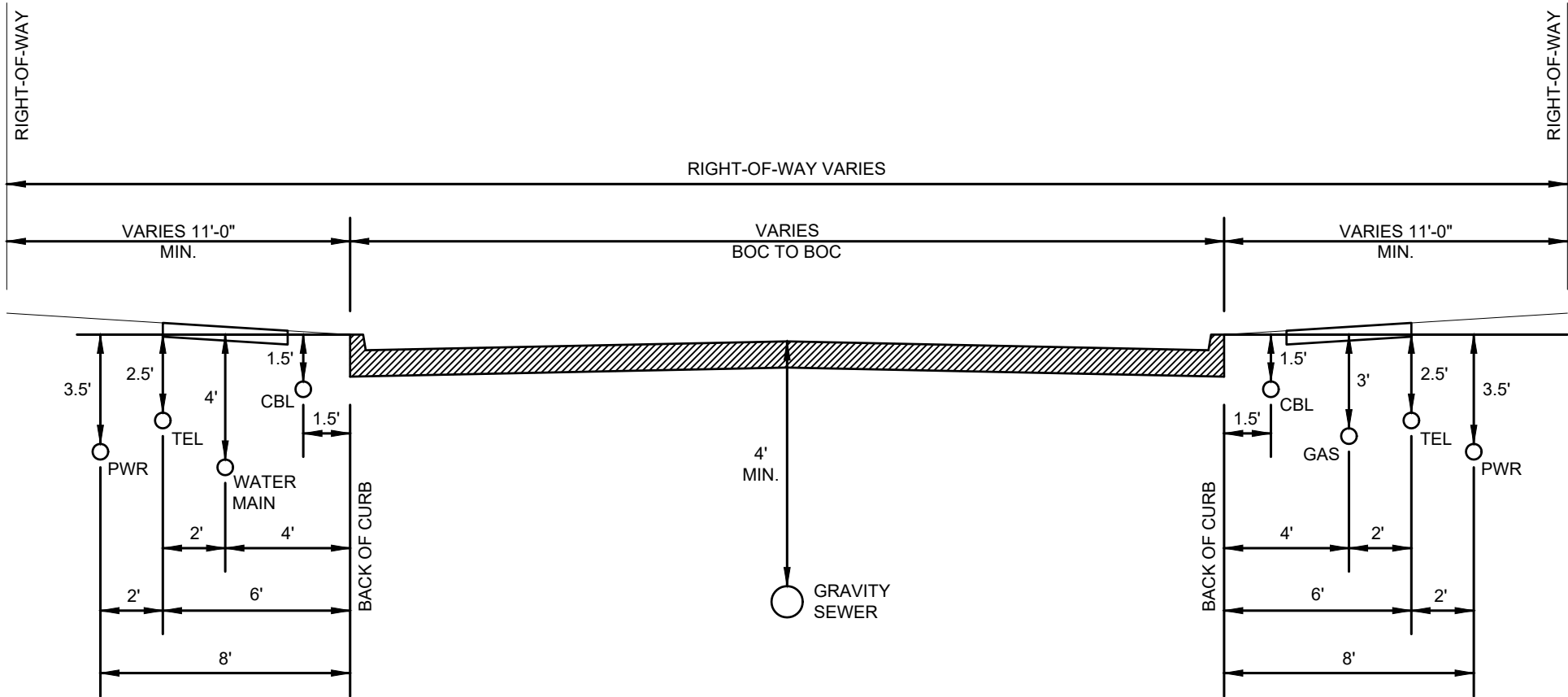
SIDWALK WHEELCHAIR RAMP CONTINUED

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
R010B

DATE:
MARCH 2023



NOTES:

1. THIS STANDARD DETAIL IS TO BE USED FOR UTILITY LOCATIONS WITHIN RIGHT-OF-WAY OF SUBDIVISIONS ONLY.
2. BEFORE ANY UTILITY IS INSTALLED, THE ENTIRE WIDTH OF THE RIGHT-OF-WAY SHALL BE ROUGH GRADED.
3. IN GENERAL, THE DEEPEST UTILITIES SHOULD BE INSTALLED FIRST TO MINIMIZE ANY POSSIBLE INTERFERENCE WITH LATERALS OR SERVICE LINES.
4. IN CUL-DE-SAC OR EYEBROW TURNAROUNDS, THE DIMENSIONS FROM THE CURB WILL VARY. HOWEVER, THE STANDARD UTILITY SPACING SHALL BE MAINTAINED.
5. BACKFILL OF ALL UTILITY TRENCHES CONSTRUCTED IN THE ROADWAY SHOULDER SHALL BE RETURNED TO 95% COMPACTION.
6. 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. NO UTILITY SHALL BE RESPONSIBLE FOR DAMAGES TO ANOTHER UTILITY WHICH IS LOCATED OUTSIDE THEIR ASSIGNED SPACE.
7. ANYONE DIGGING IN THE RIGHT-OF-WAY SHALL CALL THE "ONE CALL CENTER" AT 1-(800) 325-5000 TO HAVE UTILITIES LOCATED.
8. ONCE THE ROAD BASE HAS BEEN PLACED, ALL FURTHER INSTALLATION OF UTILITIES UNDER THE ROADWAY SHALL BE BORED.



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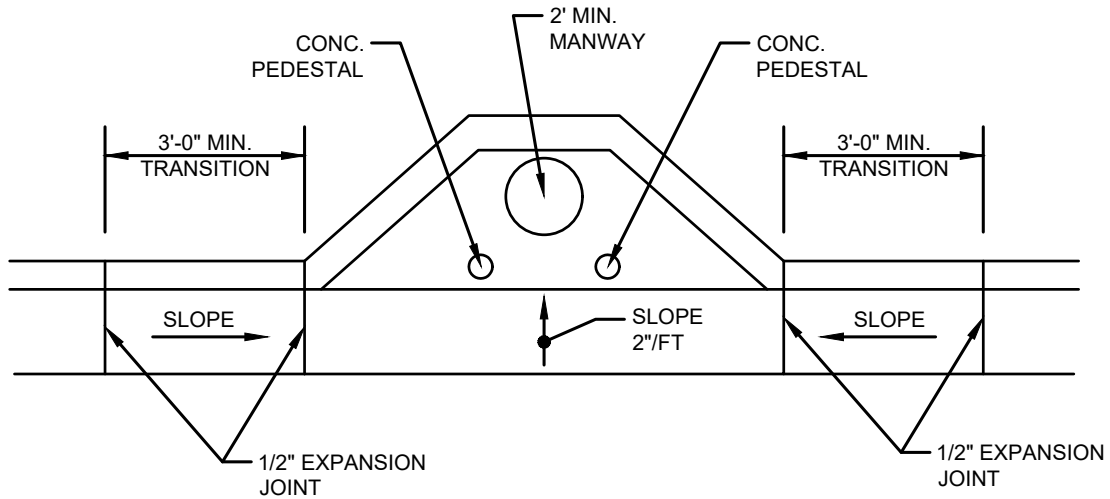
UTILITY PLACEMENT IN SUBDIVISION

STANDARD DETAILS

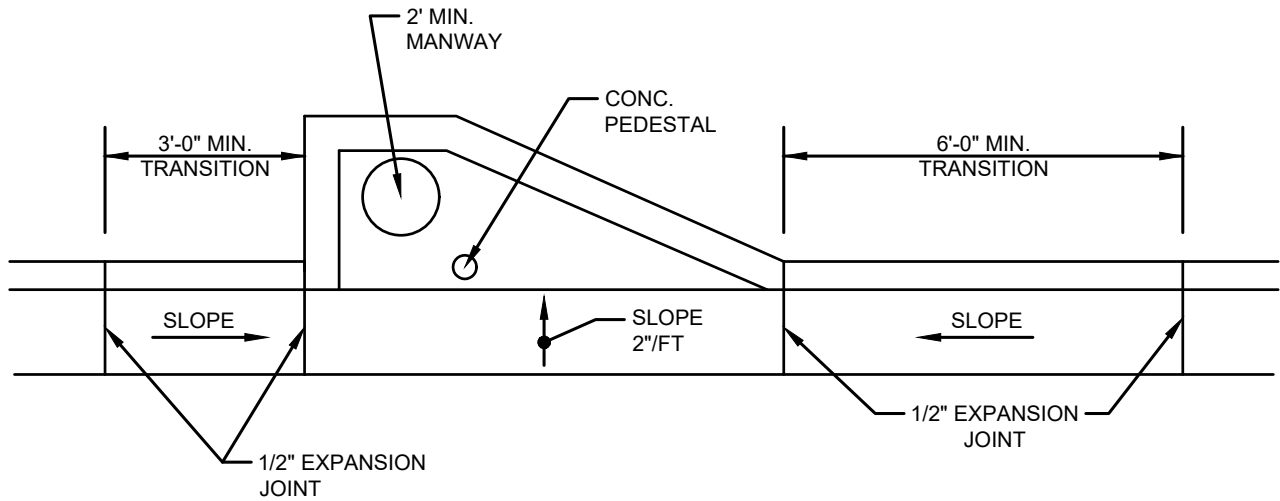
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DETAIL NO.
R011

DATE:
MARCH 2023



DOUBLE WING CATCH BASIN



SINGLE WING CATCH BASIN

NOTES:

1. CATCH BASIN CONSTRUCTION SHALL COMPLY WITH GEORGIA DEPARTMENT OF TRANSPORTATION STANDARD DETAILS NUMBERS 1033, 1034, AND 1040.
2. CURB AND GUTTER SHALL BE CONSTRUCTED OF FIBER REINFORCED 3,000 PSI CONC.
3. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS FIBER JOINT FILLER AND SHALL BE REQUIRED AT EACH CONNECTION TO A STRUCTURE, CURB RETURNS AND AT A MINIMUM OF 250 FT ON CENTER.



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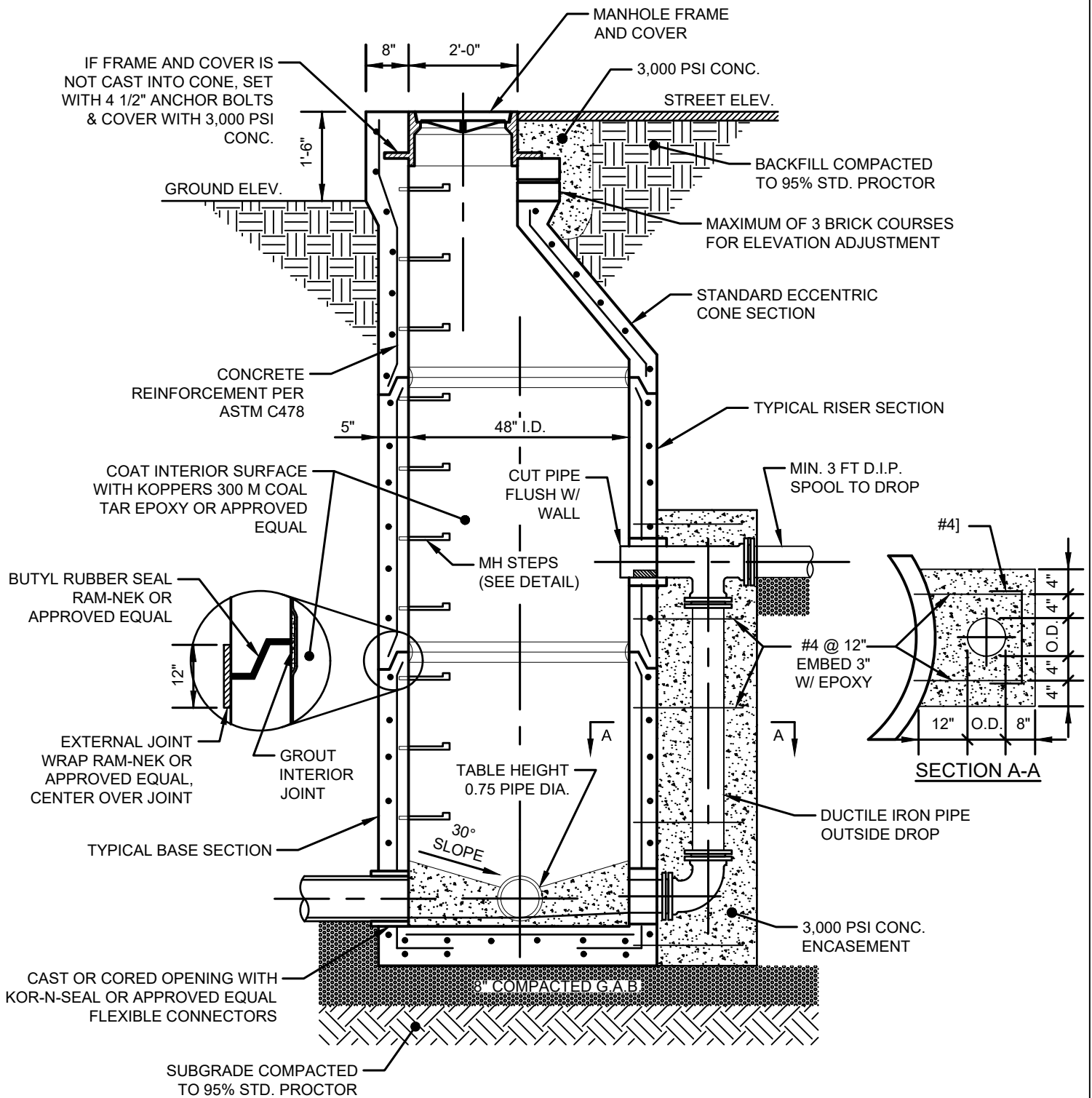
CATCH BASIN

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
R012

DATE:
MARCH 2023



NOTES:

1. MANHOLES SHALL BE FLUSH MOUNTED IN ALL PAVED AREAS, SIDEWALKS AND WITHIN ROAD RIGHT-OF-WAYS.
2. MANHOLES LOCATED OUTSIDE OF PAVED AREAS, SIDEWALKS AND ROAD RIGHT-OF-WAYS SHALL BE MOUNTED 1.5FT ABOVE GRADE AND FRAME SHALL BE CAST INTO PRECAST MANHOLE.
3. PROVIDE MINIMUM 0.2 FT DROP THROUGH STANDARD 4FT MANHOLE.
4. INFLUENT PIPES THAT ARE A SMALLER DIA. THAN THE OUTFLOW PIPE SHALL MATCH THE OUTFLOW PIPE CROWN.
5. DUCTILE IRON PIPE OUTSIDE DROP TO BE USED FOR ALL PIPES ENTERING MANHOLE WITH AN INVERT MORE THAN 2 FT ABOVE OUTLET PIPE.



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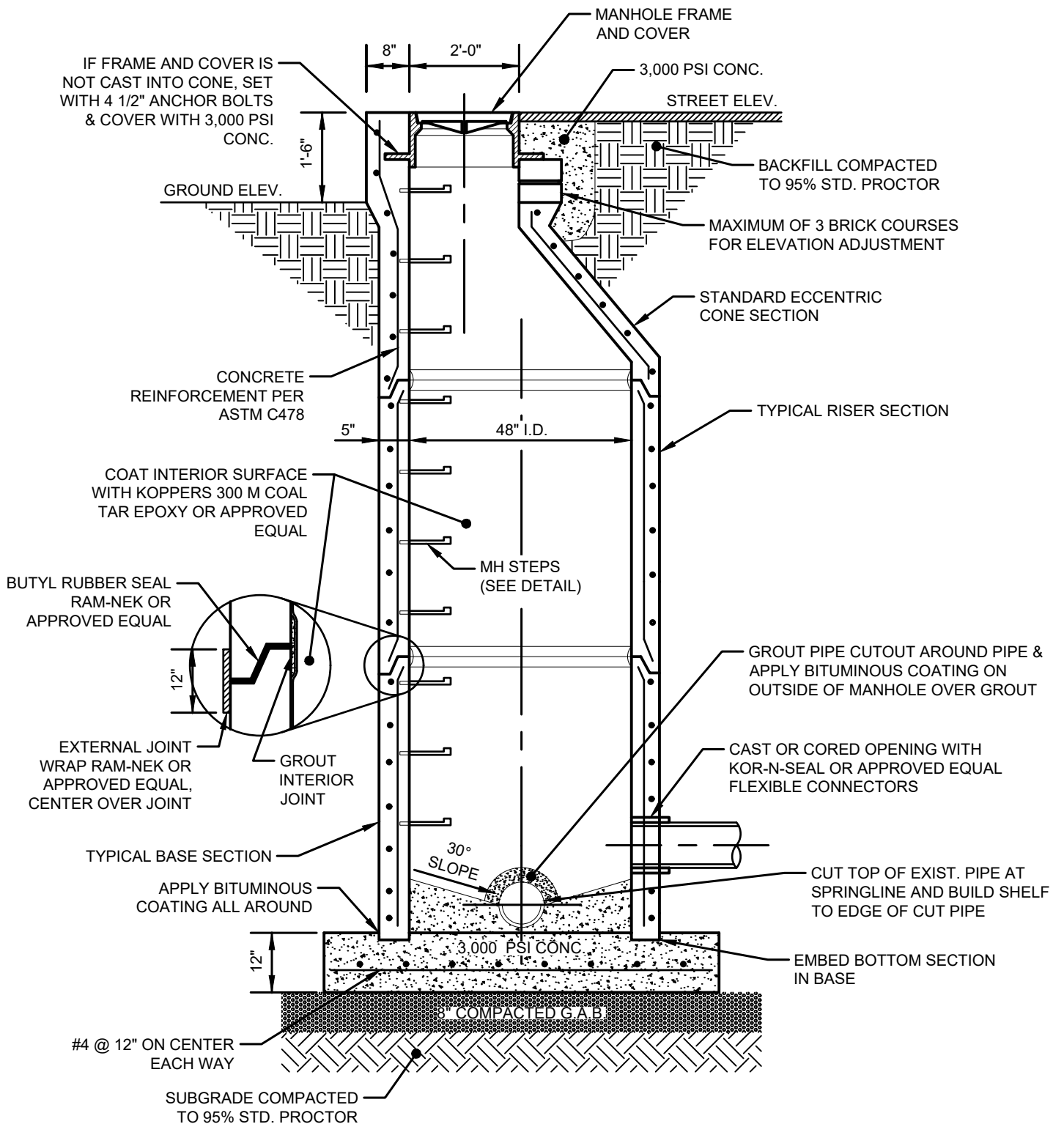
PRECAST CONCRETE MANHOLE

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
S001

DATE:
MARCH 2023



NOTES:

1. MANHOLES SHALL BE FLUSH MOUNTED IN ALL PAVED AREAS, SIDEWALKS AND WITHIN ROAD RIGHT-OF-WAYS.
2. MANHOLES LOCATED OUTSIDE OF PAVED AREAS, SIDEWALKS AND ROAD RIGHT-OF-WAYS SHALL BE MOUNTED 1.5FT ABOVE GRADE AND FRAME SHALL BE CAST INTO PRECAST MANHOLE.
3. CONSTRUCT TROUGH FOR NEW INCOMING PIPES.



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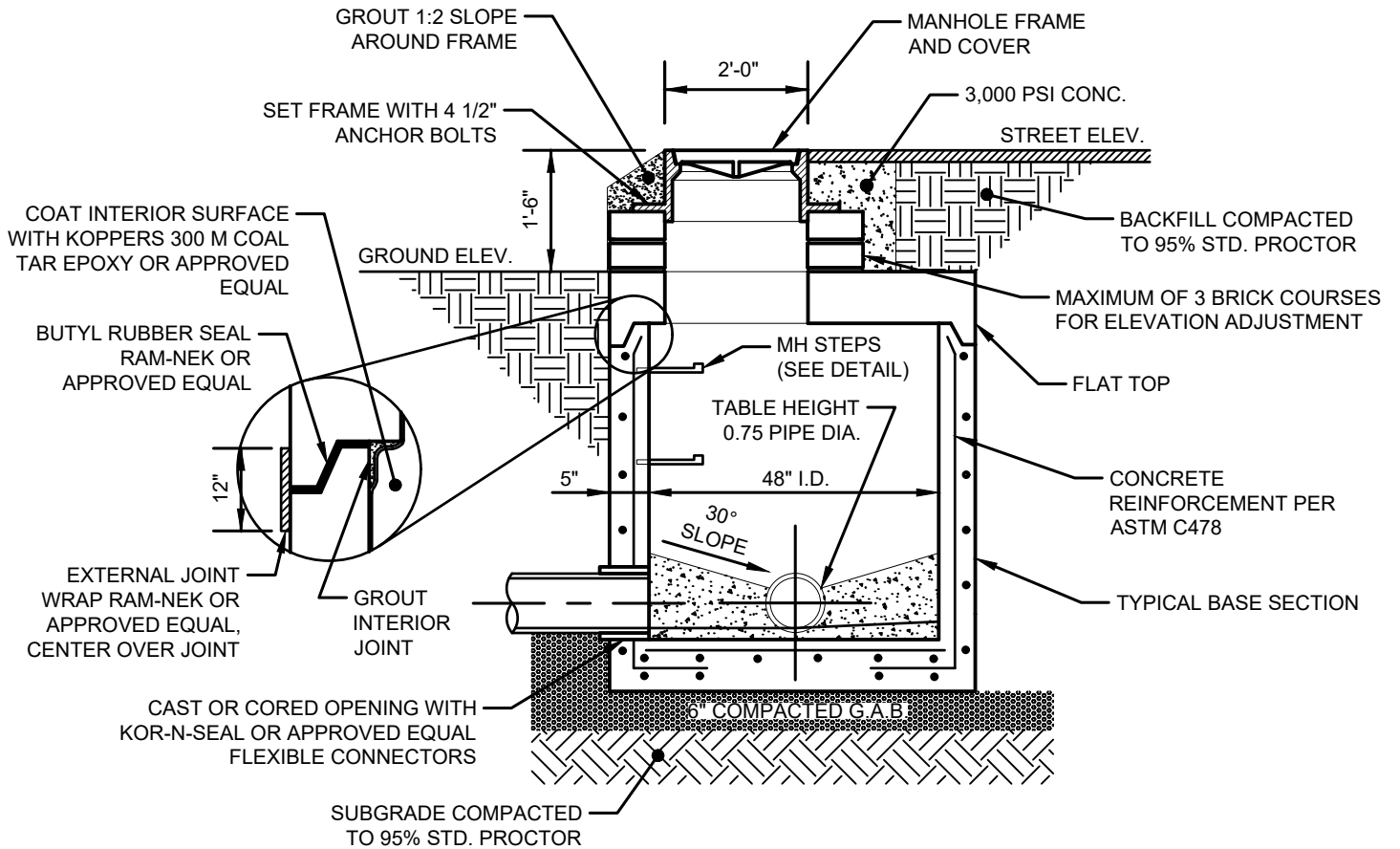
DOGHOUSE MANHOLE

DETAIL NO.
S002

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



NOTES:

1. MANHOLES SHALL BE FLUSH MOUNTED IN ALL PAVED AREAS, SIDEWALKS AND WITHIN ROAD RIGHT-OF-WAYS.
2. MANHOLES LOCATED OUTSIDE OF PAVED AREAS, SIDEWALKS AND ROAD RIGHT-OF-WAYS SHALL BE MOUNTED 1.5FT ABOVE GRADE AND FRAME SHALL BE CAST INTO PRECAST MANHOLE.
3. PROVIDE MINIMUM 0.2 FT DROP THROUGH STANDARD 4FT MANHOLE.
4. INFLUENT PIPES THAT ARE A SMALLER DIA. THAN THE OUTFLOW PIPE SHALL MATCH THE OUTFLOW PIPE CROWN.
5. PROVIDE MH STEP(S) IF TOP OF SHELF TO FRAME IS GREATER THAN 30".



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SHALLOW MANHOLE

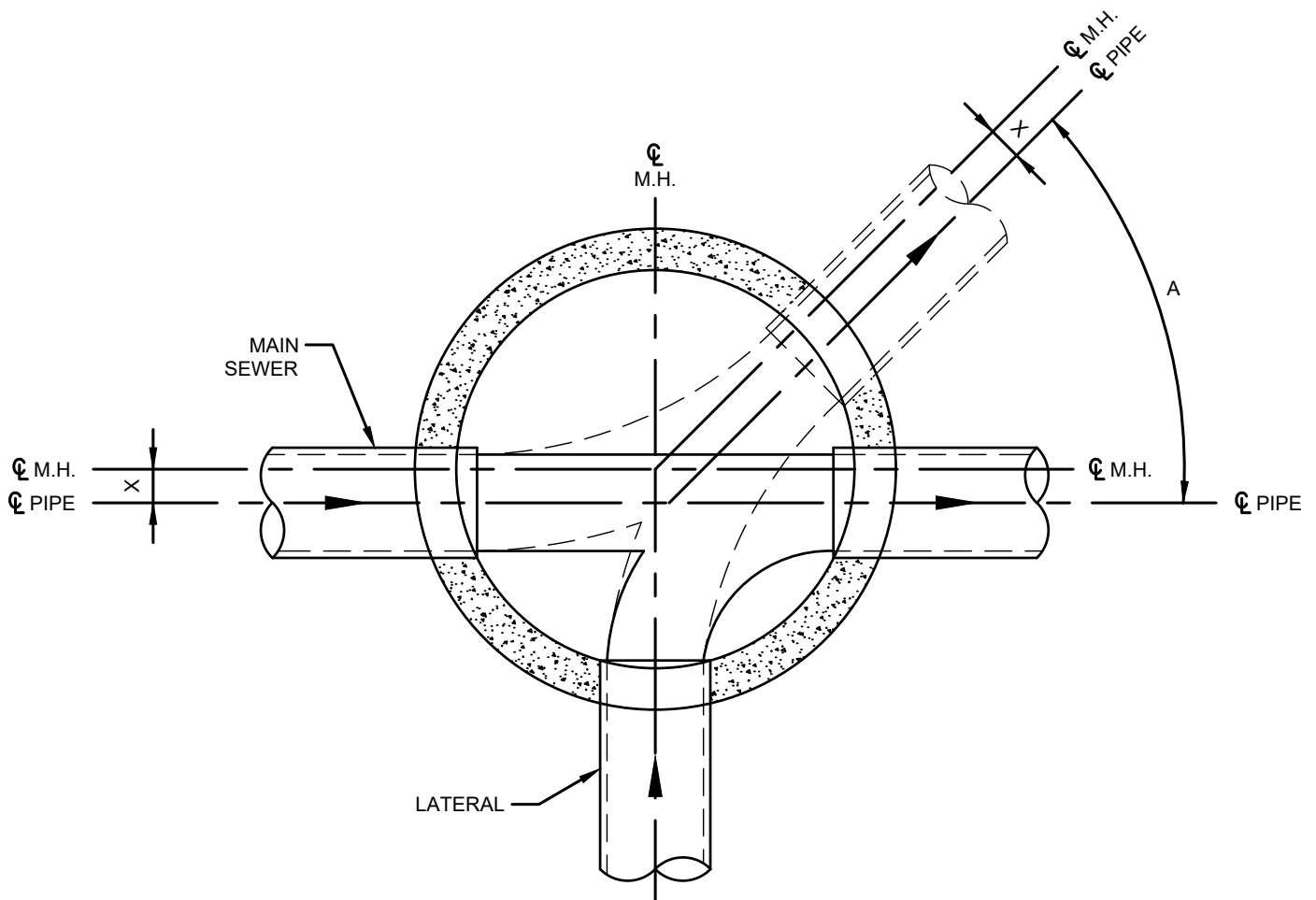
DETAIL NO.
S003

DATE:
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STANDARD DETAILS

NOT TO SCALE

GOVERNING DIMENSIONS FOR CIRCULAR MANHOLES			
PIPE SIZE	ANGLE "A"	M.H. DIA.	DIMENSION "X"
8" - 15"	0° - 90°	4'-0"	0"
18" - 24"	0° - 60°	4'-0"	0"
18" - 24"	60° - 90°	5'-0"	6"
27" - 30"	0° - 30°	5'-0"	0"
27" - 30"	30° - 60°	5'-0"	6"
27" - 30"	60° - 90°	6'-0"	8"
36"	0° - 90°	6'-0"	0"
42"	0° - 60°	6'-0"	0"
48"	0° - 30°	6'-0"	6"



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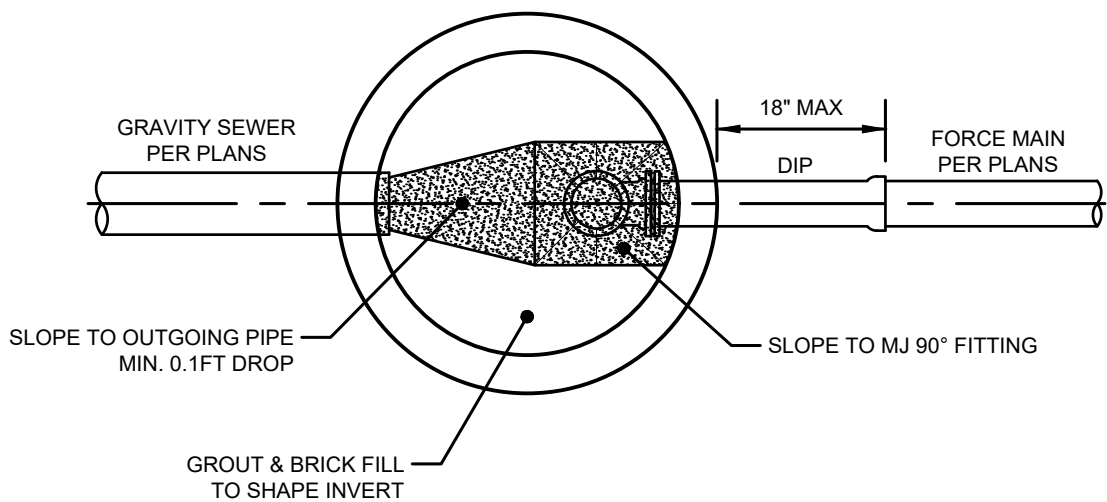
TYPICAL MANHOLE INVERT PLAN

STANDARD DETAILS

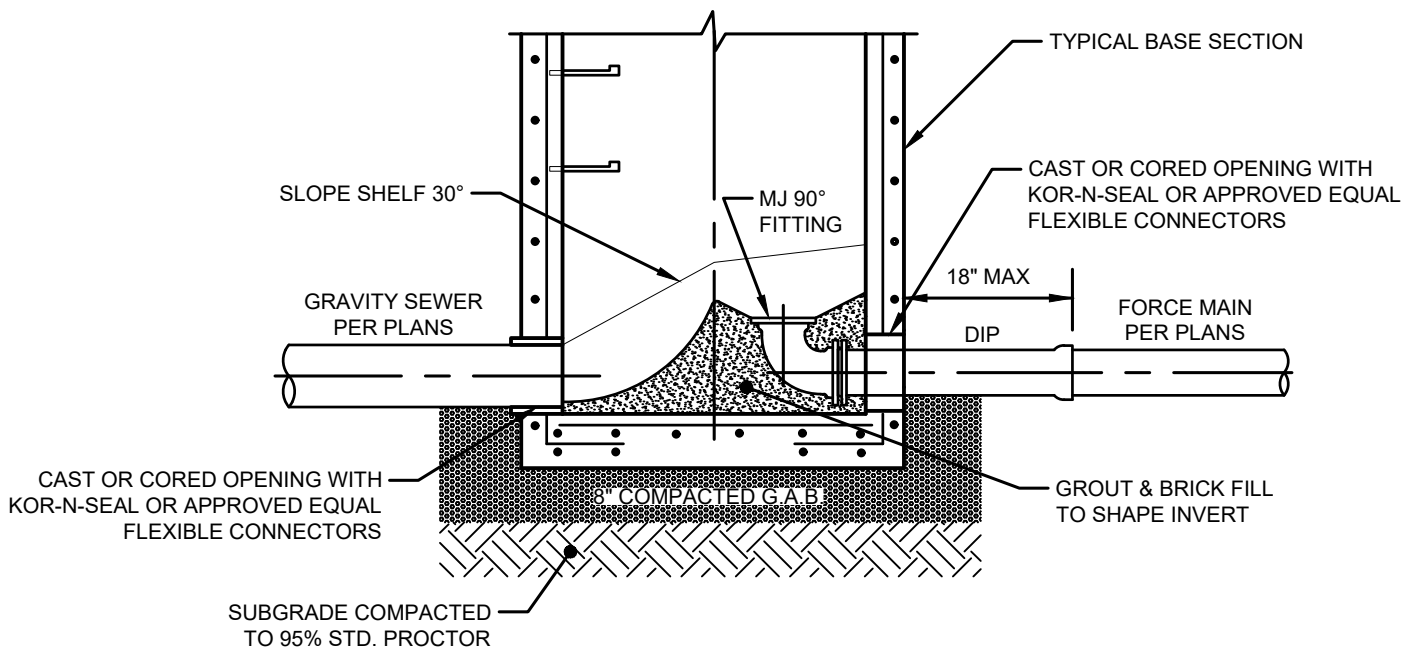
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DETAIL NO.
S004

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INVERT PLAN



INVERT SECTION

NOTES:

1. SEE PRECAST CONCRETE MANHOLE DETAIL FOR ADDITIONAL MANHOLE DETAILS.



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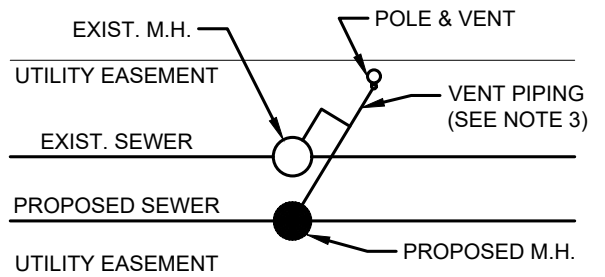
**FORCE MAIN CONNECTION
MANHOLE INVERT**

STANDARD DETAILS

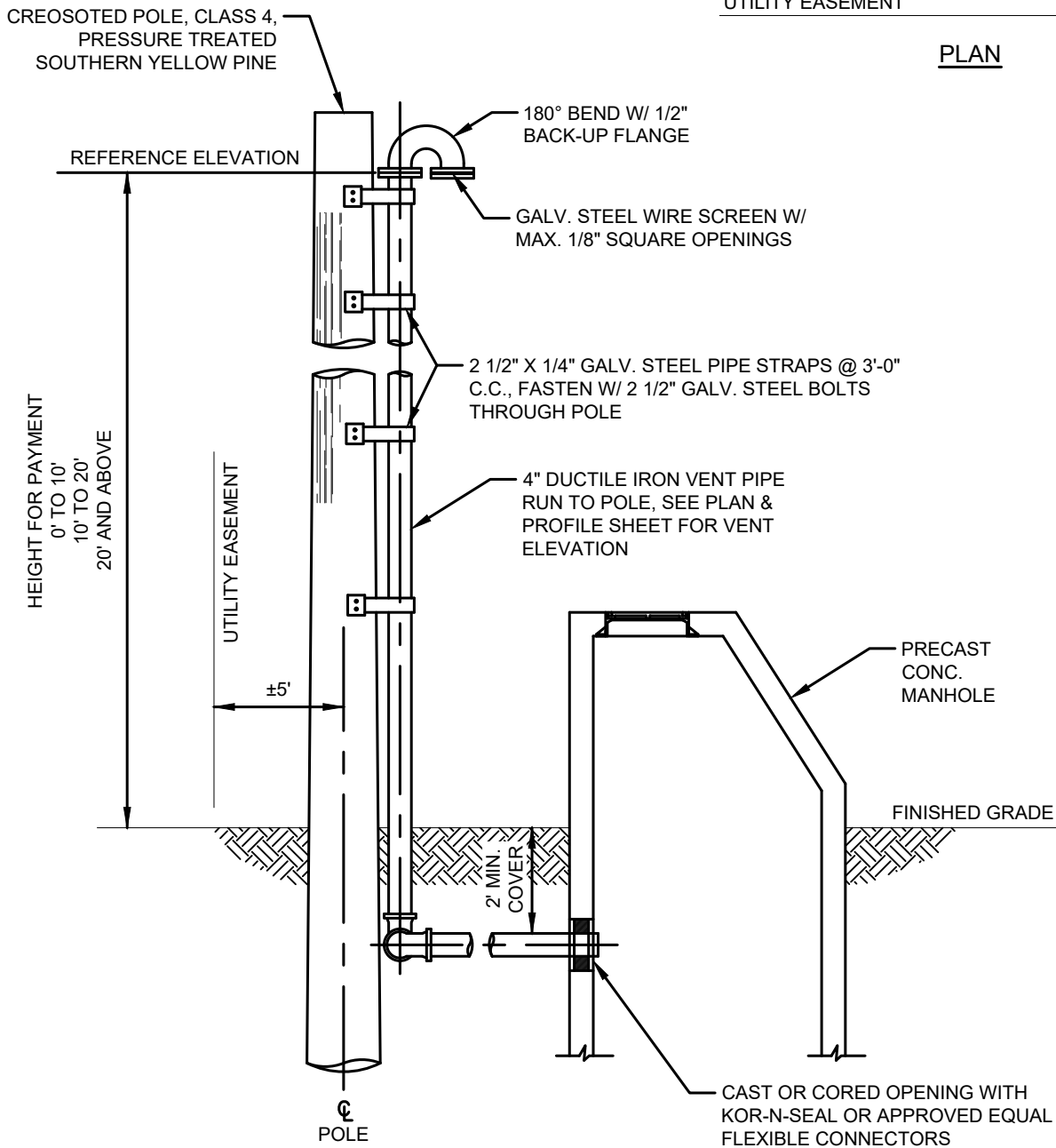
NOT TO SCALE

DETAIL NO.
S005

DATE:
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PLAN



SECTION

NOTES:

1. REFERENCE ELEVATION SHALL BE ABOVE THE 100 YR FLOOD PLAIN ELEVATION.
2. BURIED PIPE SHALL BE MECHANICAL JOINT AND PIPE ABOVE GROUND SHALL BE FLANGED.
3. IF PROPOSED MANHOLE WILL BE INSTALLED NEAR AN EXISTING MANHOLE, TIE VENT PIPING TOGETHER AND CONNECT BOTH MANHOLES TO SINGLE VENT.



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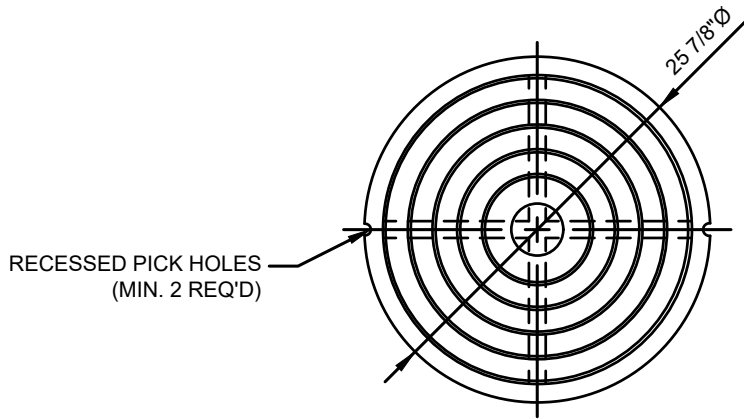
MANHOLE VENT

DETAIL NO.
S006

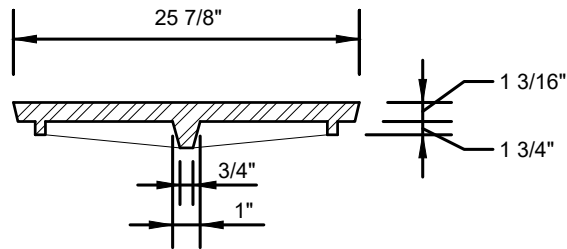
DATE:
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STANDARD DETAILS

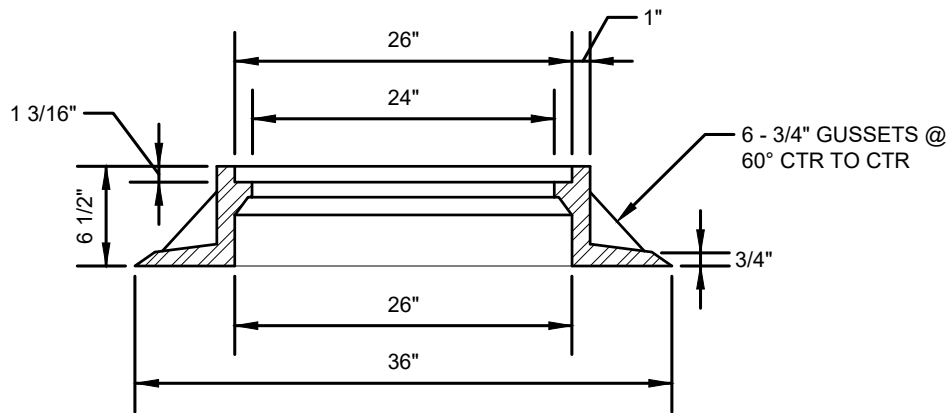
NOT TO SCALE



COVER PLAN



COVER SECTION



FRAME SECTION

NOTES:

1. APPROXIMATE WEIGHTS: FRAME = 200 LBS / COVER = 170 LBS / TOTAL = 370 LBS
2. SEATING SURFACE OF FRAMES AND COVERS TO BE MACHINED FOR FIT.
3. MANHOLE LID SHALL HAVE INSCRIPTION "SEWER", "STORM", ETC. PER APPLICATION.



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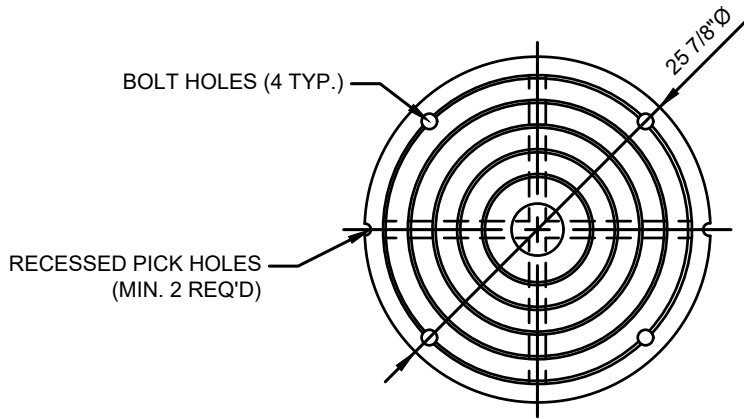
FRAME AND COVER

DETAIL NO.
S007

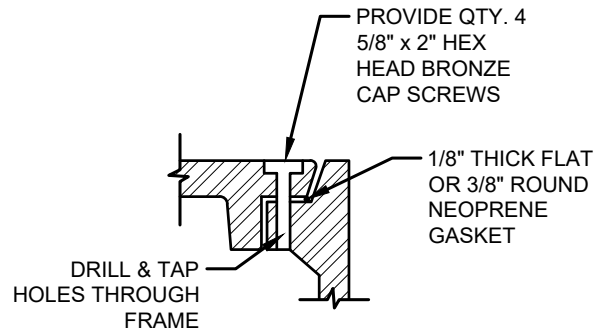
DATE:
MARCH 2023

STANDARD DETAILS

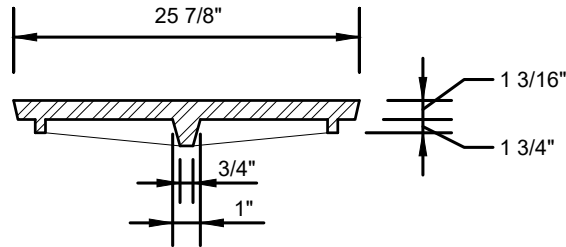
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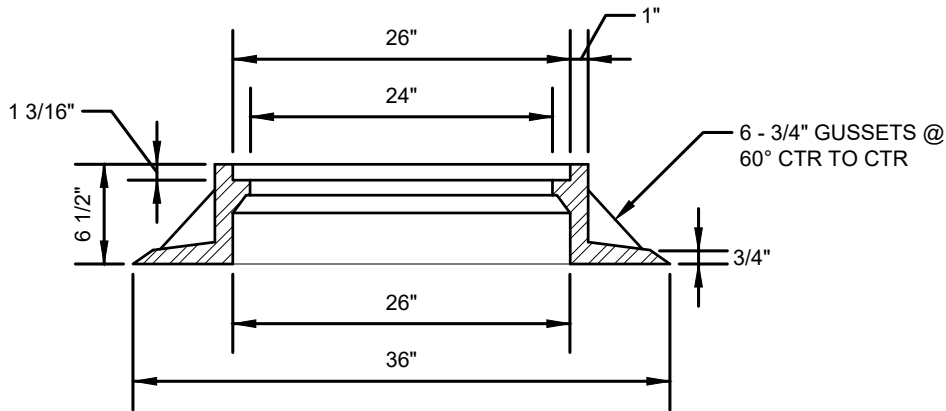
COVER PLAN



BOLT HOLE SECTION



COVER SECTION



FRAME SECTION

NOTES:

1. APPROXIMATE WEIGHTS: FRAME = 200 LBS / COVER = 170 LBS / TOTAL = 370 LBS
2. SEATING SURFACE OF FRAMES AND COVERS TO BE MACHINED FOR FIT.
3. MANHOLE LID SHALL HAVE INSCRIPTION "SEWER", "STORM", ETC. PER APPLICATION.



CITY OF
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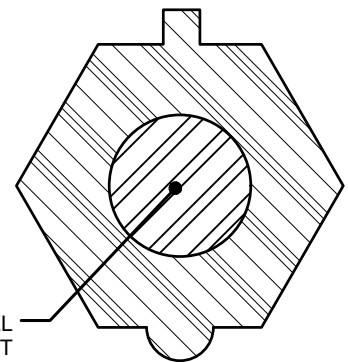
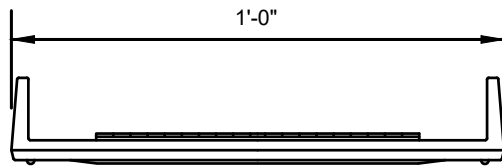
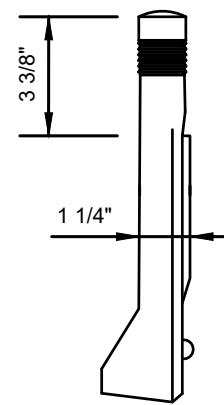
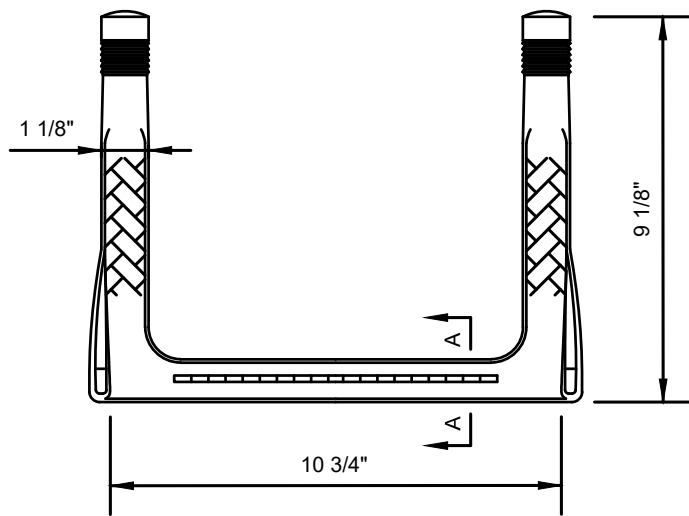
WATERTIGHT FRAME AND COVER

STANDARD DETAILS

NOT TO SCALE

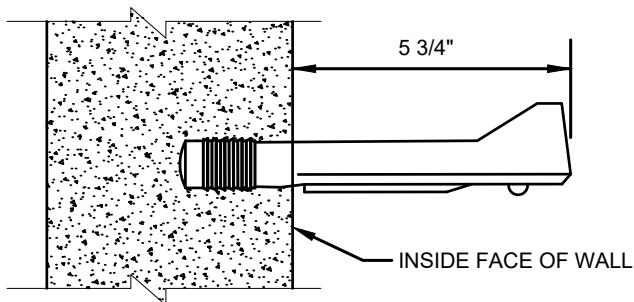
DETAIL NO.
S008

DATE:
MARCH 2023



1/2" GRADE 60 STEEL REINFORCEMENT

SECTION A-A



NOTES:

1. MANHOLE STEPS ARE TO BE POLYPROPYLENE PLASTIC WITH STEEL REINFORCEMENT CORE.
2. STEPS SHALL BE SPACED 14" TO 16" VERTICALLY.



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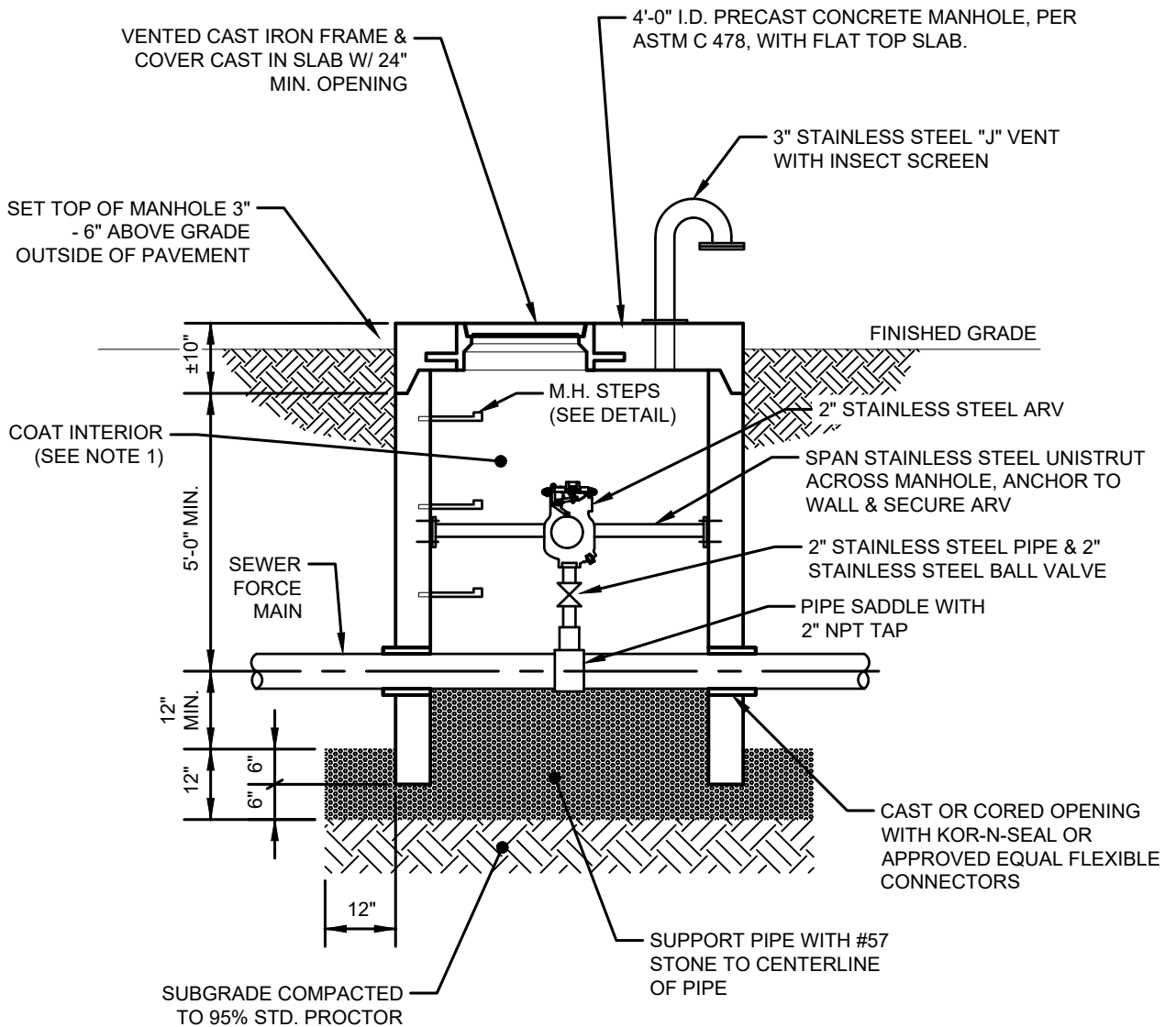
MANHOLE STEP

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
S009

DATE:
MARCH 2023



NOTES:

1. PAINT ENTIRE INTERIOR SURFACE OF MANHOLE WITH 24 MILS MIN. DRY FILM THICKNESS KOPPERS BITUMASTIC 300M COAL TAR EPOXY, OR APPROVED EQUAL.
2. AIR RELEASE VALVE (ARV): USE 2" SEWAGE AIR RELEASE VALVE, STAINLESS STEEL BODY & INTERNALS, 2" INLET, 1" OUTLET (CRISPIN UX20B-L OR APPROVED EQUAL).
3. INSTALL ARVs AS INDICATED ON THE PUMP STATION PLANS, AND FORCE MAIN PLAN AND PROFILE SHEETS.



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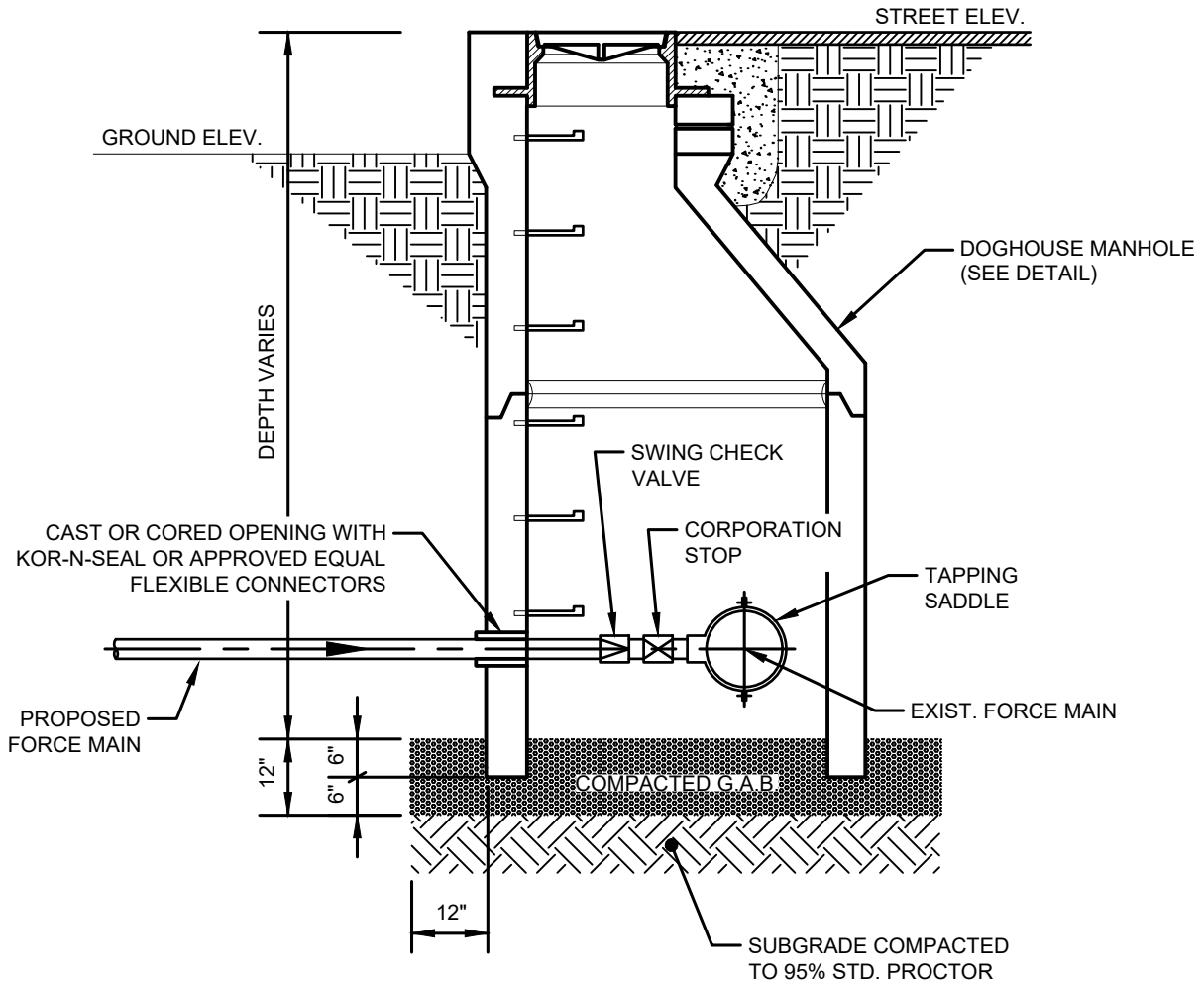
AIR RELEASE VALVE

DETAIL NO.
S010

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



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GEORGIA

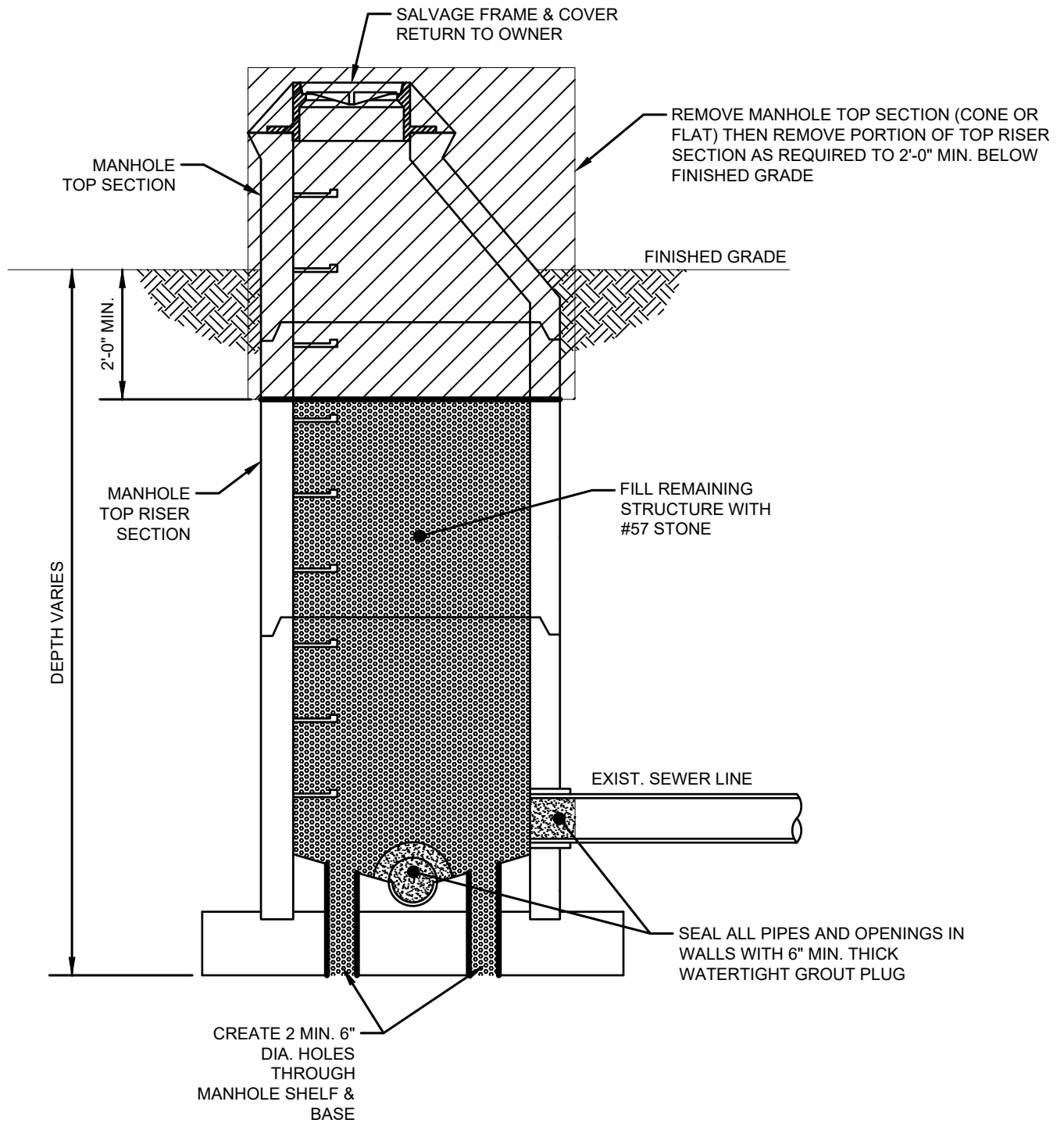
EXISTING FORCE MAIN TIE-IN

DETAIL NO.
S011

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



MANHOLE BENEATH PAVEMENT OR CONCRETE:
RESTORE AREA PER PAVEMENT OR CONCRETE PATCH DETAIL OR, IF APPLICABLE, PER GDOT STANDARDS.

MANHOLES OUTSIDE OF PAVEMENT OR CONCRETE:
BACKFILL WITH SUITABLE MATERIAL, COMPACT TO 85% STD. PROCTOR AND RESTORE WITH PERMANENT VEGETATION.



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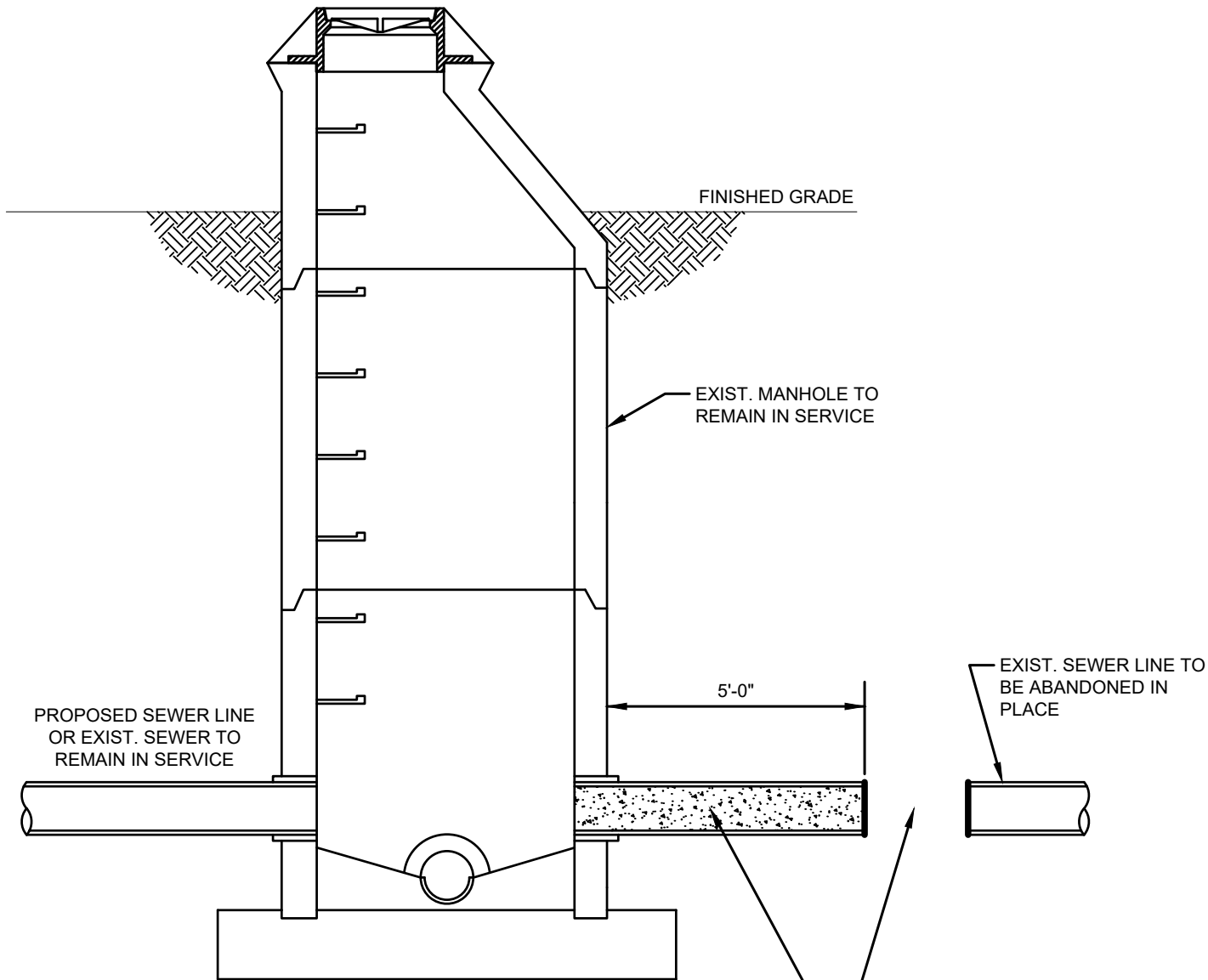
MANHOLE ABANDONMENT

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
S012

DATE:
MARCH 2023



ABANDON BY SEPARATING THE PIPE 5 FEET
 OUTSIDE OF THE STRUCTURE AND CREATE A
 WATERTIGHT PLUG BY FILLING THE PIPE
 WITH 2,000 PSI CONCRETE TO THE INSIDE
 FACE OF THE MANHOLE



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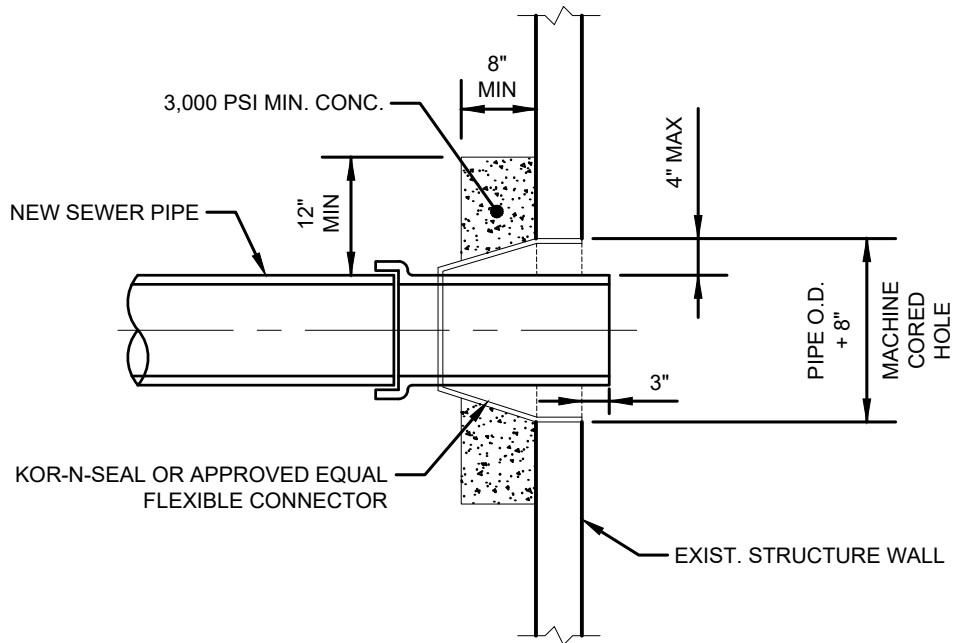
SEWER LINE ABANDONMENT

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
 S013

DATE:
 MARCH 2023



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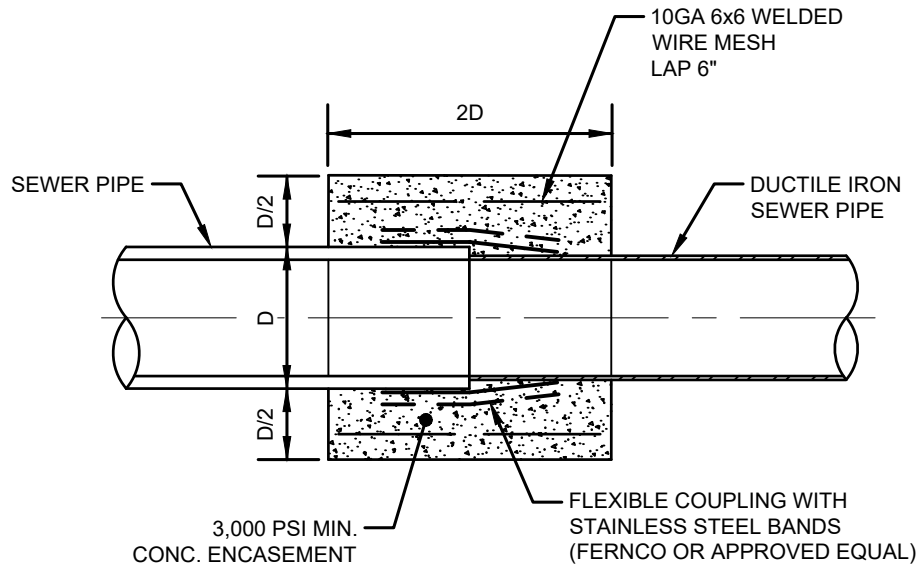
SEWER CONNECTION TO EXISTING STRUCTURE

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
S014

DATE:
MARCH 2023



NOTES:

1. FLEXIBLE PVC COUPLING SHALL CONFORM TO ASTM C-564 AND HAVE DOUBLE 316 STAINLESS STEEL BANDS PER SIDE.
2. BEDDING SHALL CONFORM TO MANUFACTURER'S RECOMMENDATIONS.



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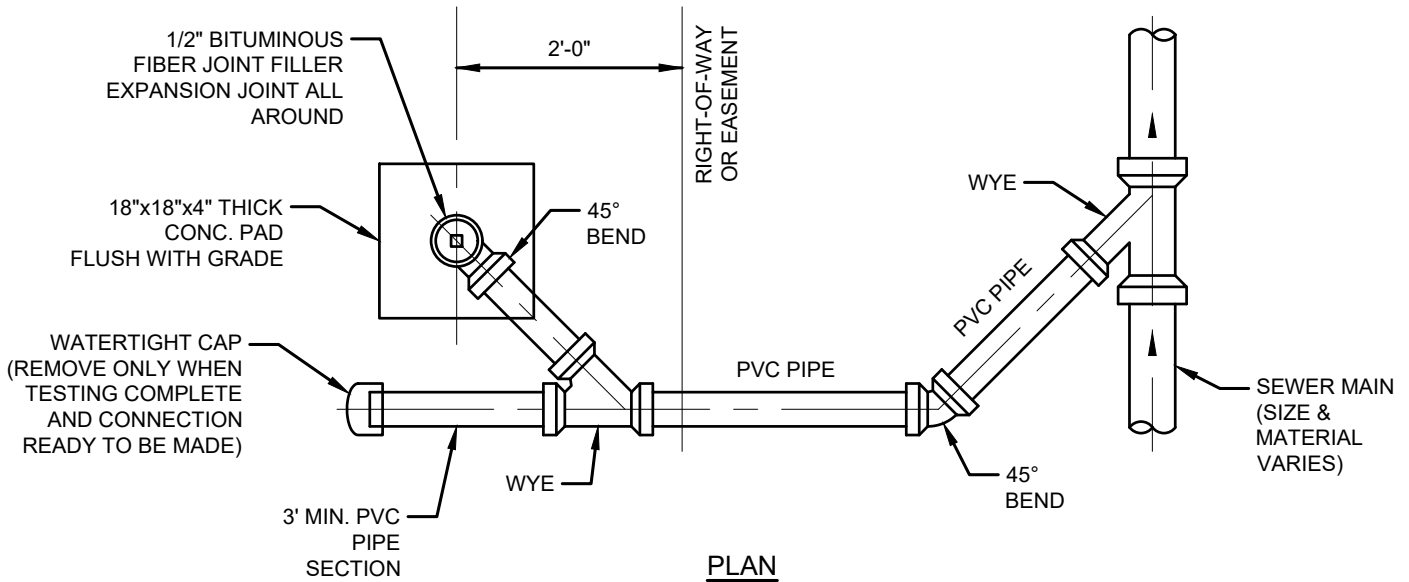
SEWER TRANSITION COLLAR

STANDARD DETAILS

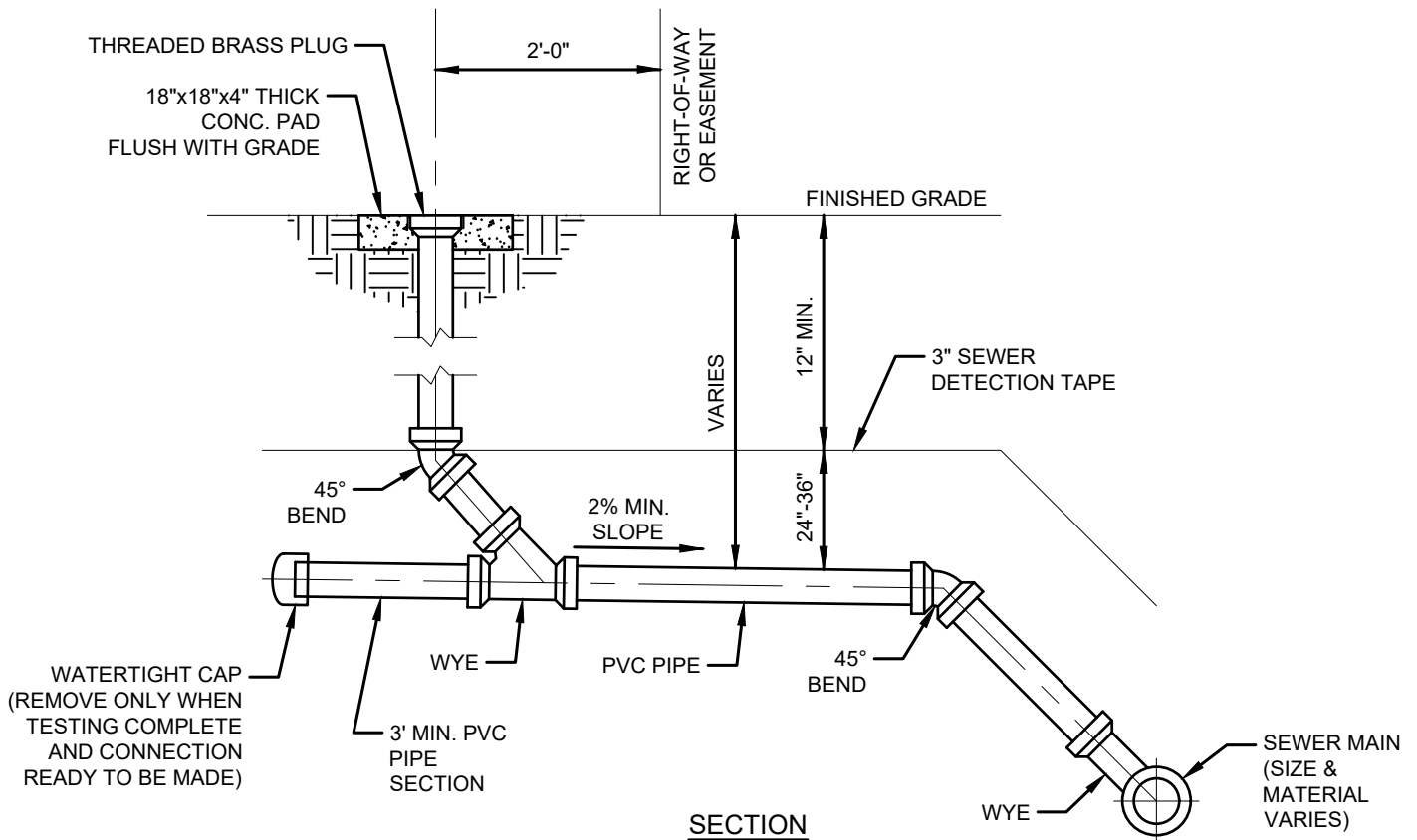
NOT TO SCALE

DETAIL NO.
S015

DATE:
MARCH 2023



PLAN



SECTION

NOTES:

1. MINIMUM SEWER SERVICE PIPE SIZE IS 4" FOR RESIDENTIAL AND 6" FOR COMMERCIAL.
2. MINIMUM SEWER SERVICE PIPE SLOPE IS 2%.
3. DEPTH OF SEWER SERVICE SHALL BE 4' TO TOP OF PIPE, WHERE PRACTICAL.
4. SEE PVC PIPE BEDDING DETAIL FOR BEDDING REQUIREMENTS.
5. WATERTIGHT CAP SHALL ONLY BE REMOVED WHEN TESTING HAS BEEN COMPLETED AND CONNECTION TO BUILDING IS READY TO BE MADE.
6. CONCRETE USED SHALL BE 3,000 PSI MIN.



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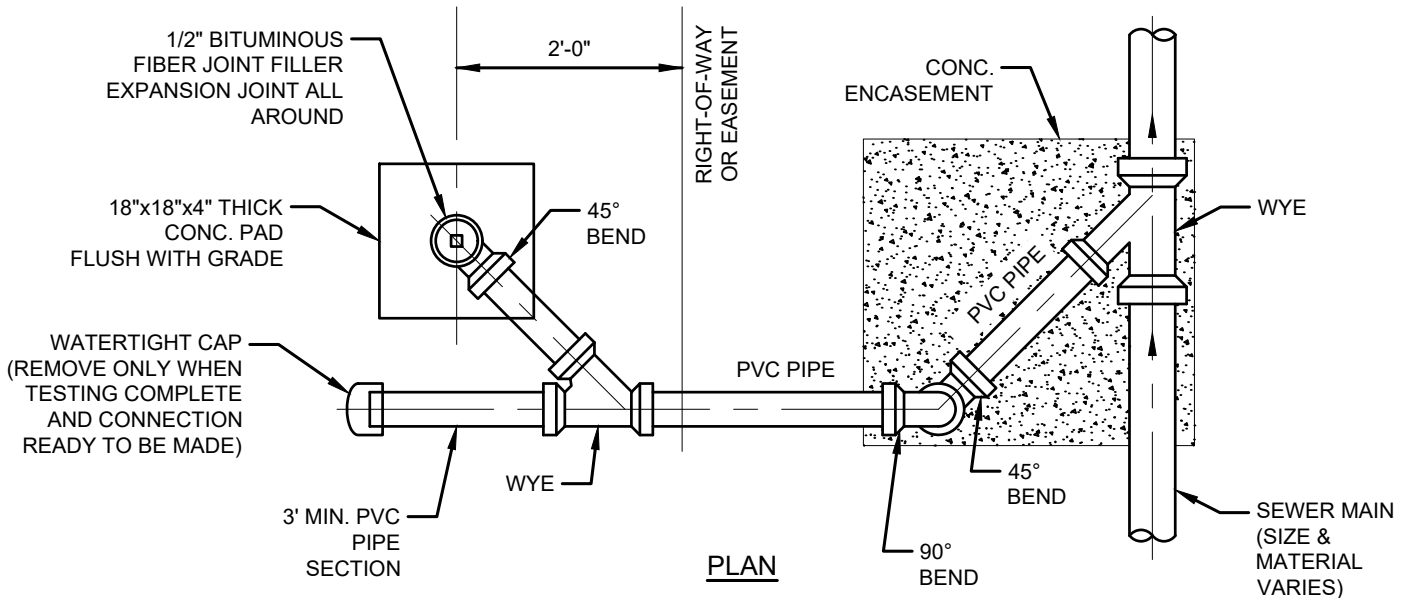
STANDARD SEWER SERVICE

DETAIL NO.
S016

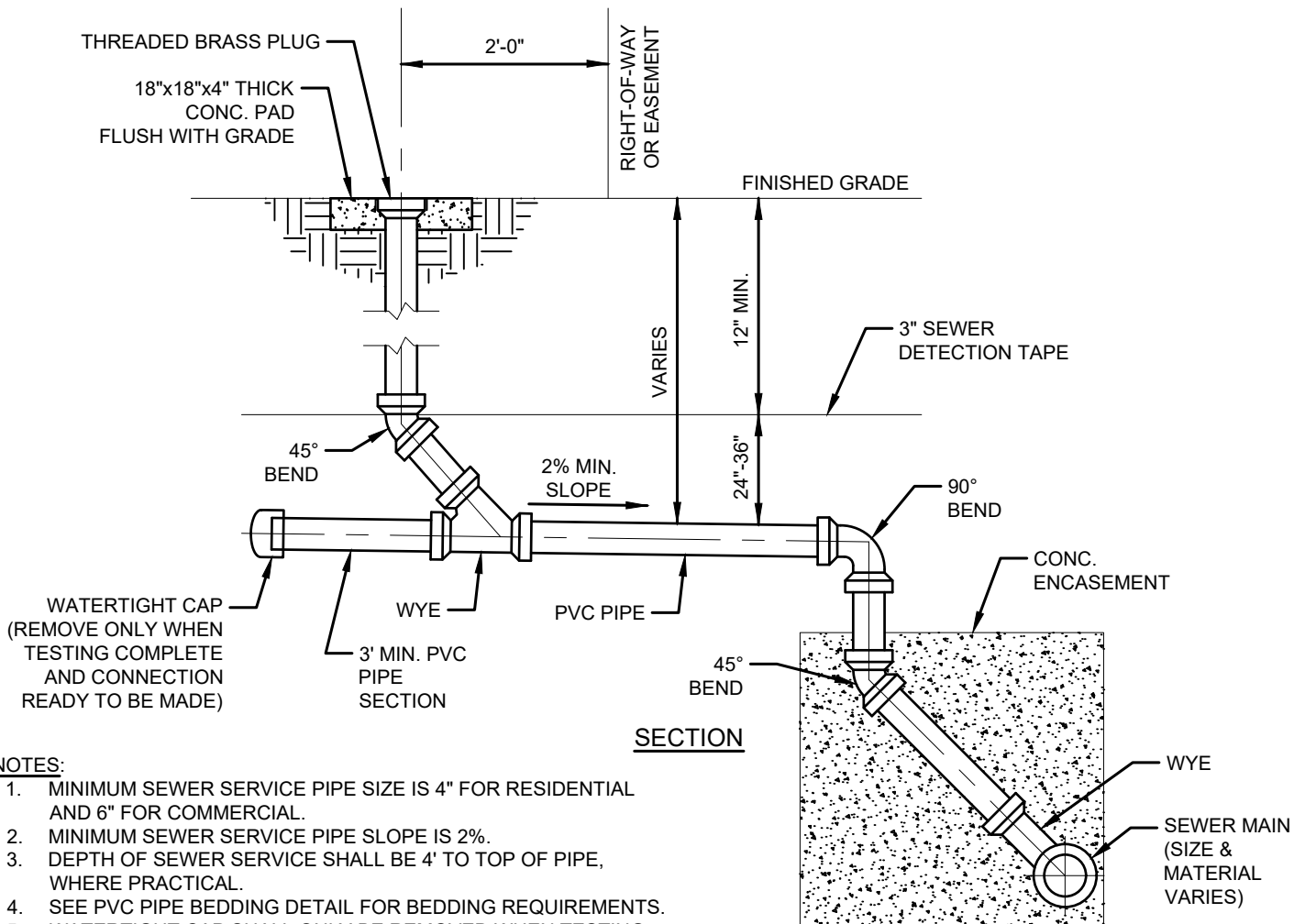
DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



PLAN



SECTION

NOTES:

1. MINIMUM SEWER SERVICE PIPE SIZE IS 4" FOR RESIDENTIAL AND 6" FOR COMMERCIAL.
2. MINIMUM SEWER SERVICE PIPE SLOPE IS 2%.
3. DEPTH OF SEWER SERVICE SHALL BE 4' TO TOP OF PIPE, WHERE PRACTICAL.
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6. CONCRETE USED SHALL BE 3,000 PSI MIN.



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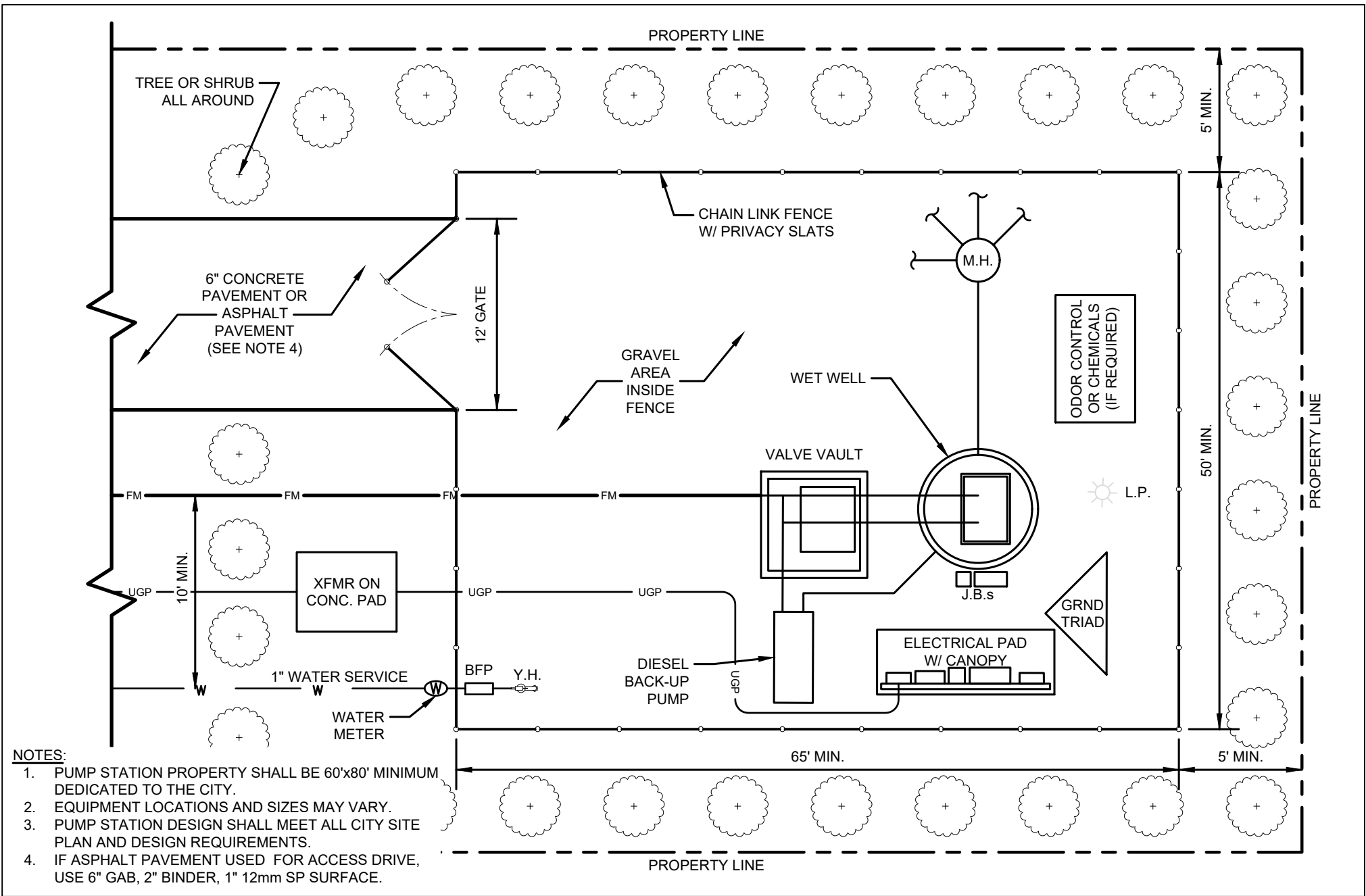
SEWER SERVICE WITH VERTICAL DROP

STANDARD DETAILS


NOT TO SCALE

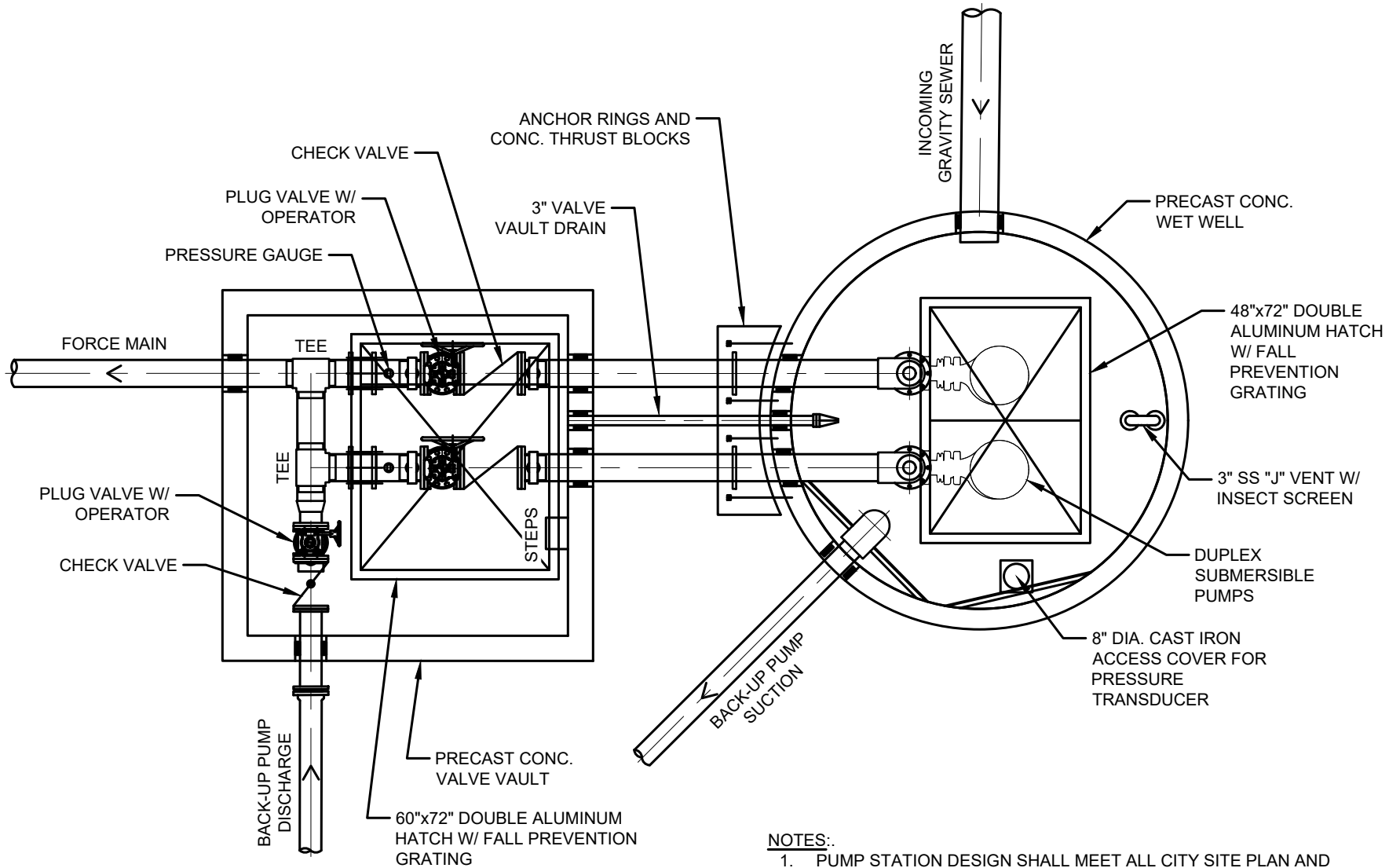
DETAIL NO.
S017

DATE:
MARCH 2023



- NOTES:**
1. PUMP STATION PROPERTY SHALL BE 60'x80' MINIMUM DEDICATED TO THE CITY.
 2. EQUIPMENT LOCATIONS AND SIZES MAY VARY.
 3. PUMP STATION DESIGN SHALL MEET ALL CITY SITE PLAN AND DESIGN REQUIREMENTS.
 4. IF ASPHALT PAVEMENT USED FOR ACCESS DRIVE, USE 6" GAB, 2" BINDER, 1" 12mm SP SURFACE.

 <p>CITY OF GRANTVILLE, GEORGIA</p>	<h2>TYPICAL PUMP STATION LAYOUT</h2>		DETAIL NO. S018
	STANDARD DETAILS	NOT TO SCALE	DATE: MARCH 2023



NOTES:

1. PUMP STATION DESIGN SHALL MEET ALL CITY SITE PLAN AND DESIGN REQUIREMENTS.
2. WET WELL SHALL BE EPOXY COATED.
3. ALL EQUIPMENT AND PIPE SIZES MAY VARY WITH DESIGN.



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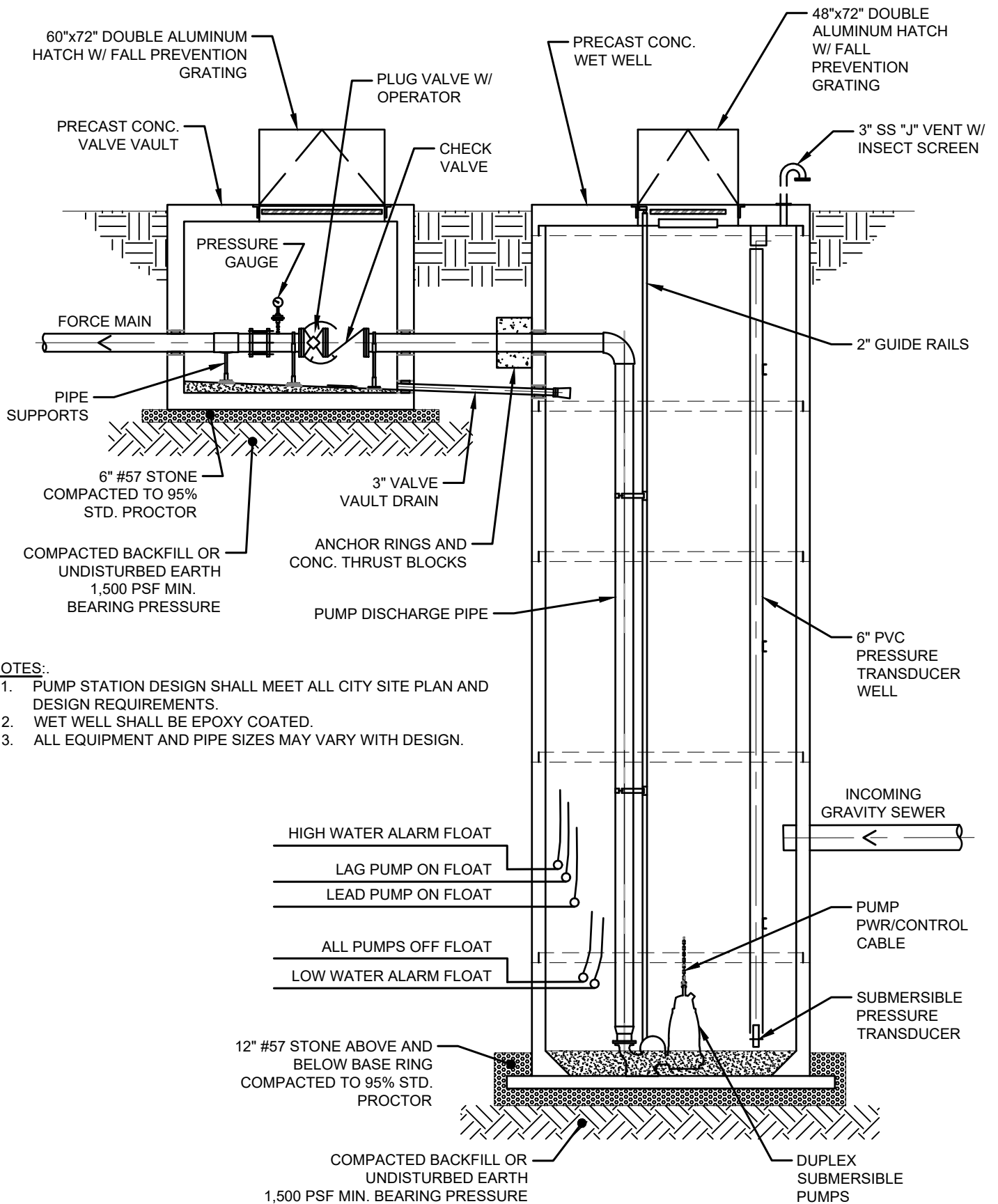
**TYPICAL PUMP STATION WET WELL
AND VALVE PIT PLAN**

DETAIL NO.
S019

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



NOTES:

1. PUMP STATION DESIGN SHALL MEET ALL CITY SITE PLAN AND DESIGN REQUIREMENTS.
2. WET WELL SHALL BE EPOXY COATED.
3. ALL EQUIPMENT AND PIPE SIZES MAY VARY WITH DESIGN.

TYPICAL PUMP STATION WET WELL AND VALVE PIT SECTION

DETAIL NO. S020

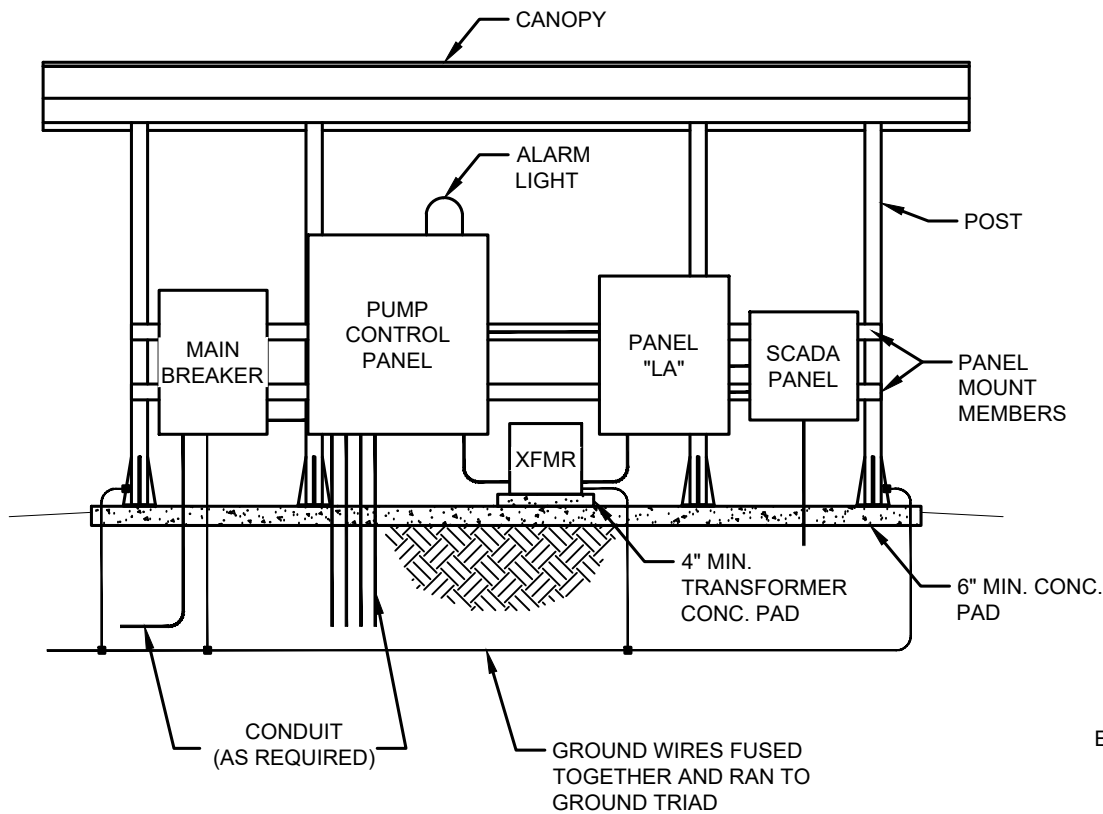
DATE: MARCH 2023

STANDARD DETAILS

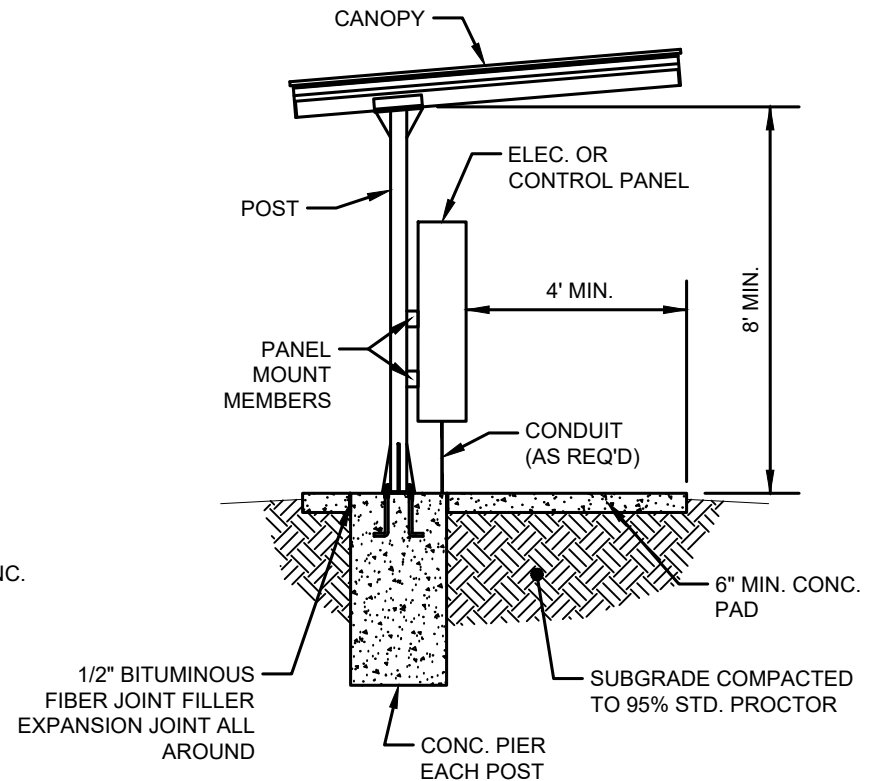
NOT TO SCALE



CITY OF GRANTVILLE, GEORGIA



FRONT



SECTION

NOTES:

1. ALL ELECTRICAL SYSTEMS SHALL MEET OR EXCEED NEC REQUIREMENTS.
2. EQUIPMENT SHOWN MAY VARY WITH DESIGN.



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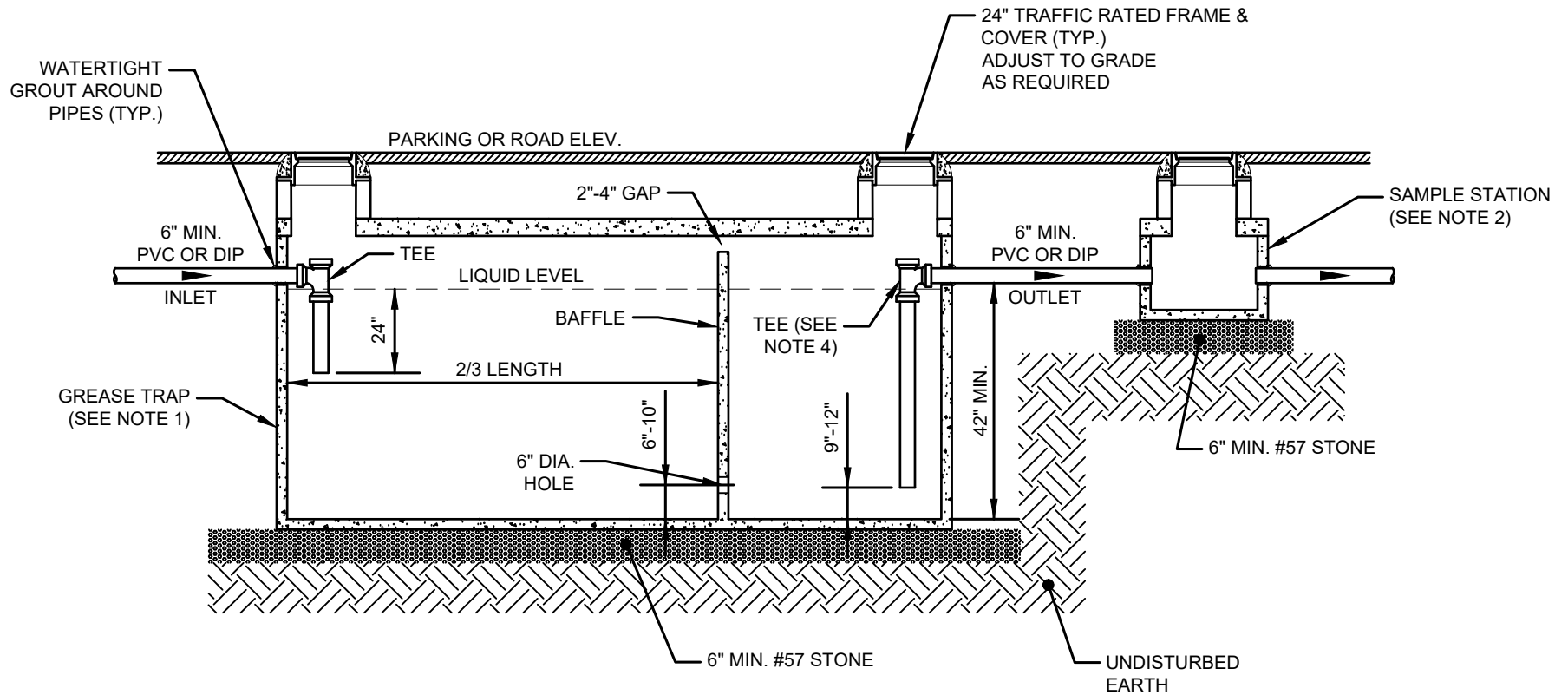
TYPICAL PUMP STATION ELECTRICAL RISER

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
S021

DATE:
MARCH 2023



NOTES:

1. GREASE TRAP SHALL BE 1,500 GALLON MIN. - 3,000 GALLON MAX PRECAST REINFORCED CONCRETE TANK WITH 6" MIN. TOP THICKNESS AND 3 1/4" MIN WALL THICKNESS. SIZE TO BE DETERMINED BY THE SEWER SYSTEM OWNER.
2. IF SAMPLE STATION IS DEEPER THAN 4 FT, USE STANDARD PRECAST CONCRETE MANHOLE.
3. GREASE TRAP AND SAMPLE STATION MUST BE INSTALLED OUTSIDE OF ROAD RIGHT-OF-WAY AND COMPLETELY CONTAINED ON THE OWNER'S PROPERTY.
4. IF EFFLUENT FILTRATION REQUIRED, AS DETERMINED BY THE SEWER SYSTEM OWNER, USE ZABEL 8" A300-8X18-VC EFFLUENT FILTER, OR APPROVED EQUAL, ON THE OUTLET SIDE OF THE GREASE TRAP. INSTALL 8"x6" REDUCER ON THE OUTSIDE OF THE GREASE TRAP.



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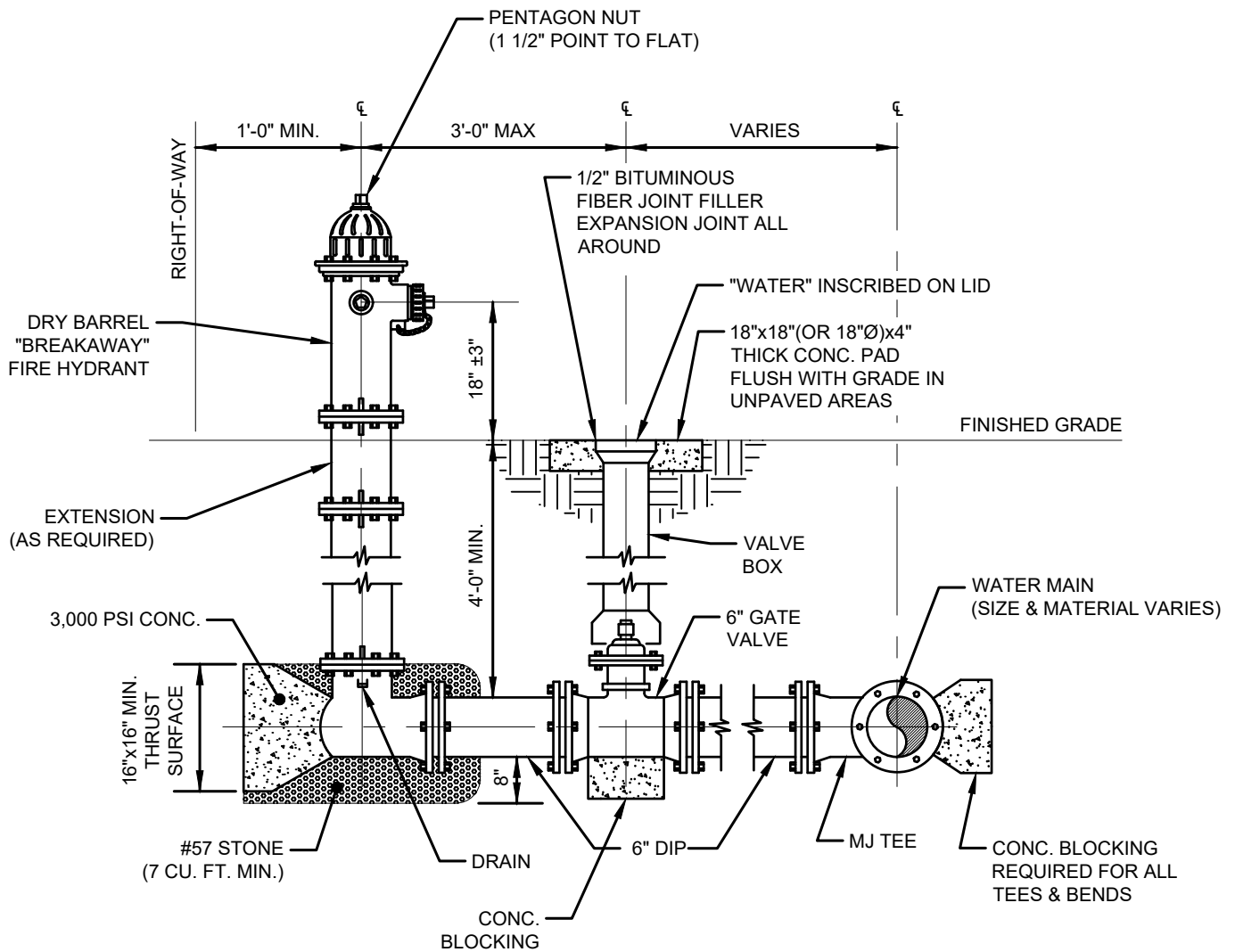
GREASE TRAP INSTALLATION

DETAIL NO.
S022

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



NOTES:

1. FIRE HYDRANT SHALL BE INSTALLED SO THAT THE FINISH GRADE MATCHES THE MANUFACTURER'S BURY LINE (AS TYPICALLY MARKED BY THE FACTORY).
2. HYDRANT LUGS & TIE RODS MAY BE USED IN LIEU OF CONCRETE BLOCKING.
3. HYDRANT PAINT COLOR SHALL BE IN ACCORDANCE WITH W/AWWA C502. COLOR TO BE APPROVED BY ENGINEER AND OWNER.
4. EXACT LOCATION OF HYDRANTS TO BE DETERMINED IN FIELD BY ENGINEER AND OWNER.



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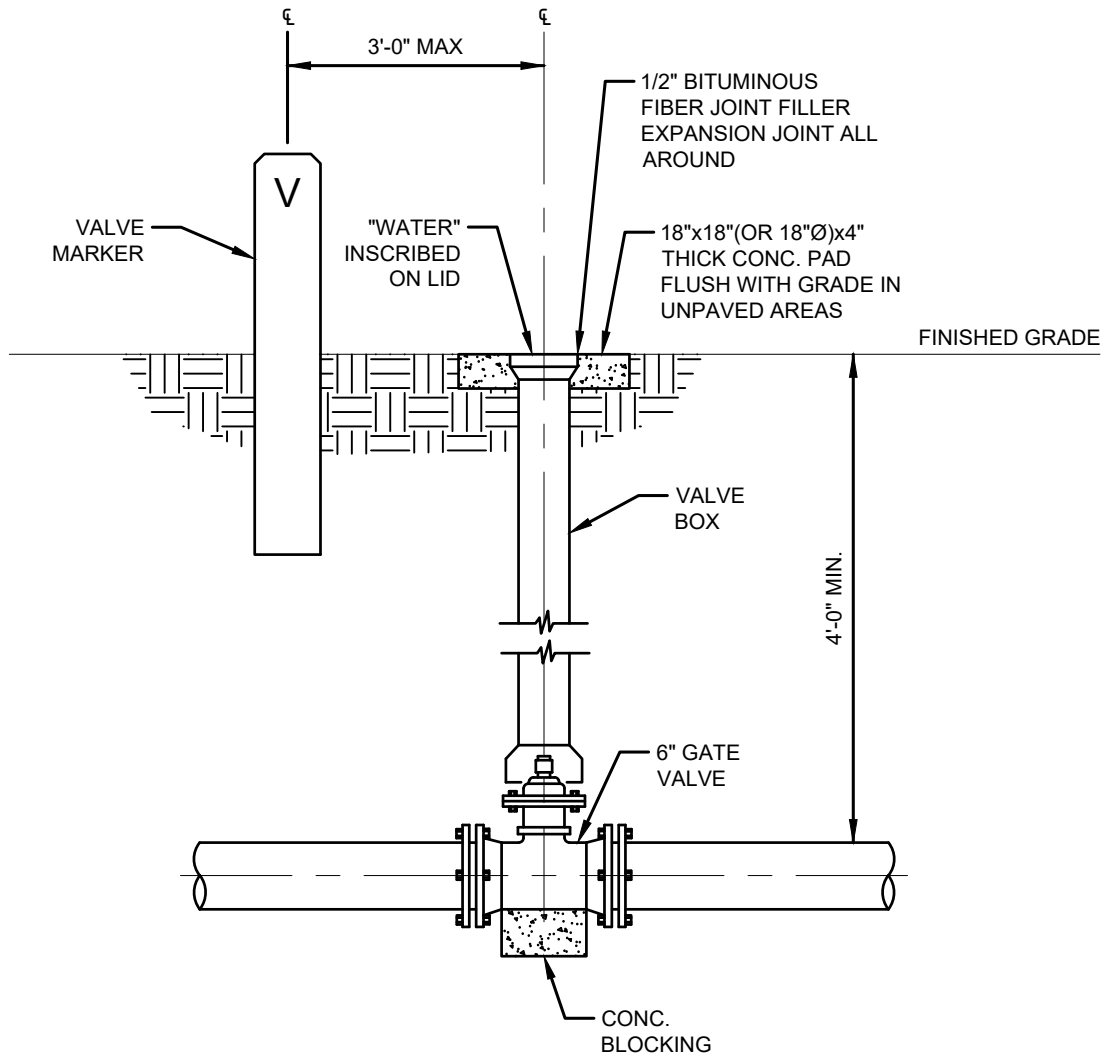
FIRE HYDRANT ASSEMBLY

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
W001

DATE:
MARCH 2023



NOTES:

1. CONCRETE PAD AROUND TOP OF VALVE BOX REQUIRED IN UNPAVED AREAS NOT SUBJECT TO TRAFFIC.
2. CONCRETE PAD SHALL BE 3,000 PSI MIN.



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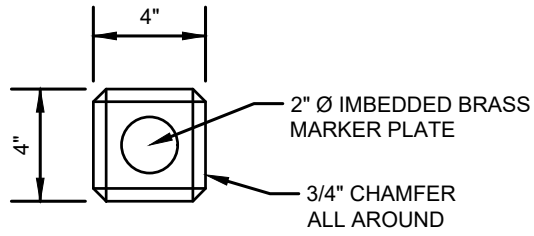
GATE VALVE ASSEMBLY

STANDARD DETAILS

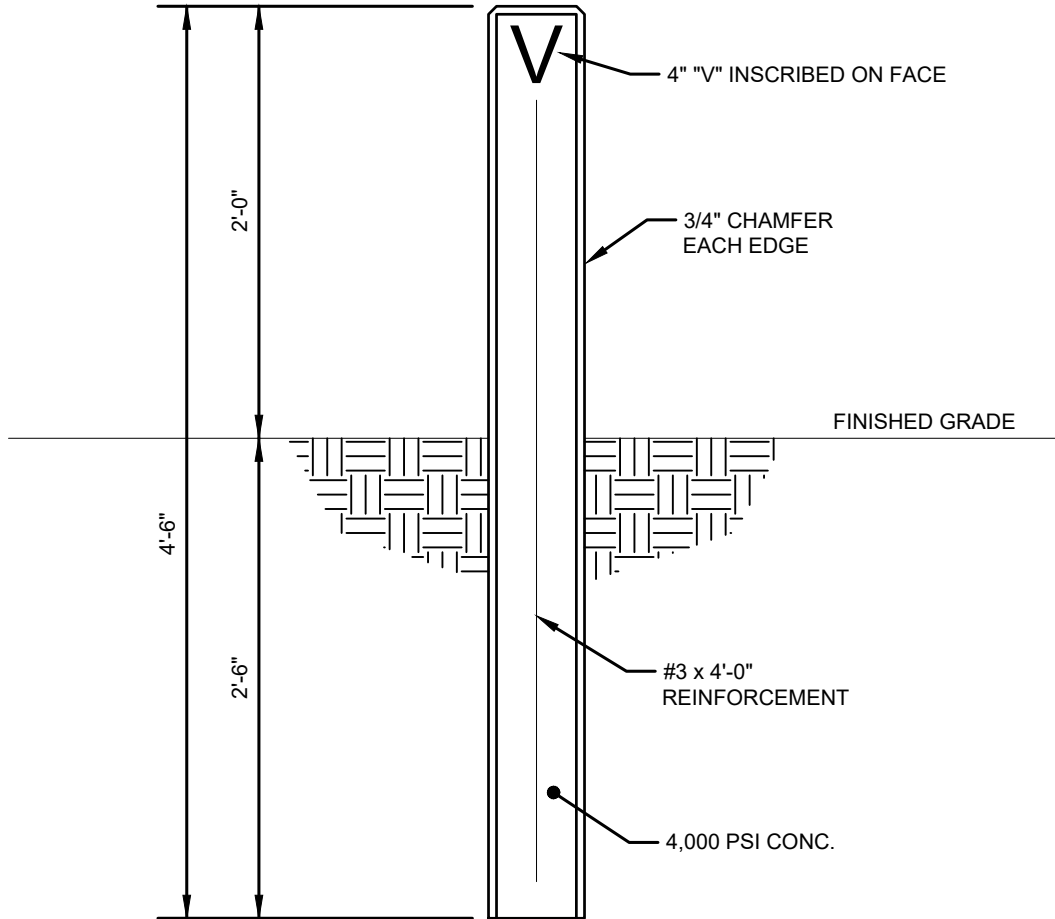
NOT TO SCALE

DETAIL NO.
W002

DATE:
MARCH 2023



TOP



FRONT

NOTES:

1. BRASS MARKER PLATE SHALL CONTAIN DIRECTIONAL ARROW POINTING TO VALVE WITH THE DISTANCE TO THE NEAREST FOOT AND SHALL BE LABELED "WATER VALVE".
2. CONCRETE SURFACE ABOVE GRADE SHALL BE PAINTED BLUE.



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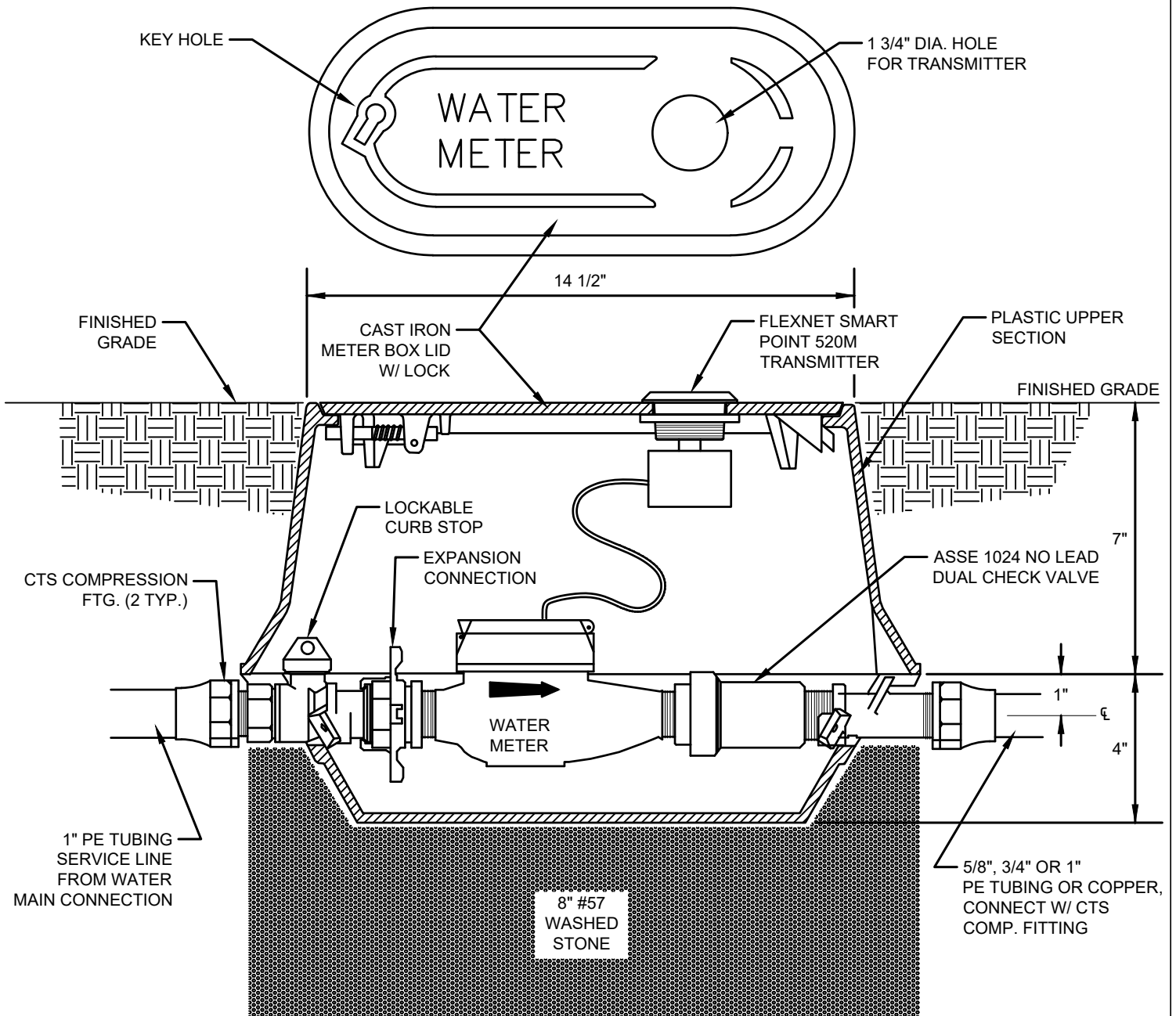
WATER VALVE MARKER

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
W003

DATE:
MARCH 2023



NOTES:

1. 3/4" OR 1" METER WITH ADAPTERS AS REQUIRED.
2. METER SHALL COMPLY WITH ANSI/NSF STD. 61, ANSI/AWWA C-700 AND C-710.
3. USE SENSUS IPERL METER WITH FLEXNET SMART POINT 520M RADIO READ TRANSMITTER.
4. DUAL CHECK VALVE BACKFLOW PREVENTER SHALL COMPLY WITH ASSE 1024, NO LEAD.
5. DO NOT INSTALL DUAL CHECK BACKFLOW PREVENTER IF A REDUCED PRESSURE ZONE OR DOUBLE CHECK VALVE ASSEMBLY IS INSTALLED OUTSIDE OF METER BOX.
6. METER BOXES SHALL HAVE PLASTIC UPPER SECTION AND CAST-IRON LOWER SECTION WITH CAST IRON LID. THE LID SHALL HAVE PRECAST "WATER METER" TEXT, HAVE LOCKING MECHANISM AND HAVE PRECAST HOLE WITH REMOVABLE PLUG FOR ELECTRONIC METER TRANSMITTER.
7. ALL BRASS COMPONENTS THAT COME INTO CONTACT WITH POTABLE WATER SHALL BE NO LEAD BRASS CONFORMING TO AWWA STD. C800 (UNS NO C89833).
8. ALL BRASS COMPONENTS THAT DOES NOT COME INTO CONTACT WITH POTABLE WATER SHALL CONFORM TO AWWA STD. C800 (ASTM B-62, ASTM B-584, AND UNS NO C83600-85-5-5-5).
9. INLET AND OUTLET COMPRESSION FITTINGS SHALL BE NO LEAD COMPRESSION (CTS) CONNECTIONS FOR PE TUBING OR COPPER.



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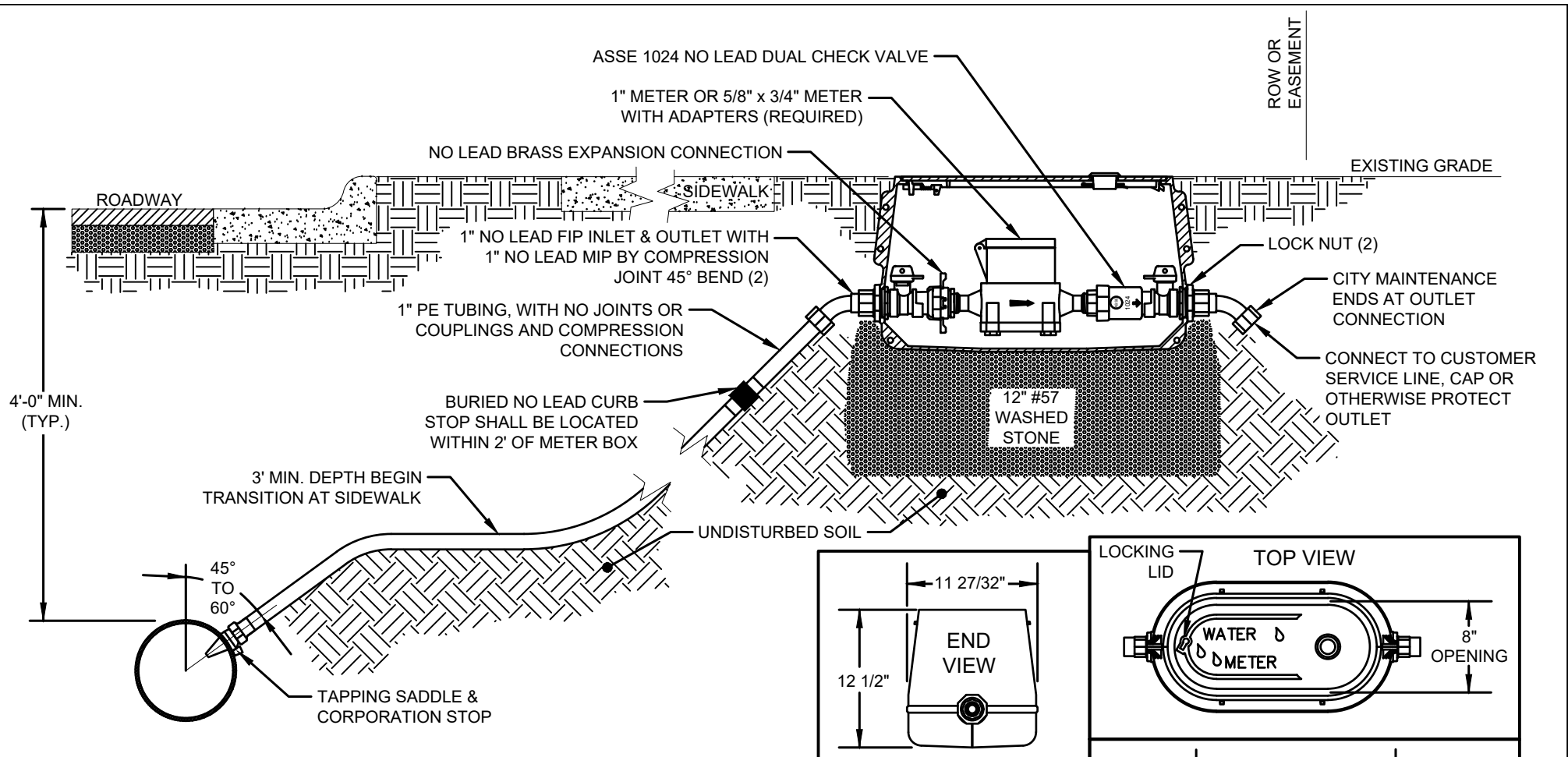
WATER METER ASSEMBLY

STANDARD DETAILS

NOT TO SCALE

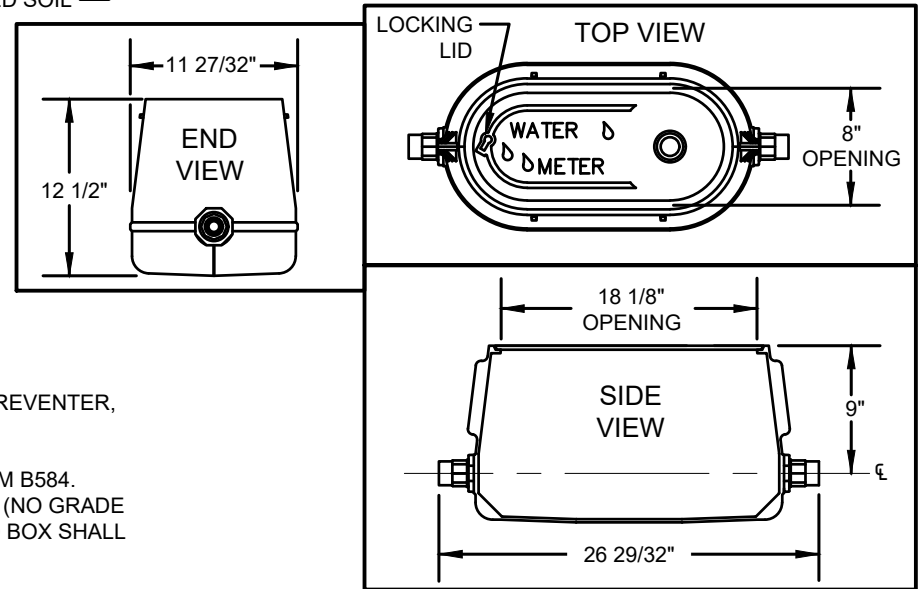
DETAIL NO.
W004

DATE:
MARCH 2023



NOTES:

1. WATER METER SHALL NOT BE LOCATED IN AREAS SUBJECT TO VEHICULAR TRAFFIC.
2. ALL METER BOXES AND LIDS SHALL BE APPROVED BY THE CITY.
3. ALL SERVICE LINES, VALVES AND FITTINGS SHALL COMPLY WITH AWWA C800.
4. FOR NON-RESIDENTIAL APPLICATIONS THAT REQUIRE AN ABOVE-GROUND BACKFLOW PREVENTER, THE DUAL CHECK ASSEMBLY MAY BE OMITTED.
5. BOX AND LID SHALL BE CAST GRAY IRON, ASTM A48, CLASS 25.
6. ALL BRASS COMPONENTS SHALL BE 'NO LEAD' BRASS MEETING UNS C89833 AS PER ASTM B584.
7. ONE 2" OR 6" GRADE ADJUSTER MAY BE UTILIZED WHEN NEEDED TO MEET FINAL GRADE (NO GRADE ADJUSTERS MAY BE USED ON NEW CONSTRUCTION PROJECTS). GRADE ADJUSTER AND BOX SHALL BE BY THE SAME MANUFACTURER.
8. SERVICE SADDLE REQUIRED FOR CONNECTING TO WATER MAINS 4" OR LARGER.



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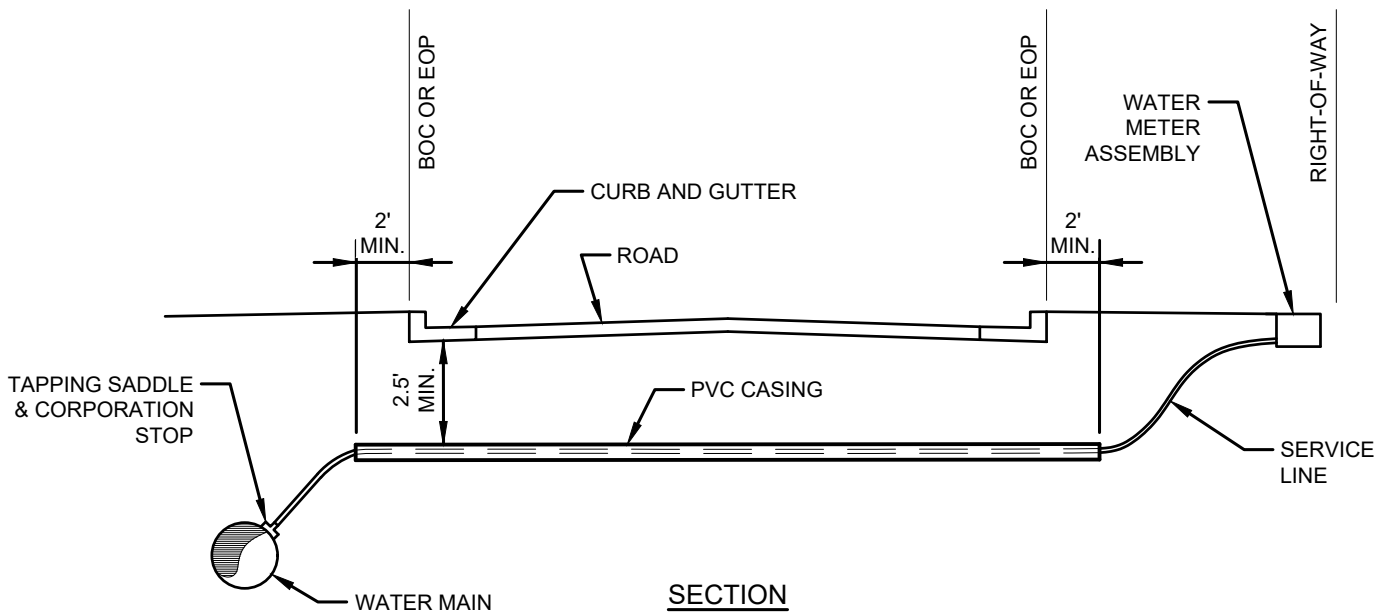
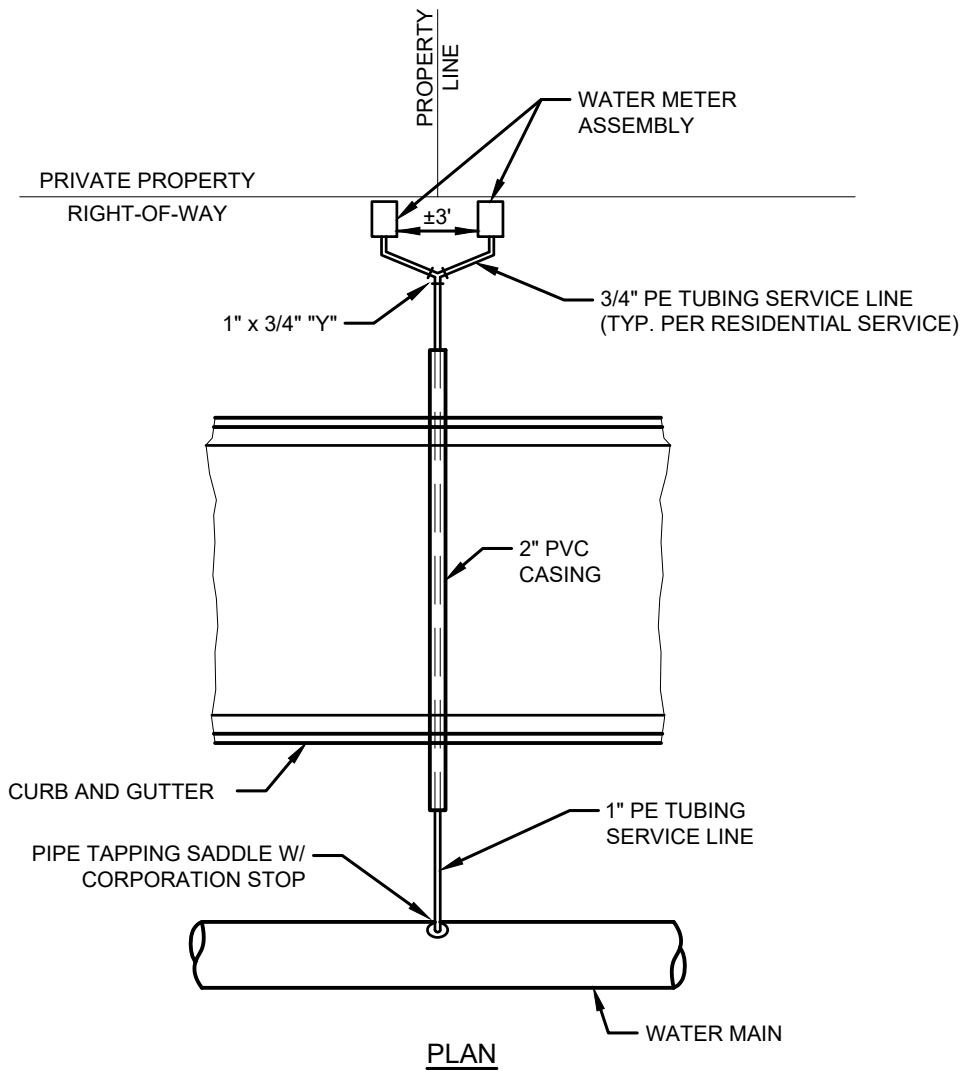
TYPICAL WATER SERVICE

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
W005

DATE:
MARCH 2023



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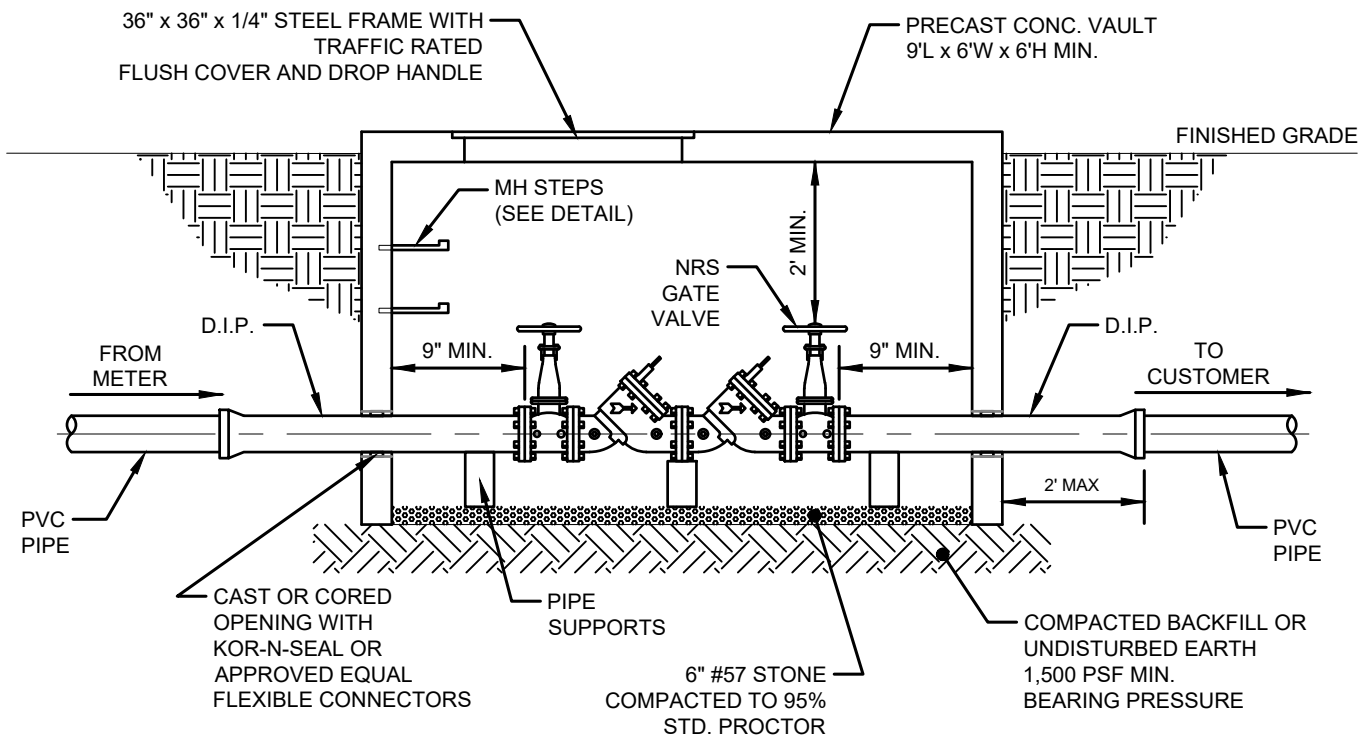
WATER SERVICE (LONG SIDE)

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
W006

DATE:
MARCH 2023



NOTES:

1. FOR BACKFLOW PREVENTION DEVICE, PROVIDE TWO INTERNALLY LOADED DOUBLE CHECK VALVES WITH BRONZE BALL VALVE TEST COCK FITTED WITH BRONZE PLUG. MUST CONFORM TO AWWA C506, FCC C&HR 69-2 AND ASSE STD. 1015.
2. TWO GATE VALVES SHALL BE NON-RISING STEM (NRS) GATE VALVES.
3. PROVIDE PIPE SUPPORTS FOR PIPE & ASSEMBLY TO ELIMINATE ALL STRAIN ON PIPE JOINTS.



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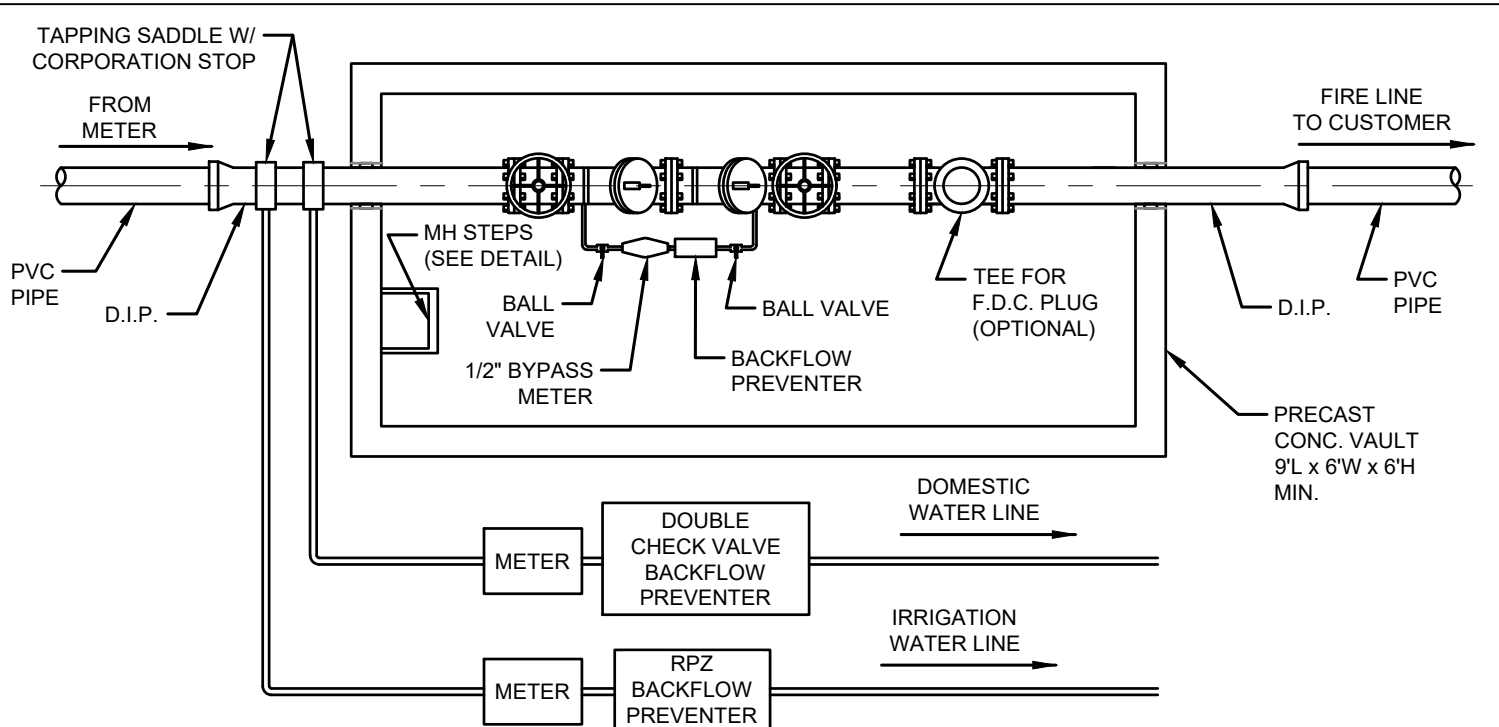
**BACKFLOW PREVENTER
(1 1/2" AND LARGER)**

STANDARD DETAILS

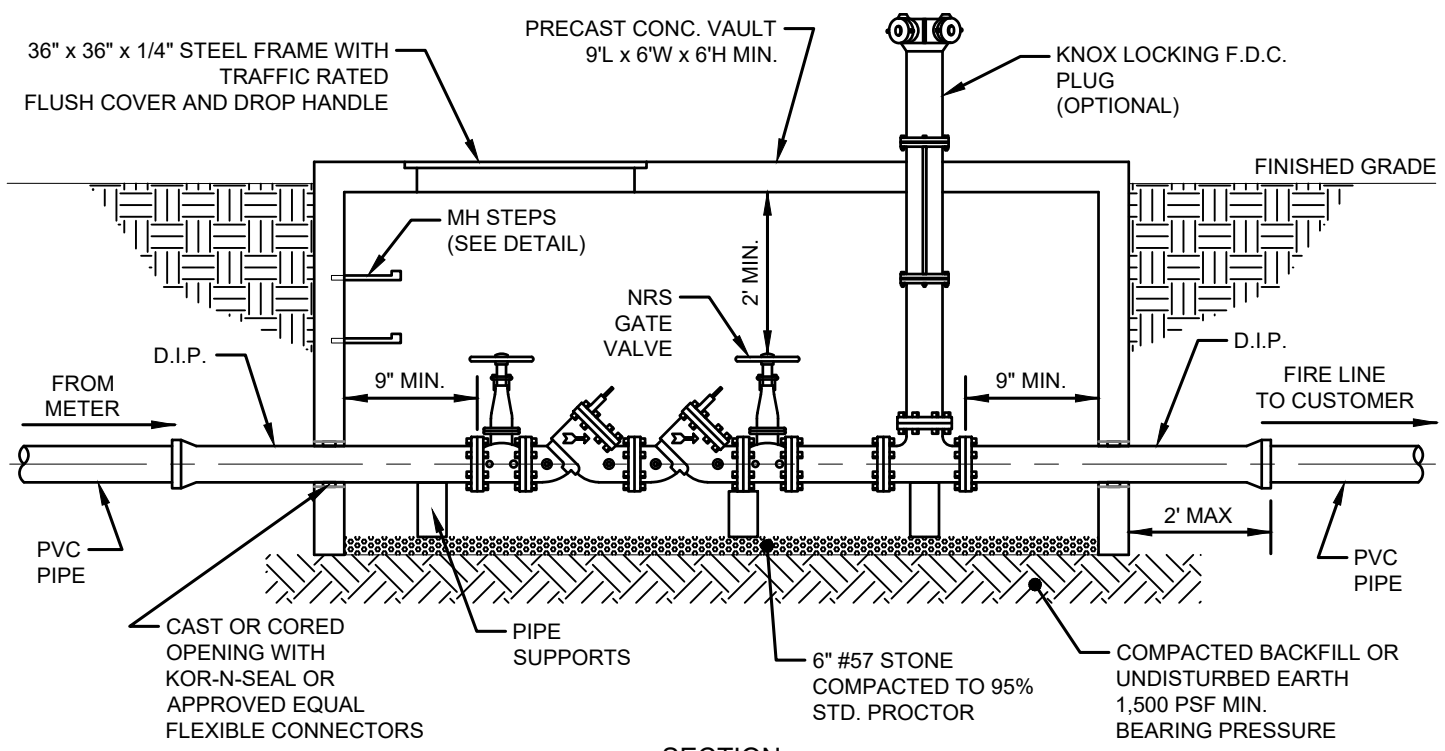
NOT TO SCALE

DETAIL NO.
W007

DATE:
MARCH 2023



PLAN



SECTION

NOTES:

1. FOR BACKFLOW PREVENTION DEVICE, PROVIDE TWO INTERNALLY LOADED DOUBLE CHECK VALVES WITH BRONZE BALL VALVE TEST COCK FITTED WITH BRONZE PLUG. MUST CONFORM TO AWWA C506, FCC C&HR 69-2 AND ASSE STD. 1015.
2. TWO GATE VALVES SHALL BE NON-RISING STEM (NRS) GATE VALVES.
3. PROVIDE PIPE SUPPORTS FOR PIPE & ASSEMBLY TO ELIMINATE ALL STRAIN ON PIPE JOINTS.



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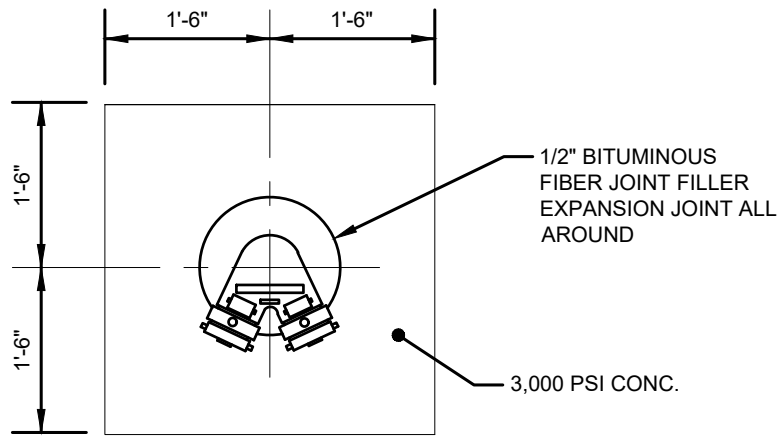
**FIRE MAIN AND DOMESTIC
WATER CONNECTION**

STANDARD DETAILS

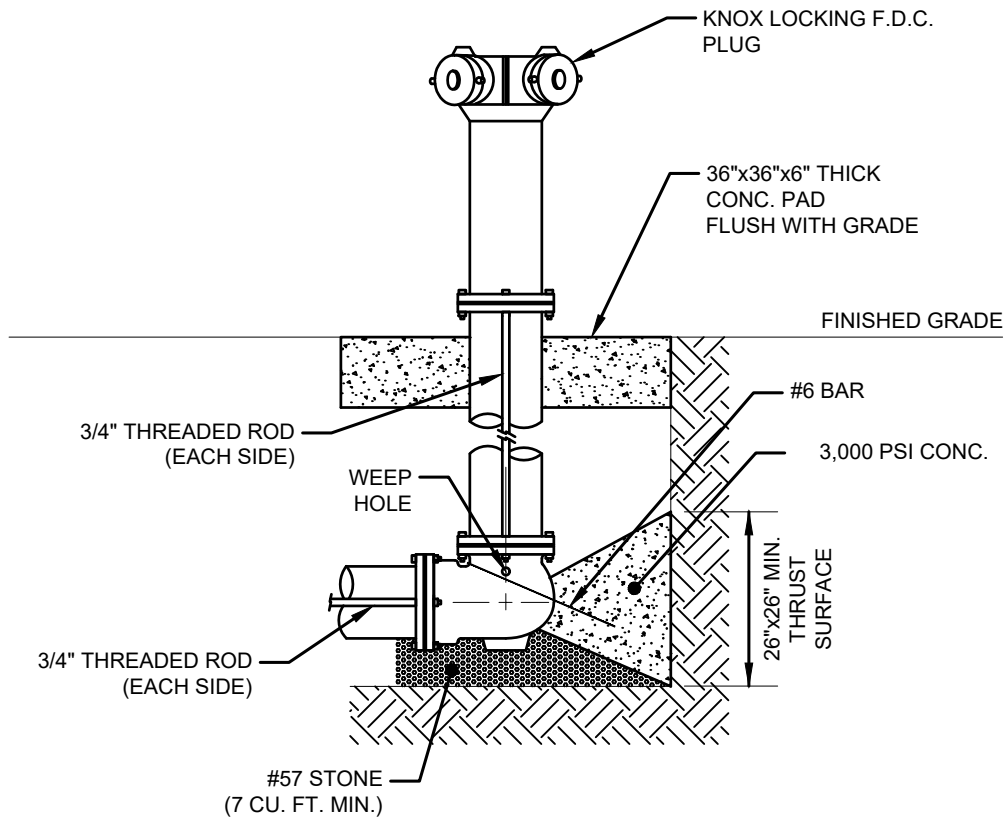
NOT TO SCALE

DETAIL NO.
W008

DATE:
MARCH 2023



TOP



SECTION

NOTES:

1. COORDINATE INSTALLATION WITH FIRE DEPARTMENT.
2. MINIMUM 36" DIAMETER AREA ALL AROUND SHALL BE FREE OF ALL OBSTRUCTIONS, INCLUDING LANDSCAPING.



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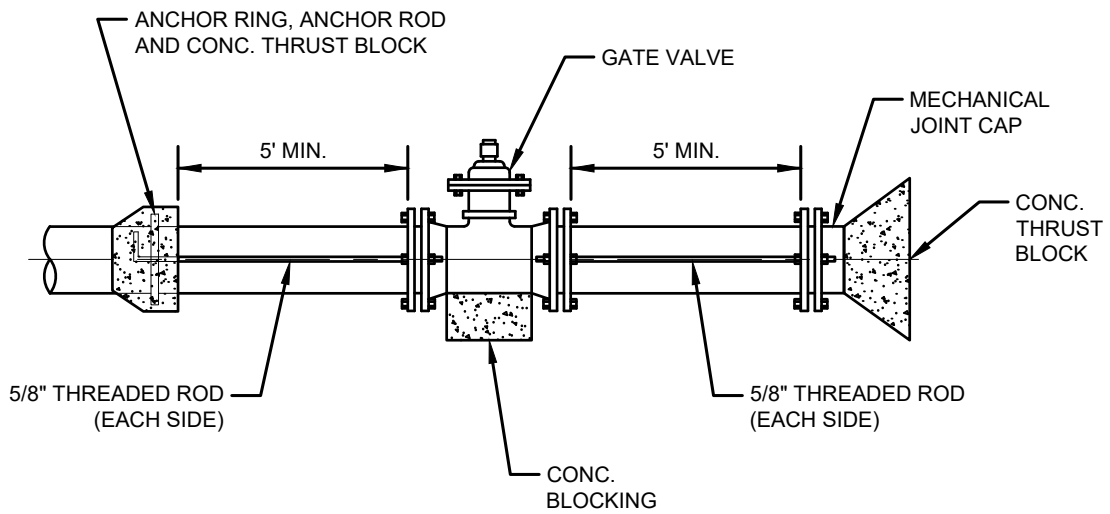
FIRE DEPARTMENT CONNECTION

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
W009

DATE:
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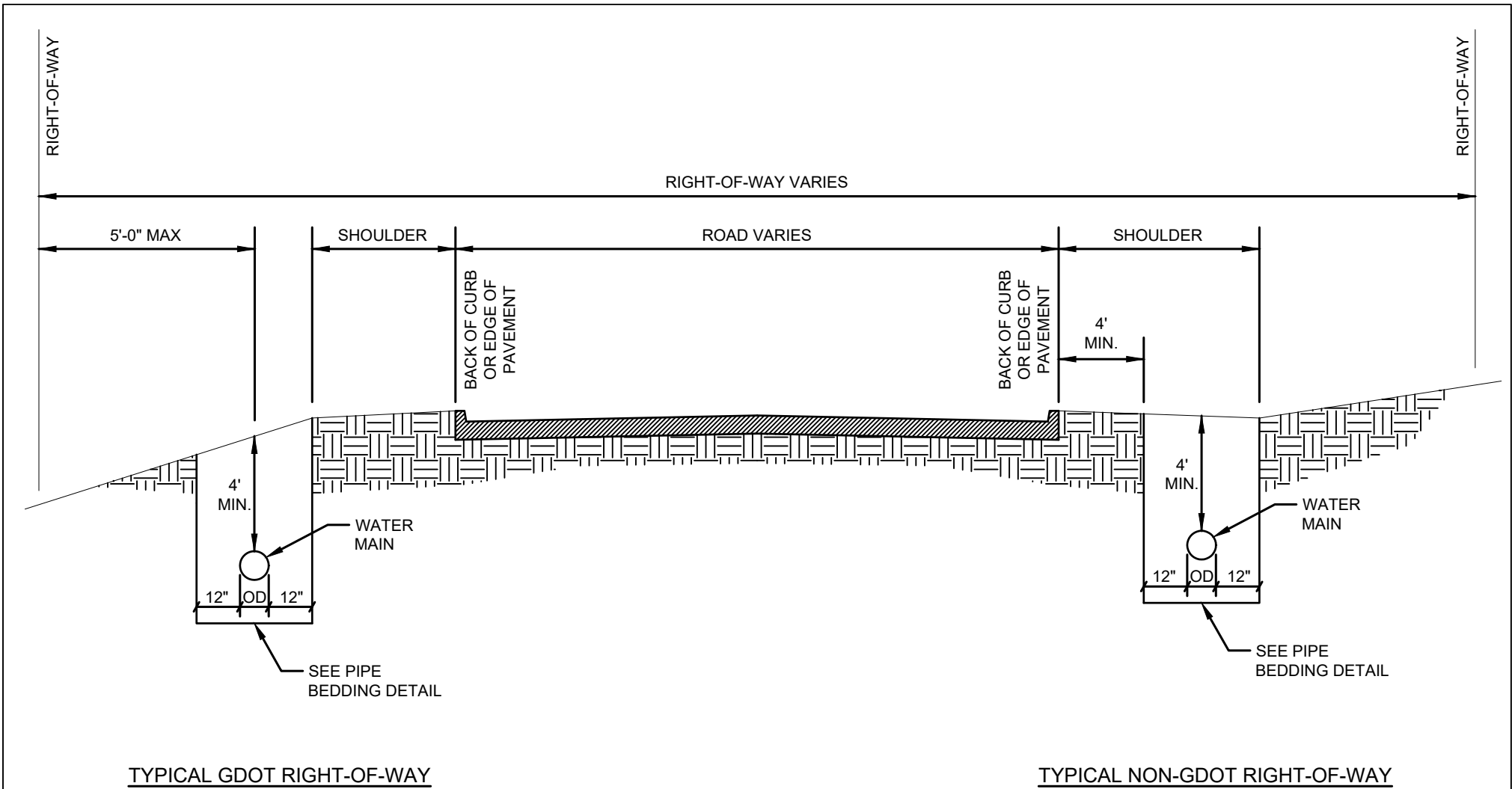
WATER MAIN TERMINATION

DETAIL NO.
W010

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE



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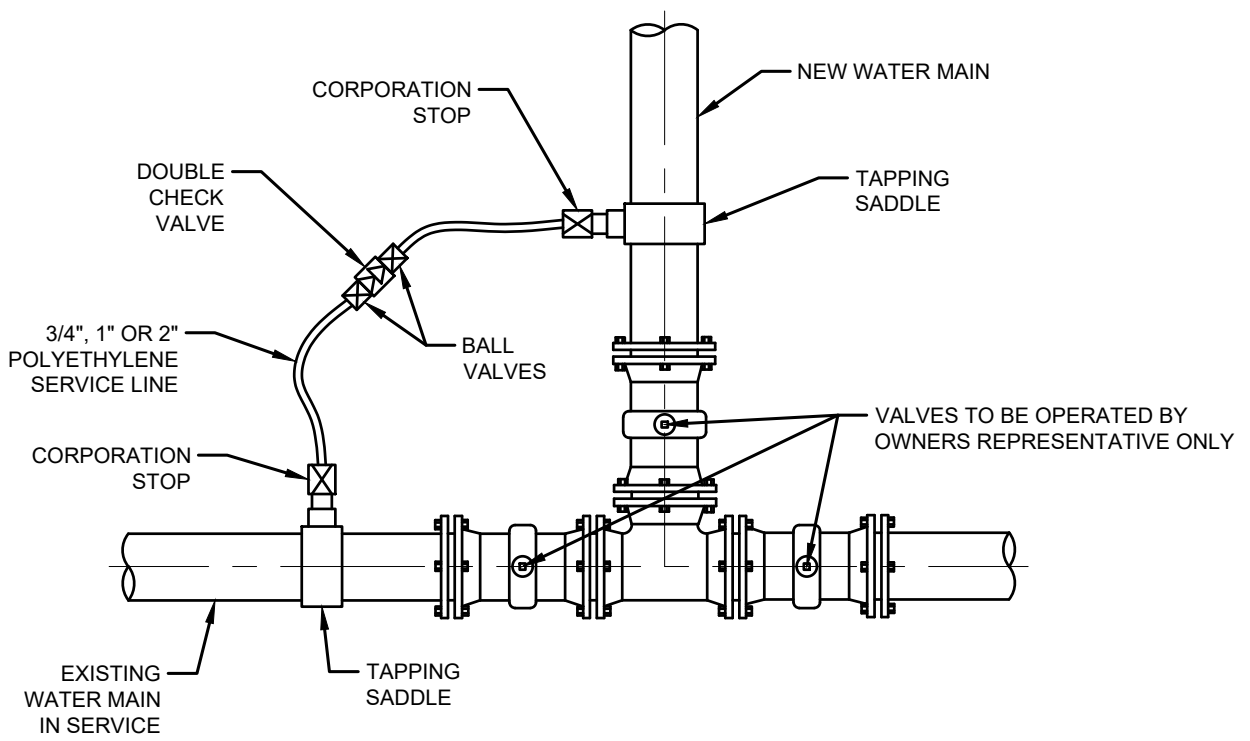
TYPICAL WATER MAIN PLACEMENT

STANDARD DETAILS

NOT TO SCALE

DETAIL NO.
W011

DATE:
MARCH 2023



CITY OF
GRANTVILLE,
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FILLING NEW WATER MAIN

DETAIL NO.
W012

DATE:
MARCH 2023

STANDARD DETAILS

NOT TO SCALE

APPENDIX B

STORMWATER LOCAL DESIGN MANUAL



CITY OF GRANTVILLE, GEORGIA

Prepared: April 2023

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ATTACHMENT A: Stormwater Hydrology Report Checklist

1. FORWARD

This Stormwater Local Design Manual (LDM) is meant to serve as a comprehensive guide to implementing stormwater management systems in the City of Grantville (City). Additionally, the LDM is designed to supplement the Georgia Stormwater Management Manual (GSMM) First Edition, which shall serve as the technical reference manual for design and specification of individual components within the system.

1.1. Meeting the Stormwater Management Requirements of the City

The following outlines the process for developing a stormwater management plan as required for issuance and maintenance of a site development permit in the City.

Pre-Design Phase

- Step 1. Check for new special district requirements with City staff
- Step 2. Check for concept plan submittal requirements
- Step 3. Prepare concept plan (if required)
- Step 4. Submit concept plan to City and schedule concept plan meeting (if required)
- Step 5. Meet with City staff to discuss concept plan (if required)

Design Phase

- Step 6. Prepare stormwater management plan
- Step 7. Submit stormwater management plan to City for approval

Construction Phase

- Step 8. After receiving approval from City begin construction
- Step 9. Coordinate construction with City inspection staff during construction

Post Construction Phase

- Step 10. After construction prepare As-Built Survey and As-Built Design Certification
- Step 11. Adjust stormwater structures if necessary
- Step 12. Execute stormwater inspection and maintenance agreement for all private on-site stormwater management facilities
- Step 13. Secure Certificate of Occupancy / Final Plat

2. GENERAL LEVEL OF SERVICE STANDARDS

2.1. Detention Requirements

2.1.1. Discharge Rates from New Development Projects

Development plans including site grading and drainage plans should be developed to minimize disruption of natural drainage patterns on properties, as well as to minimize impacts to

downstream drainage infrastructure and structures. Whenever a Hydrologic & Hydraulic Report (as defined in Section 7 of this document) indicates a potentially adverse impact resulting from development of a property on a downstream property, that project shall incorporate stormwater detention facilities to reduce the discharge rate. The meaning of adverse impact shall apply to situations where the post-development discharge rates, up to and including the 100-year storm event, exceed those determined for the pre-developed conditions. Additionally, no increases in stormwater runoff rates shall be allowed at any discharge point from the site unless approved by the City.

The baseline or pre-developed conditions shall be on an analysis of the existing conditions taking into account existing land use, stormwater management controls and other factors that can affect the hydrologic responsiveness of the site. Proposed developments shall be analyzed for the following storm events:

- 1-year 24-hour Design Storm
- 2-year 24-hour Design Storm
- 5-year 24-hour Design Storm
- 10-year 24-hour Design Storm
- 25-year 24-hour Design Storm
- 50-year 24-hour Design Storm
- 100-year 24-hour Design Storm

If the total area of the site (i.e., total property area) and the drainage area to each stormwater management facility is less than one acre, then a rainfall intensity-based analysis (i.e., rational method) may be performed. However, if detention facilities are to be designed and constructed in series, the 24-hour storm criteria will apply regardless of the drainage area.

Where downstream conditions indicate that the conveyance and/or storage capacity of existing infrastructure could be impacted by the post development conditions, or where existing structures could be impacted by the post developed conditions, a more stringent standard may be required. For example, if the project site drains into an existing detention pond within the study area then the designer will be required to demonstrate that the discharge rates from the proposed development will still allow the detention pond to operate at a level commiserate with the site in an undeveloped state.

Detention facilities should be designed upon the basis of known or projected developments (proposed by the developer) for the contributing drainage basin. Although, the developer is only required to construct the facility with sufficient volume to provide detention for the proposed development, a design shall be provided to the City demonstrating the ultimate configuration of the facility at full build-out. Additionally, the proposed site plan should have sufficient land around the facility reserved to construct the ultimate configuration without significant demolition.

2.1.2. Discharge Rates from Redevelopment Projects

Development plans including site grading and drainage plans should be developed to minimize disruption of natural drainage patterns on properties as well as to minimize impacts to downstream drainage infrastructure and structures. Whenever a Hydrologic & Hydraulic Report (as defined in Section 7 of the LDM) indicates a potentially adverse impact resulting from development of a property on a downstream property, that project shall incorporate stormwater detention facilities to reduce the discharge rate. The meaning of adverse impact shall apply to situations where the post-development discharge rates, up to and including the 100-year storm event, exceed those determined for the pre-developed conditions. Additionally, no increases in stormwater runoff rates shall be allowed at any discharge point from the site unless approved by the City.

The baseline or pre-developed conditions shall be based on an analysis of the existing conditions taking into account existing land use, stormwater management controls and other factors that can affect the hydrologic responsiveness of the site. Proposed developments shall be analyzed for the following storm events:

- 1-year 24-hour Design Storm
- 2-year 24-hour Design Storm
- 5-year 24-hour Design Storm
- 10-year 24-hour Design Storm
- 25-year 24-hour Design Storm
- 50-year 24-hour Design Storm
- 100-year 24-hour Design Storm

If the total area of the site (i.e., total property area) and the drainage area to each stormwater management facility is less than one acre, then a rainfall intensity-based analysis (i.e., rational method) may be performed. However, if detention facilities are to be designed and constructed in series, the 24-hour storm criteria will apply regardless of the drainage area.

Where downstream conditions indicate that the conveyance and/or storage capacity of existing infrastructure could be impacted by the post-development conditions, or where existing structures could be impacted by the post-developed conditions, a more stringent standard may be required. For example, if the project site drains into an existing detention pond within the study area then the designer will be required to demonstrate that the discharge rates from the proposed development will still allow the detention pond to operate at a level commiserate with the site in an undeveloped state.

Detention facilities should be designed upon the basis of known or projected developments (proposed by the developer) for the contributing drainage basin. Although, the developer is only required to construct the facility with sufficient volume to provide detention for the proposed development, a design shall be provided to the City demonstrating the ultimate configuration of the facility at full build-out. Additionally, the proposed site plan should have

sufficient land around the facility reserved to construct the ultimate configuration without significant demolition.

2.2. Conveyance Systems

The following subsections outline the specifications for the design of stormwater conveyance systems. In no case shall a drainage system be designed to directly or indirectly discharge stormwater runoff into a sanitary sewer line or system.

2.2.1. Bridges

All bridges shall be designed to accommodate the 100-year 24-hour design storm with the established 100-year flood elevation one foot below the low cord of the bridge (i.e., the lowest part of the bridge deck structure or girders whichever is lower).

2.2.2. Culverts & Pipe Systems

The level of service provided by culverts and pipe systems in the City is dependent on a number of different factors. These include the type of road that the system will service, the potential for upstream flooding, floodplain impacts and other service issues. Generally, the level of service to be provided by culverts in the City is outlined in the table below:

Roadway Classification / Use	Design Storm
Emergency Access Routes (To be Determined by City)	100-Year
Collector Roadways	50-Year
Local Roads	25-Year
Roads with No Other Outlet	100-Year
Parking Lots / Material Storage Areas / Landscape Areas	10-Year

The level of service standards outlined above are considered minimum standards, where warranted the level of service may be increased at the discretion of the designer. For determining the maximum allowable head at any structure, the hydraulic grade line (HGL) should be designed to no less than six inches below the elevation of the inlet (catch basins, yard inlets, drop inlets, hooded grate inlets, etc.). The HGL should be designed to no less than six inches below the rim elevation for all junction boxes. Other inlets such as headwalls, flared end sections, etc. should be designed based on the guidance outlined in Section 2.2.4 of the LDM.

Culverts with contributing drainage areas greater than 25 acres shall be designed to the 24-hour storm. For example, if a culvert is to be designed to convey stormwater runoff from a 25-acre drainage basin under a neighborhood road, the design storm shall be a 25-year 24-hour storm.

If a culvert is designed to connect to an existing system of a differing design level of service, then the system with the greater design requirement will be used to size the proposed system.

All pipes should be designed to maintain a minimum velocity of three feet per second during the 2-year design storm to promote sediment removal.

2.2.3. Inlets (Catch Basins, Yard Inlets, Drop Inlets, Hooded Grate Inlets and Flumes)

Inlets collecting stormwater runoff from street surfaces and area inlets shall be sized to capture the storm event specified for the pipe system to which it drains and a maximum flooding depth as determined by the following table:

Roadway Classification / Use	Design Storm	Flooding Depth
Emergency Access Routes	100-Year	8.0 ft Maximum Gutter Spread
Collector Roads	50-Year	8.0 ft Maximum Gutter Spread
Local Roads	25-Year	8.0 ft Lane Width Open
Roads with No Other Outlet	100-Year	8.0 ft Lane Width Open
Parking Lots (with a check of the 100-year storm flooding depth and maximum 1-foot depth)	10-Year	Maximum 0.5 ft Depth
Detention Areas utilized for other purposes with general public access (i.e., parking lot detention, etc.) with flood warning sign	100-Year	Maximum 1.5 ft Depth
Material Storage Areas / Landscape Areas with flood warning sign if area is utilized by the public (with a check of the 100-year storm flooding depth)	10-Year	Maximum 2.0 ft Depth

Inlets and grading adjacent to habitable structures shall be designed to prevent stormwater runoff from entering the structure during the 100-year design storm.

In no case shall inlets located on public streets be spaced in excess of 400 feet.

2.2.4. Inlets (Headwalls, Flared End Sections, etc.)

Inlets that utilize the opening of the pipe as the inlet (i.e., headwalls, flared end sections, etc.) shall be sized to capture the storm event specified for the pipe system to which it drains. The HGL should be designed to be no less than six inches below the edge of pavement or the point at which water would bypass the inlet (i.e., bypass to another inlet, etc.) whichever is less. Additionally, the headwater conditions induced by the inlet should not cause an impact on any upstream drainage structures such that the upstream structure will realize a loss in performance. In simpler terms, the headwater from an inlet should not back water into another culvert or drainage system. This requirement can be waived by the City in situations

where it would be infeasible to design the culverts due to proximity of the culverts or extremely shallow grades between the culverts.

2.2.5. Roadside Ditches

Roads constructed without curb and gutter shall incorporate ditches that are designed to the specific design storms. The level of service provided by the ditches shall match the level of service provided by a comparable pipe system as outlined in Section 2.2.2 of the LDM above. The level of service standards are considered minimum standards, where warranted the level of service may be increased at the discretion of the designer.

Ditches with contributing drainage areas greater than 25 acres shall be designed to the 24-hour storm. For example, if a ditch is to be designed to convey stormwater runoff from a 25-acre drainage basin along a neighborhood road, the design storm shall be a 25-year 24-hour storm.

2.2.6. Drainage Channels

For drainage channels designed to convey stormwater runoff either from or to a culvert, the channel should be sized to accommodate the same storm event specified for the pipe system at a minimum. Channels designed to convey stormwater runoff to detention ponds shall be sized to accommodate the 100-year design storm.

2.2.7. Groundwater Dewatering

Sub-drainage will be installed to control the surplus groundwater by intercepting seepage or by lowering or regulating the groundwater level where such conditions exist.

2.2.8. Flood Elevation Impacts

It is the policy of the City that raising the elevation of flooding on an adjacent property shall not be acceptable. As such, the level of service standards outlined in Section 2.2 of the LDM shall be considered minimum standards. Where flood elevations on an adjacent property will be increased due to development and / or construction of a drainage system, the level of service may be increased by the City to result in no impact to the adjacent property. This requirement may be waived at the City's discretion if the adjacent property owner provides a permanent drainage easement between the two property owners. The easement shall provide that the owner of the impacted property acknowledges that an increase in flood elevations will occur on their property as a result of the proposed development. Additionally, the easement shall include at a minimum a map showing the extent of the pre-development and post-development 100-year floodplains. Finally, the easement must be recorded with the City as an attachment to the affected property's land deed and shall be binding on all future property owners.

2.3. Stormwater Quality Treatment

2.3.1. Stormwater Quality in New Development

Stormwater runoff generated from a site shall be adequately treated before discharge. Stormwater management systems must be designed to remove 80% of the average annual post-development total suspended solids (TSS) load and be able to meet any other additional watershed or site-specific water quality requirements. It is presumed that a stormwater management system complies with this performance standard if:

- It is sized to capture and treat the prescribed water quality treatment volume, which is defined as the runoff volume resulting from the first 1.2 inches of rainfall from a site.
- Appropriate structural controls are selected, designed, constructed, and maintained according to the specific criteria in this manual, the GSMM and the Operations & Maintenance schedule developed for the proposed development.

The City encourages the designer to implement specific stormwater credits for reducing the water quality treatment requirements on-site. These credits can be found in Section 1.4.4 of the GSMM. However, the City recognizes that water quality treatment of stormwater runoff from certain areas of a site is infeasible. As such, the following areas are exempt from water quality treatment:

- Portions of the site that lie within City mandated undisturbed buffers.
- Portions of the site that lie within 50 feet of the property line and drain away from the site assuming that no impervious surfaces (including compacted gravel / rock) lie within the 50-foot zone except retaining walls.
- Impervious surfaces associated with the driveway for the first 50 feet as measured from the edge of pavement of the public street to which it connects.
- Portions of the site which will remain undisturbed, and which does not drain to a water quality or detention facility / BMP. These undisturbed areas must contain at least 10,000 square feet of contiguous area. Additionally, these areas must not be used for any purposes during construction and must be protected from such activities by construction fencing or other means to prevent construction personnel ingress.

Additional water quality requirements may be specified for hotspot land uses and activities.

2.3.2. Stormwater Quality in Redevelopment

Stormwater runoff generated from the disturbed area of the site shall be adequately treated before discharge. Stormwater management systems must be designed to remove 80% of the average annual post-development TSS load and be able to meet any other additional watershed or site-specific water quality requirements.

It is presumed that a stormwater management system complies with this performance standard if:

- It is sized to capture and treat the prescribed water quality treatment volume, which is defined as the runoff volume resulting from the first 1.2 inches of rainfall from a site.
- Appropriate structural controls are selected, designed, constructed, and maintained according to the specific criteria in this manual, the GSMM and the Operations & Maintenance schedule developed for the proposed development.

The City encourages the designer to implement specific stormwater credits for reducing the water quality treatment requirements on-site. These credits can be found in Section 1.4.4 of the GSMM. However, the City recognizes that water quality treatment of stormwater runoff from certain areas of a site is infeasible. As such, the following areas are exempt from water quality treatment:

- Portions of the site that lie within 50 feet of the property line and drain away from the site assuming that no impervious surfaces (including compacted gravel / rock) lie within the 50-foot zone except retaining walls.
- Impervious surfaces associated with any new driveway for the first 50 feet as measured from the edge of pavement of the public street to which it connects.

Additional water quality requirements may be specified for hotspot land uses and activities.

2.3.3. Stormwater Quality Requirements for Hotspot Land Uses

Stormwater hotspots are land uses that often produce higher concentrations of certain pollutants, such as hydrocarbons or heavy metals, than are normally found in urban stormwater runoff. For the purposes of stormwater regulation, the City defines the following land uses / activities as hotspots.

- Gas / Fueling Stations
- Large Parking Lots with Greater than 200 Parking Spaces
- Vehicle Maintenance Areas
- Vehicle Washing / Steam Cleaning
- Auto Recycling Facilities
- Outdoor Material Storage Areas
- Loading and Transfer Areas
- Landfills
- Construction Sites
- Industrial Sites (NPDES Industrial Stormwater Permitted Sites Only)

For the purposes of this regulation, activities that are required to be compliant with National Pollutant Discharge Elimination System (NPDES) Permits issued by the Georgia Environmental Protection Division (EPD) will be considered compliant with the water quality requirements of this section if the requirements for the EPD permit are fully met unless noted below. These activities typically include construction site activities and certain industrial activities. Those

sites, which do not meet these exemption criteria, will be required to implement additional requirements.

Gas / fueling stations are required to construct and maintain oil / water separators to collect and treat stormwater runoff from those areas where gas / fuel will be dispensed or loaded to underground and / or above ground storage tanks.

Large parking lots with greater than 200 parking spaces are required to construct and maintain oil / water separators to collect and treat stormwater runoff from those areas where vehicles will be parked.

Vehicle maintenance areas are required to construct and maintain oil / water separators to collect and treat stormwater runoff from those areas where vehicle maintenance will occur, and vehicles will be parked awaiting maintenance.

Vehicle washing / steam cleaning areas are required to construct and maintain oil / water / grit separators to collect and treat stormwater runoff from those areas where washing will occur. Sand filters may be utilized in lieu of oil / water / grit separators with prior approval from the City.

Auto recycling facilities are required to construct and maintain oil / water separators to collect and treat stormwater runoff from those areas where vehicles will be stored, as well as areas where active recycling is occurring.

Outdoor material storage areas are required to construct and maintain sedimentation basins meeting the minimum standards outlined in the Georgia Manual for Sedimentation and Erosion (current edition) to collect and treat stormwater runoff from those areas where materials will be stored.

Loading and transfer areas, other than truck docks which shall be considered exempt, will be evaluated on a case-by-case basis. Generally, where the primary concern will be solids transport to nearby streams and drainage structures, the area will be required to construct and maintain sedimentation basins meeting the minimum standards outlined in the Georgia Manual for Sedimentation and Erosion (the Green Book, current edition). If the primary concern will be hydrocarbons and other floatable contaminants, the area will be required to construct and maintain oil / water separators to collect and treat stormwater runoff. All oil / water separators should be designed to the following criteria:

- Sized to treat the Water Quality Volume
- Designed as an off-line system
- Designed to pre-treat stormwater runoff before entering other Water Quality BMPs

2.4. Energy Dissipation

Energy dissipation shall be employed whenever the velocity of flows leaving a new stormwater facility exceeds the erosion velocity of the downstream area.

3. APPROVED CONSTRUCTION MATERIALS & BMPs

3.1. Conveyance Structures

3.1.1. Pipes within the Public Right-of-Way & Dedicated City Easements

All pipes located under roadways and within the public right-of-way or dedicated City easements, and that are accepted by the City for long-term maintenance, shall be constructed of reinforced concrete pipe (RCP – Class 3) meeting Georgia Department of Transportation Standards. All pipes must have a minimum diameter of 18 inches and 12 inches of cover from the exterior crown of the pipe, and in accordance with manufacturer's specifications. Pipes under pavement must have a minimum of 12 inches of cover from the exterior crown of the pipe to the bottom of the roadway base.

In situations where the City has reason to suspect that a pipe system may not have been installed properly, the City may require at their discretion, video inspections of pipe systems to be provided at the Owner's expense prior to acceptance of the system.

3.1.2. Other Pipe Systems

All other pipe systems not within the public right-of-way shall be constructed of reinforced concrete pipe (RCP – Class 3) or HDPE meeting Georgia Department of Transportation Standards. Minimum bedding standards for HDPE pipe shall be such that stone bedding (i.e., No. 57 stone) shall be placed to half of the pipe diameter for all depths greater than four feet and/or in accordance with manufacturer's specifications, whichever is greater. All pipes must have a minimum of 12-inches of cover from the crown of the pipe, and in accordance with manufacturer's specifications, provided the Owner and/or designer coordinates easement requirements with the City in advance.

In the case where HDPE pipe originating from private property is joined to RCP, in the right-of-way, a transition structure, approved by the City, must be provided at the right-of-way by the Owner.

All pipes must have a minimum diameter of 18 inches and 12 inches of cover from the exterior crown of the pipe, and in accordance with manufacturer's specifications. Pipes under pavement must have a minimum diameter of 18 inches and 12 inches of cover from the exterior crown of the pipe to the bottom of the roadway base. The minimum cover for pipes, which run along individual lot property lines in residential developments, shall be increased to three feet to account for the potential for damage due to residential fence construction.

In situations where the City has reason to suspect that a pipe system may not have been installed properly, the City may require at their discretion, video inspections of pipe systems to be provided at the Owner's expense prior to acceptance of the system.

3.1.3. Channels

All channels with erosive velocities must be protected from erosion through the use of rip-rap, concrete, erosion control matting or similar method acceptable to the City. All channel side slopes shall have a 3-foot horizontal to 1-foot vertical (3:1) slope or less and a minimum bottom width of 3.5 feet. Inverts should match at intersections, or the intersection will be designed / modified to accommodate the erosive forces at the transition.

3.1.4. Inlets

All inlets shall be constructed of materials and methods approved by the Georgia Department of Transportation and / or designs pre-approved by the City. Inlet covers (where appropriate) shall be designed and manufactured in accordance with local construction standards related to storm drain stenciling and pollution prevention education. The Owner and / or designer shall consult the City regarding specific requirements for storm drain covers and inlets.

Headwalls or flared end sections shall be required on inlet and outlet ends of any pipe culvert system.

3.2. **Detention Ponds**

All detention facilities constructed in accordance with the requirements of this manual shall be constructed on subdivided parcels deeded to the property owner or the homeowner's association. No detention facility for residential subdivisions shall be constructed in whole or part on a parcel or lot intended for sale to a future resident.

All outlet structures for controlling discharge rates from detention facilities shall be constructed of pre-cast concrete or cast-in-place concrete. The only exception to this rule shall be in situations where a pipe is utilized as the primary outlet control. In these situations, the pipe must be protected from scour through the use of a concrete headwall or flared-end-section. Emergency spillways may utilize rip-rap or concrete to prevent erosion if the invert of the spillway is set at or above the 100-year maximum stage of the facility.

3.2.1. Dry Earthen Detention Ponds

Dry detention ponds shall be designed to provide for positive drainage on the pond floor to the outlet of the pond. Side slopes for the dam shall be designed to have a maximum of 3-foot horizontal to 1-foot vertical (3:1) slopes.

A 6-foot chain link fence will be required for above ground stormwater detention facilities that exceed six feet in depth measured from the outlet invert to the top of the berm. In the front yard, the fence height may be reduced to four feet. The fence shall include a double drive-thru gate of sufficient size to permit entrance of equipment necessary to allow periodic maintenance activities.

Acceptable backfill and fill materials shall consist of suitable soils for dam construction as determined by the City; free of rock or gravel larger than one inch in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Backfill and fill materials should be placed in layers not more than eight inches in loose depth for material compacted by heavy compaction equipment, and not more than four inches in loose depth for material compacted by hand-operated tampers. Each layer should be uniformly moistened or aerated before compaction to within 3% of optimum moisture content. Layers should not be placed on surfaces that are muddy, frozen, or contain frost or ice. All backfill and fill materials should be placed evenly to required elevations, and uniformly along the full length of the embankment. Additionally, soils should be compacted to at least 95% maximum dry unit weight according to ASTM D 698.

3.2.2. Dry Underground Detention Ponds

No underground detention pond shall be constructed on residential development projects. Underground detention ponds may be considered on non-residential development projects after the designer has shown that construction of an aboveground detention pond is infeasible to the satisfaction of the City. If allowed, all structures, which are designed to store water, shall be constructed of reinforced concrete or HDPE. Additionally, the structures should be designed such that vehicular traffic meeting an H-20 loading standard could traverse the area over the detention pond once backfilled or completed without resulting in structural failure of the pond. When designing the pond, the designer should design the structure such that routine maintenance can be accommodated without unreasonable demands being placed on future property owners.

3.2.3. Wet Detention Ponds

Wet detention ponds may be constructed if the facilities are designed to the criteria outlined in Section 3.2.1 of the GSMM (Volume 2). However, the designer will be required to submit a water balance simulation as part of the Hydrologic and Hydraulic Report submittal.

3.3. **Water Quality Best Management Practices**

Structural BMPs shall be designed so that 80% of the average annual post development TSS load is removed before entering the municipal separate stormwater system or channel. The following formula should be used to determine water quality volume (WQ_v):

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Where,

P = Rainfall depth in inches, using the Water Quality Storm Event (e.g., 1.2 inches).

A = Project area in acres.

R_v = Volumetric runoff coefficient $[0.05 + 0.009(I)]$, where I is the impervious surface percentage (impervious area \div total project area) \times 100.

3.3.1. General Application Structural Stormwater Controls

The following general application structural stormwater controls shall be acceptable to meet the water quality requirements for the contributing drainage areas. For design, construction and maintenance specifications for each control, the designer is directed to Section 3.2 of the GSMM (Volume 2).

- Stormwater Ponds
- Stormwater Wetlands
- Bioretention Areas
- Sand Filters (Hotspot/Commercial Developments Only)
- Infiltration Trenches (Hotspot/Commercial Developments Only)
- Enhanced Swales

3.3.2. Limited Application Structural Controls

The following limited application structural stormwater controls shall be acceptable to meet a portion of the water quality requirements for the contributing drainage areas. For design, construction and maintenance specifications for each control, the designer is directed to Section 3.3 of the GSMM (Volume 2).

- Filter Strip
- Grass Channel
- Organic Filter (Hotspot/Commercial Developments Only)
- Underground Sand Filter (Hotspot/Commercial Developments Only)
- Submerged Gravel Wetlands (Hotspot/Commercial Developments Only)
- Gravity Separators (Hotspot/Commercial Developments Only)
- Dry Detention Ponds

3.3.3. Proprietary Structural Controls

The City may at their discretion allow proprietary structural controls. Prior to specification of such a device, the designer shall consult with the City to determine if the control will be acceptable.

4. APPROVED HYDROLOGIC & HYDRAULIC METHODS

4.1. Hydrologic Methods

4.1.1. Rational Method

The rational method may be used to develop peak runoff flows for culverts with contributing drainage areas less than 25 acres in size and for detention ponds with contributing drainage areas less than one acre in size. All computations shall be in accordance with Section 2.1.4 of the GSMM (Volume 2). Rainfall intensities shall be derived from Table A-6 of Appendix A of the GSMM (Volume 2).

As specified above, the rational method may be used to size detention facilities. If the rational method is utilized, the DeKalb Method or the Baumgardner / Morris Method (Terramodel) must be utilized to develop runoff hydrographs. Triangular rational method runoff hydrographs may not be utilized in the design of detention facilities.

4.1.2. SCS Method

In most cases, the Soil Conservation Service (SCS) method must be utilized to size detention ponds with contributing drainage areas greater than one acre and culverts with contributing drainage areas greater than 25 acres. All computations shall be in accordance with Section 2.1.5 of the GSMM (Volume 2). Rainfall depths shall be derived from Table A-6 of Appendix A of the GSMM (Volume 2). The following table also provides the rainfall depths for use in the City:

Design Storm	Rainfall Depth
1-Year 24-Hour	4.32"
2-Year 24-Hour	5.04"
5-Year 24-Hour	6.24"
10-Year 24-Hour	7.20"
25-Year 24-Hour	8.16"
50-Year 24-Hour	9.60"
100-Year 24-Hour	10.80"

4.2. Hydraulic Methods

All hydraulic calculations shall be made in accordance with Chapter 4 of the GSMM (Volume 2).

5. SPECIAL DISTRICTS

The City may establish special design criteria for select areas based on the findings of watershed assessments, hydrologic and hydraulic reports, and known flooding issues. The designer is encouraged to consult with the City to determine if any special districts exist within the City.

6. STORMWATER CONCEPT PLAN REQUIREMENTS

The City recognizes that some sites will require a substantial investment in time and effort to develop a comprehensive stormwater management plan that will address the requirements contained within this manual. As such, some developments are required to develop a concept plan prior to submittal of the land disturbance application. This requirement is aimed at reducing the amount of effort required to develop the final plan and permit the project. Concept plans are required to be submitted for all developments that meet one or more of the following criteria:

- Any residential subdivision with greater than 50 lots, unless such development is comprised of lots which are all 2-acres or greater in area.
- Any non-residential development with a disturbed area of 10 acres or greater.
- Any non-residential development regardless of size which has an impervious surface coverage that covers 50% or more of the property excluding those lands contained within undisturbed buffers including but not limited to floodplains, stream buffers and undisturbed buffers between dissimilar zonings.
- Any non-residential development regardless of size, which is defined as a hotspot land use.

As stated earlier, all developments that meet one or more of the requirements listed above are required to submit a stormwater concept plan. However, all developments may submit a plan for preliminary evaluation. If a stormwater concept plan is submitted to the City, the plan should contain the following sections.

6.1. Project Narrative

A brief narrative should be provided with the report outlining the project goals, location and provide a location map such that the project location can be identified by City staff.

6.2. Existing Conditions Hydrologic Analysis

The existing conditions hydrologic analysis should provide the reader with a comprehensive evaluation of the site conditions prior to development of the project. The designer should provide the following information with this element of the report:

6.2.1. Existing Conditions Narrative

A written description of the existing conditions found at the site should be provided. Additionally, the narrative should describe the methodologies, assumptions and other pertinent discussions of how the existing conditions were analyzed by the designer.

6.2.2. Existing Conditions Map

An existing conditions map should be provided with the report including but not limited to following:

- Topography (2-foot or less contour interval) of existing site conditions.
- Perennial / intermittent streams, wetlands, lakes and other surface water features.
- Drainage basin delineations showing the location of each drainage sub-basin.
- Drainage basin delineations for each contributing drainage basin upstream of the project site on an appropriate map (USGS Quadrangle, etc.).
- Existing stormwater conveyances and structural control facilities.
- Direction of flow and discharge points from the site including sheet flow areas.
- Any area of significant depression storage.
- Federal, state and local buffers.

The map should provide a clear understanding of the various drainage patterns located throughout the site as well as drainage onto the site from upstream areas. Additionally, the map should provide a clear view of the natural features of the site that may impact development.

6.2.3. Existing Conditions Tables

A set of tables should be included in the report that will allow the reader to understand how various parameters utilized in modeling the existing conditions were developed. Additionally, tables should be included documenting the results of the modeling.

- A table listing the acreage, soil types and land cover characteristics for each sub-basin.
- A table listing the total acreage, composite curve number and time of concentration for each sub-basin.
- A table listing the peak runoff rates and total runoff volumes from each sub-basin.
- A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site.
- A table listing the peak runoff rates and maximum water surface elevations for all detention facilities studied as part of the existing conditions analysis.

6.2.4. Existing Conditions Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

6.3. Preliminary Downstream Analysis

The downstream analysis should provide the reader with a comprehensive picture of the downstream areas and their capacity to accommodate stormwater runoff from the proposed development.

6.3.1. Maps

- Drainage basin delineations showing the point at which the contributing area of the project represents 10% of the total drainage basin area as defined in Section 2.1.9.2 of the GSMM.
- Identify culverts, channels and other structural stormwater controls that the stormwater runoff must pass through prior to the 10% point identified previously.

6.3.2. Narratives

Provide a narrative with associated calculations demonstrating the downstream analysis at various points showing existing conditions and future conditions without detention or other on-site stormwater controls.

6.3.3. Downstream Analysis Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

6.4. Preliminary Stormwater Management Plan

A preliminary stormwater management plan should be included with the concept plan submittal. The purpose of a preliminary stormwater management plan will be to show that the proposed controls will be sufficient to meet the requirements outlined in this manual. As such the following should be provided with the concept plan.

6.4.1. Narratives

A written description of the proposed conditions at the site should be provided. Additionally, the narrative should describe the means by which stormwater runoff will be managed by the designer including proposed stormwater quality BMPs and detention facilities.

6.4.2. Proposed Conditions Maps

A proposed conditions map should be provided with the report including but not limited to following:

- A general proposed conditions drainage map. It is not necessary to produce a full grading plan as part of this submittal. The detail should be sufficient to show how the

designer proposes to grade the site and drainage will be managed on-site. This should be accomplished at a minimum with flow arrows and spot elevations to indicate a feasible grading concept.

- Drainage basin delineations for each discharge point from the site.
- Drainage basin delineations for each water quality BMP and detention facility indicating the approximate drainage area for each.
- Location and type of each water quality BMP.
- Location of each detention facility.

The map should provide a clear understanding of the various drainage patterns located throughout the site, as well as drainage onto the site from upstream areas. Additionally, the map should provide a clear view of the natural features of the site that will be impacted by development.

7. HYDROLOGIC & HYDRAULIC REPORT REQUIREMENTS

All development projects must submit a hydrologic and hydraulic report outlining the impacts of the site on the stormwater system. At a minimum, this report must include the following sections:

- Certification by Registered Professional
- Project Narrative
- Existing Conditions Hydrologic Analysis
- Post-Development Hydrologic Analysis
- Stormwater Management System Design
- Downstream Analysis
- Erosion & Sedimentation Control Plan
- Planting Plan (if applicable)
- Operations & Maintenance Plan

The following subsections outline the requirements for each of the elements outlined above.

7.1. Professional Certification

Each report should begin with the following statement and be signed and sealed by the professional who prepared the report and analysis:

“I, (Name of Professional), a Registered (Professional Engineer / Land Surveyor) in the State of Georgia, hereby certify that the grading and drainage plans for the project known as (Project Name), lying in Land Lot (XXX), of the (XX) District, McIntosh County, Georgia, have been prepared under my supervision, and, state that in my opinion, the construction of said project will not produce storm drainage conditions that will cause damage or adversely affect the surrounding

properties for the storm events specified in City of Grantville Land Development Regulations. This (day) day of (Month), (Year).”

7.2. Project Narrative

A brief narrative should be provided with the report outlining the project goals, location and provide a location map such that the project location can be identified by City staff.

7.3. Existing Conditions Hydrologic Analysis

The existing conditions hydrologic analysis should provide the reader with a comprehensive evaluation of the site conditions prior to development of the project. The designer should provide the following information with this element of the report:

7.3.1. Existing Conditions Narrative

A written description of the existing conditions found at the site should be provided. Additionally, the narrative should describe the methodologies, assumptions and other pertinent discussions of how the existing conditions were analyzed by the designer.

7.3.2. Existing Conditions Map

An existing conditions map should be provided with the report including, but not limited to, the following:

- Topography (2-foot or less contour interval) of existing site conditions.
- Perennial / intermittent streams, wetlands, lakes and other surface water features.
- Drainage basin delineations showing the location of each drainage sub-basin.
- Drainage basin delineations for each contributing drainage basin upstream of the project site on an appropriate map (USGS Quadrangle, etc.).
- Existing stormwater conveyances and structural control facilities.
- Direction of flow and discharge points from the site including sheet flow areas.
- Any area of significant depression storage.
- Federal, state and local buffers.

The map should provide a clear understanding of the various drainage patterns located throughout the site, as well as drainage onto the site from upstream areas. Additionally, the map should provide a clear view of the natural features of the site that may impact development.

7.3.3. Existing Conditions Tables

A set of tables should be included in the report that will allow the reader to understand how various parameters utilized in modeling the existing conditions were developed. Additionally, tables should be included documenting the results of the modeling.

- A table listing the acreage, soil types and land cover characteristics for each sub-basin.
- A table listing the total acreage, composite curve number and time of concentration for each sub-basin.
- A table listing the peak runoff rates and total runoff volumes from each sub-basin.
- A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site.
- A table listing the peak runoff rates and maximum water surface elevations for all detention facilities studied as part of the existing conditions analysis.

7.3.4. Existing Conditions Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

7.4. Post-Development Hydrologic Analysis

The proposed conditions hydrologic analysis should provide the reader with a comprehensive evaluation of the site conditions following development of the project. The designer should provide the following information with this element of the report:

7.4.1. Proposed Conditions Narrative

A written description of the proposed conditions to be found at the site after construction should be provided. Additionally, the narrative should describe the methodologies, assumptions and other pertinent discussions of how the proposed conditions were analyzed by the designer.

7.4.2. Proposed Conditions Map

A proposed conditions map should be provided with the report including, but not limited to, the following:

- Topography (2-foot or less contour interval) of proposed site conditions.
- Perennial/intermittent streams, wetlands, lakes and other surface water features.
- Drainage basin delineations showing the location of each drainage sub-basin.
- Proposed stormwater conveyances and structural control facilities.
- Direction of flow and discharge points from the site including sheet flow areas.
- Location and boundaries of proposed natural feature protection areas.

The map should provide a clear understanding of the various drainage patterns located throughout the site, as well as drainage onto the site from upstream areas. Additionally, the map should provide a clear view of the natural features of the site that will be impacted by development, as well as features that will not be impacted.

7.4.3. Proposed Conditions Tables

A set of tables should be included in the report that will allow the reader to understand how various parameters utilized in modeling the proposed conditions were developed. Additionally, tables should be included documenting the results of the modeling.

- A table listing the acreage, soil types and land cover characteristics for each sub-basin.
- A table listing the total acreage, composite curve number and time of concentration for each sub-basin.
- A table listing the peak runoff rates and total runoff volumes from each sub-basin.
- A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site.
- A table listing the peak runoff rates and maximum water surface elevations for all detention facilities studied as part of the proposed conditions analysis.

7.4.4. Proposed Conditions Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

7.5. **Stormwater Management System Design**

The stormwater management system design should provide the reader with a comprehensive description of the proposed stormwater management system components on-site. The designer should provide the following information with this element of the report:

7.5.1. Stormwater Management System Map

The stormwater management system map should document the various structural components of how stormwater runoff will be moved around the site.

- Location of all non-structural stormwater controls
- Location of all existing stormwater controls to remain after development
- Location of all proposed stormwater controls
- Location of all proposed impoundment type controls (i.e., detention ponds, stormwater ponds, stormwater wetlands, etc.)
- Location of all conveyance structures
- All impoundment type controls should be labeled with the following information:
 - Maximum water surface elevation

- Depth and storage volumes for the design storm
 - Depth and storage volumes maximum water surface if the design storm event is exceeded (i.e., top of dam)
- All inlets to conveyance structures should be labeled with the following information:
 - Maximum design water surface
 - Maximum potential water surface
- All pipes should be labeled with:
 - Length
 - Material
 - Slope
- All pipes should be profiled and labeled with:
 - Length
 - Material
 - Slope
 - Hydraulic grade line
- Map showing all contributing drainage areas/sub-basin delineations

7.5.2. Narratives

- Narrative describing that appropriate and effective structural stormwater controls have been selected.
- Design calculations and elevations for all existing and proposed stormwater conveyance elements including stormwater drains, pipes, culverts, catch basins, channels, swales and areas of overland flow.
- Design calculations and elevations for all structural water quality BMPs to be utilized for water quality improvement.
- Design calculations showing that the design meets the requirements of the water quality improvements as outlined in the ordinance and LDM. The City encourages the designer to utilize the site design tool provided by the Metropolitan North Georgia Water Planning District to meet this requirement. The tool can be acquired from the following website: <http://www.northgeorgiawater.com/>.

7.6. **Downstream Analysis**

The downstream analysis should provide the reader with a comprehensive picture of the downstream areas and their capacity to accommodate stormwater runoff from the proposed development.

7.6.1. Maps

- Drainage basin delineations showing the point at which the contributing area of the project represents 10% of the total drainage basin area as defined in Section 2.1.9.2 of the GSMM.

- Identify culverts, channels and other structural stormwater controls that the stormwater runoff must pass through prior to the 10% point identified previously.

7.6.2. Narratives

Provide a narrative with associated calculations demonstrating the downstream analysis at various points showing existing conditions, future conditions without detention or other on-site stormwater controls and future conditions with detention or other on-site stormwater controls.

7.7. **Erosion & Sedimentation Control Plan**

The erosion and sedimentation control plan should be included in the report demonstrating the plan to effectively mitigate stormwater impacts during construction. The following elements should be included in this section of the report.

- All elements specified in the Georgia Erosion and Sediment Control Act and local ordinances and regulations.
- Sequence/phasing of construction and temporary stabilization measures.
- Temporary structures that will be converted into permanent stormwater controls.

7.8. **Planting Plan**

A planting plan should be included in the report for all water quality BMPs that utilize vegetation as a pollutant removal method. Examples of these types of controls include but are not limited to stormwater wetlands, enhanced swales, etc.

7.9. **Operations & Maintenance Plan**

A narrative of what maintenance tasks will be required for the stormwater controls specified for the site as well as the responsible parties. Additionally, the report will need to identify access and safety issues for the site. Maintenance issues for various BMPs and other stormwater controls can be found in the GSMM.

8. **REQUIREMENTS FOR WAIVER REQUEST**

The City does not intend to waiver from the requirements outlined in this manual. However, the City recognizes that situations exist such that strict adherence to the requirements may result in degradation of upstream or downstream areas from a development project. As such, the City may from time to time allow a variance from the procedures and requirements outlined in this manual. The following documents the minimum criteria that will apply to all variance requests.

8.1. Waiver Narrative

A brief narrative should be provided with each waiver request describing the project, location, and provide a location map such that the project location can be identified by City staff. Additionally, a narrative should be provided outlining the standards for which the applicant is seeking a waiver, as well as a description of the impacts that will result from a granting of the waiver.

8.2. Existing Conditions Hydrologic Analysis

The existing conditions hydrologic analysis should provide the reader with a comprehensive evaluation of the site conditions prior to development of the project. The designer should provide the following information with this element of the waiver request:

8.2.1. Existing Conditions Narrative

A written description of the existing conditions found at the site should be provided. Additionally, the narrative should describe the methodologies, assumptions and other pertinent discussions of how the existing conditions were analyzed by the designer.

8.2.2. Existing Conditions Map

An existing conditions map should be provided with the report including, but not limited to, the following:

- Topography (2-foot or less contour interval) of existing site conditions.
- Perennial / intermittent streams, wetlands, lakes and other surface water features.
- Drainage basin delineations showing the location of each drainage sub-basin.
- Drainage basin delineations for each contributing drainage basin upstream of the project site on an appropriate map (USGS Quadrangle, etc.).
- Existing stormwater conveyances and structural control facilities.
- Direction of flow and discharge points from the site including sheet flow areas.
- Any area of significant depression storage.
- Federal, state and local buffers.

The map should provide a clear understanding of the various drainage patterns located throughout the site, as well as drainage onto the site from upstream areas. Additionally, the map should provide a clear view of the natural features of the site that may impact development.

8.2.3. Existing Conditions Tables

A set of tables should be included in the report that will allow the reader to understand how various parameters utilized in modeling the existing conditions were developed. Additionally, tables should be included documenting the results of the modeling.

- A table listing the acreage, soil types and land cover characteristics for each sub-basin.
- A table listing the total acreage, composite curve number and time of concentration for each sub-basin.
- A table listing the peak runoff rates and total runoff volumes from each sub-basin.
- A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site.
- A table listing the peak runoff rates and maximum water surface elevations for all detention facilities studied as part of the existing conditions analysis.

8.2.4. Existing Conditions Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

8.3. Downstream Analysis

The downstream analysis should provide the reader with a comprehensive picture of the downstream areas and their capacity to accommodate stormwater runoff from the proposed development.

8.3.1. Maps

- Drainage basin delineations showing the point at which the contributing area of the project represents 10% of the total drainage basin area as defined in Section 2.1.9.2 of the GSMM.
- Identify culverts, channels and other structural stormwater controls that the stormwater runoff must pass through prior to the 10% point identified previously.

8.3.2. Narratives

Provide a narrative with associated calculations demonstrating the downstream analysis at various points showing existing conditions, future conditions without detention or other on-site stormwater controls, future conditions with appropriate detention or other on-site stormwater controls, and future conditions with controls that would be put in place if the waiver were granted.

8.3.3. Downstream Analysis Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

8.4. Post-Development Hydrologic Analysis

The proposed conditions hydrologic analysis should provide the reader with a comprehensive evaluation of the site conditions following development of the project. The designer should provide the following information with this element of the report:

8.4.1. Proposed Conditions Narrative

A written description of the proposed conditions to be found at the site after construction assuming the waiver is granted should be provided. Additionally, the narrative should describe the methodologies, assumptions and other pertinent discussions of how the proposed conditions were analyzed by the designer.

8.4.2. Proposed Conditions Map

A proposed conditions map should be provided with the report including, but not limited to, the following:

- Topography (2-foot or less contour interval) of proposed site conditions.
- Perennial/intermittent streams, wetlands, lakes and other surface water features.
- Drainage basin delineations showing the location of each drainage sub-basin.
- Proposed stormwater conveyances and structural control facilities.
- Direction of flow and discharge points from the site including sheet flow areas.
- Location and boundaries of proposed natural feature protection areas.

The map should provide a clear understanding of the various drainage patterns located throughout the site, as well as drainage onto the site from upstream areas. Additionally, the map should provide a clear view of the natural features of the site that will be impacted by development, as well as features that will not be impacted.

8.4.3. Proposed Conditions Tables

A set of tables should be included in the report that will allow the reader to understand how various parameters utilized in modeling the proposed conditions were developed. Additionally, tables should be included documenting the results of the modeling.

- A table listing the acreage, soil types and land cover characteristics for each sub-basin.
- A table listing the total acreage, composite curve number and time of concentration for each sub-basin.
- A table listing the peak runoff rates and total runoff volumes from each sub-basin.
- A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site.
- A table listing the peak runoff rates and maximum water surface elevations for all detention facilities studied as part of the proposed conditions analysis.

8.4.4. Proposed Conditions Model Diagram

A diagram of the hydrologic model should be provided with the report showing how the model was developed and each node is connected.

CITY OF GRANTVILLE, GA

STORMWATER HYDROLOGY REPORT CHECKLIST

Section 1. Report Format

1.1 Does the Hydrologic & Hydraulic Report contain the following information:

<u>Provided</u>	<u>Missing</u>	
<input type="checkbox"/>	<input type="checkbox"/>	Name of the Development
<input type="checkbox"/>	<input type="checkbox"/>	Name of the Developer
<input type="checkbox"/>	<input type="checkbox"/>	Location Map of the Site referencing the nearest major road
<input type="checkbox"/>	<input type="checkbox"/>	Stormwater Impact Certification
<input type="checkbox"/>	<input type="checkbox"/>	Seal of the Professional having prepared the Report

1.2 Does the Hydrologic & Hydraulic Report contain the following sections:

<u>Provided</u>	<u>Missing</u>	<u>N/A</u>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing Conditions Hydrologic Analysis
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Post Development Hydrologic Analysis
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stormwater Management System Design
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Downstream Analysis
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erosion & Sedimentation Control Plan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Planting Plan (if applicable)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operations & Maintenance Plan

Section 2. Existing Conditions Hydrologic Analysis

2.1 This section should provide the reader with a comprehensive evaluation of the site conditions prior to development of the project.

2.2 Narratives – A narrative and supporting calculations of the pre-development conditions of the site as related to stormwater management should be provided to determine the current characteristics of the site.

- Written description of the existing conditions found on the site
- Name of the receiving waters from which runoff drains to after leaving the site

- Analysis of runoff provided by off-site areas upstream of the project site
- Methodologies, assumptions, site parameters and supporting design calculations used in the analyzing the existing conditions site hydrology

2.3 Existing Conditions Map – A map documenting the following elements should be provided with the following information if applicable.

- Topography (2-foot or less contour interval) of existing site conditions
- Perennial / intermittent streams, wetlands, lakes and other surface water features
- Drainage basin delineations showing the location of each drainage sub-basin
- Drainage basin delineations for each contributing drainage basin upstream of the project site on an appropriate map (USGS Quadrangle, etc.)
- Existing stormwater conveyances and structural control facilities
- Soil types including hydrologic soil groups
- Direction of flow and discharge points from the site including sheet flow areas

2.4 Existing Conditions Tables – Tables documenting the following information should be provided if applicable.

- A table listing the acreage, soil types and land cover characteristics for each sub-basin
- A table listing the peak runoff rates and total runoff volumes from each sub-basin
- A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site

Section 3. Post-Development Hydrologic Analysis

3.1 The post-development hydrologic analysis should provide the reader with a comprehensive evaluation of the anticipated site conditions following development of the project. The designer should provide the following information with this element of the report.

3.2 Narratives – A narrative and supporting calculations of the post-development conditions of the site as related to stormwater management should be provided to determine the future stormwater characteristics of the site.

- Written description of the existing conditions found on the site

- Stormwater calculations for water quality, channel protection and post construction detention for each sub-basin affected by the project
 - Documentation and calculations for any applicable site design credits that are being utilized
 - Methodologies, assumptions, site parameters and supporting design calculations used in the analyzing the post development conditions site hydrology
- 3.3 Post Development Conditions Map – A map documenting the following elements should be provided with the following information if applicable.
- Topography (2-foot or less contour interval) of proposed site conditions
 - Perennial / intermittent streams, wetlands, lakes and other surface water features
 - Drainage basin delineations showing the location of each drainage sub-basin
 - Proposed stormwater conveyances and structural control facilities
 - Direction of flow and discharge points from the site including sheet flow areas
 - Location and boundaries of proposed natural feature protection areas
- 3.4 Post Development Conditions Tables – Tables documenting the following information should be provided if applicable.
- A table listing the acreage, soil types, impervious surface area and land cover characteristics for each sub-basin
 - A table listing the peak runoff rates and total runoff volumes from each sub-basin
 - A table listing the peak runoff rates and total runoff volumes for each drainage area upstream of the project site
 - A table listing the peak discharge rates, total runoff volumes and peak elevations for all detention ponds studied.

Section 4. Stormwater Management System

- 4.1 The stormwater management system section should provide the reader with a comprehensive description of the proposed stormwater management system components on-site. The designer should provide the following information with this element of the report.
- 4.2 Narratives – A narrative and supporting calculations describing the on-site stormwater management controls to be utilized. This narrative should include appropriate

narratives / tables demonstrating compliance with the various stormwater management requirements outlined in the post-development article of the stormwater ordinance and local design manual.

- Narrative describing that appropriate and effective structural stormwater controls have been selected
- Design calculations and elevations for all existing and proposed stormwater conveyance elements including stormwater drains, pipes culverts catch basins, channels, swales and areas of overland flow

4.3 Stormwater Management System Map(s) – A map(s) illustrating the location, type and specifications of all stormwater management components to provide stormwater management for the proposed site.

- Location of all non-structural stormwater controls
- Location of all existing stormwater controls to remain after development
- Location of all proposed stormwater controls
- Location of all proposed impoundment type controls (i.e. detention ponds, stormwater ponds, stormwater wetlands, etc.)
- Location of all conveyance structures
- All impoundment type controls should be labeled with the following information: maximum water surface elevation, depth and storage volumes for both the design storm and maximum water surface if the design storm event is exceeded (i.e. top of dam)
- All inlets to conveyance structures should be labeled with the following information: maximum design water surface and maximum potential water surface
- All pipes should be labeled with length, material and slope
- All pipes should be profiled and labeled with length, material, slope and hydraulic grade line

Section 5. Downstream Analysis

- 5.1 The downstream analysis should provide the reader with a comprehensive picture of the downstream areas and their capacity to accommodate stormwater runoff from the proposed development.
- 5.2 Narratives – A narrative and supporting calculations for a downstream peak flow analysis using the ten-percent rule necessary to show safe passage of the post-development design flows downstream. This narrative should include appropriate

descriptions / tables for points of interest such as culverts and channel constrictions downstream of the project where increases in stormwater runoff rates could be of concern.

- 5.3 A map(s) illustrating the location, type and specifications of all stormwater management components to provide stormwater management for the proposed site.
- Drainage basin delineations showing the point at which the contributing area of the project represents 10% of the total drainage basin area
 - Identify culverts, channels and other structural stormwater controls that the stormwater runoff must pass through prior to the 10% point identified previously

Section 6. Erosion & Sedimentation Control Plan

- 6.1 The erosion and sedimentation control plan should be included in the report demonstrating the plan to effectively mitigate stormwater impacts during construction. The following elements should be included in the section of the report.
- All elements specified in the Georgia Erosion and Sediment Control Act and local ordinances and regulations
 - Sequence / phasing of construction and temporary stabilization measures
 - Temporary structures that will be converted into permanent stormwater controls

Section 7. Planting Plan

- 7.1 If necessary, a planting plan should be included for all stormwater controls that utilize vegetation as part of the functional design.

Section 8. Operations & Maintenance Plan

- 8.1 A narrative of what maintenance tasks will be required for the stormwater controls specified for the site as well as the responsible parties. Additionally, the report will need to identify access and safety issues for the site.



City of Grantville
123 Lagrange Street
Grantville, Georgia 30220

PRELIMINARY PLAT APPLICATION

File Number: _____ (to be filled in by City Staff)
Project Name: _____
Project Address: _____
Description of project: _____

Applicant Name: _____
Applicant Address: _____
Applicant Phone Number: _____ **Fax Number:** _____
E-Mail Address: _____

_____ affirms that he is/ she is/ they are the owners/specifically authorized agent of the property located at: _____

_____ petitions the City of Grantville Planning and Zoning Board to consider the proposed site preliminary plat located in a _____ Zoning district.

The applicant tenders herewith the sum of \$ _____ to cover the expenses of staff administrative review.

- Date Paid:** _____
- Signature of the Applicant:** _____
- Notary Public:** _____

Staff Signature: _____ **Date:** _____

P&Z Work Session: _____ **P&Z Voting Meeting:** _____

- *Applications will not be considered complete until all items have been supplied. Incomplete applications will NOT be placed on the Planning & Zoning Board agenda and will be returned to the applicant.*
- *All items must be reviewed and approved by Staff & must be in compliance with current City Ordinances.*
- *The City shall have five business days in order check applications for completeness.*

APPLICATION/CHECKLIST

All items must be submitted by 12:00 noon on the day of the deadline. Return this APPLICATION/CHECKLIST with submittal. Incomplete submittals will not be reviewed.

- Six (6) black line copies of the development site plan and elevations for departmental review.** To include:
 - Vicinity map showing project location, north arrow, graphic scale & date
 - Property boundary lines, with bearings & distances
 - Existing roads, streets, highways, & respective r-o-w widths on or adjacent to property
 - Existing drainage ditches, canals, water courses, and drainage easements on or adjacent to the property
 - Existing buildings, structures, and facilities on development property and adjacent property
 - All existing utility lines on or adjacent to the property
 - Adjacent property land uses, zoning and property owner names
- Six (6) 11"x17" copies of the site plan & elevations for Commission review.**
- TIFF of JPEG file of site plan & elevations
- Narrative describing nature & scope of project
- Compliance with Tree Protection Ordinance
- Wetlands boundary determination & certification (USACOE)
- Topographic Survey, drainage plan and stormwater runoff calculations
- Preliminary & utility plan, including:
 - Preliminary design & layout of underground electric, telephone, gas & cable TV utility lines
- Preliminary Stormwater Management Plan, showing downstream impact & final disposition of water
- Existing & proposed fire hydrant locations
- Proposed access to existing roads, circulation routes, parking space layout & dimensions
- Proposed setbacks, buffers, open space areas & landscaped areas
- Final water supply & sewage disposal plans
- Letters of capability & commitment to serve water, sewer, electric, telephone & cable TV from the affected agencies
- DNR permits & approvals
- DOT encroachment permit
- Fire safety standards approval by Fire Official
- Other applicable agency permits or approvals listed below:

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- All items must be reviewed and approved by Staff & must be in compliance with current City Ordinances.
- The City shall have five business days in order check applications for completeness.



CONCEPT PLAT DATA SHEET

File Number: _____ (to be filled in by City Staff)
Project Name: _____
Project Address: _____
Description of project: _____

Applicant Name: _____
Applicant Address: _____
Applicant Phone Number: _____ **Fax Number:** _____
E-Mail Address: _____

_____ affirms that he is/ she is/ they are the owners/specifically authorized agent of the property located at: _____

_____ petitions the City of Grantville Planning and Zoning Board to consider the proposed site concept plat located in a _____ Zoning district.

The applicant tenders herewith the sum of \$ _____ to cover the expenses of staff administrative review.

- Date Paid:** _____
- Signature of the Applicant:** _____
- Notary Public:** _____

Staff Signature: _____ **Date:** _____

- *Applications will not be considered complete until all items have been supplied. Incomplete applications will NOT be reviewed by the City Manager or designee.*
- *All items must be reviewed and approved by Staff & must be in compliance with current City Ordinances.*
- *The City shall have five business days in order check applications for completeness.*

APPLICATION/CHECKLIST

Return this APPLICATION/CHECKLIST with submittal. Incomplete submittals will not be reviewed.

- Six (6) black line copies of the conceptual site plan and elevations for departmental review.** To include:
 - Vicinity map showing project location, north arrow, graphic scale & date
 - Property boundary lines, with bearings & distances
 - Existing roads, streets, highways, & respective r-o-w widths on or adjacent to property
 - Existing drainage ditches, canals, water courses, and drainage easements on or adjacent to the property
 - Existing buildings, structures, and facilities on development property and adjacent property
 - All existing utility lines on or adjacent to the property
 - Adjacent property land uses, zoning and property owner names
- One (1) 11"x17" copies of the conceptual site plan & elevations for Staff review.**
- Typical floor plans and elevations for houses or other buildings proposed for the development.
- Narrative describing nature & scope of project
- Compliance with Tree Protection Ordinance
- Preliminary Wetlands boundary and 100-year flood plain determination
- Approximate topographic contours
- Zoning Setbacks and approximate lot dimensions
- Required off-site improvements for the development (e.g., water system, wastewater collection, etc.)
- Proposed access to existing roads
- Proposed setbacks, buffers, open space areas & landscaped areas
- Concept Plat Certification Statements.
- Concept Plat Review Fee.



FINAL PLAT CHECKLIST

Date: _____

Project: _____

- ____ 1. Signature and Seal of Registered Land Surveyor
- ____ 2. Owners Acknowledgement with signature
- ____ 3. Right-of-way width, lot numbers, and house numbers.
- ____ 4. Project name/Title, street names, date, scale north arrow, landlot/district and vicinity map.
- ____ 5. Bearings, distances, dimensions and acreage on each lot measured to nearest 100th of a foot and 100th of an acre.
- ____ 6. Show total acreage of each lot, if any that lie within and outside of the 100-year floodplain.
- ____ 7. Compliance with Tree Protection Ordinance
- ____ 8. Show approved usage delineated wetland boundaries including correspondence from the U.S. Army Corps of Engineers.
- ____ 9. Indicate and label existing structures to remain or be removed, if applicable.
- ____ 10. Street centerlines showing horizontal curve data: angles of deflection, tangent lengths, radii, arc lengths, and point of curves and tangents.
- ____ 11. Locations, dimensions, invert elevations of piped segments and control weirs, maximum water surface elevations of retention ponds.
- ____ 12. Location of any easements, public service utility right-of-way lines, and any areas to be reserved, donated, or dedicated to public use; location of sites to be used for purposes other than residential with notes stating their purpose and limitations, and any areas to be reserved by deed covenant for the common use of all property owners shall be shown. More specifically but not limited to:
 - (a) FEMA map panel and number with note stating site is in or out of floodplain. Also natural and artificial floodplain must be shown with elevations and minimum finished floor elevations (MFFE).
 - (1) MFFEs must be based off as-built elevations for ponds and low areas.
 - (2) MFFEs must be 3 ft above the 100-year elevation or 1 ft above top of dam elevations, whichever is greater
 - (b) Protected buffer areas and wetland areas delineated with notes.
 - (c) Greenbelt areas delineated.

(d) Drainage, access, and maintenance easements delineated. To a pond for example.

- _____ 13. Delineate water, sewer, and stormwater pipes with inverts, lengths, and diameters.
- _____ 14. Accurate location, material and description of monuments and markers shall be shown. Monuments to be placed after final street improvements shall be designated as "future."
- _____ 15. Final Plat Certificates (Article VIII of the Subdivision Regulations Ordinance): *Surveyors certificate, Final plat approval, Maintenance guarantee, and Certificate of dedication.*
- _____ 16. All information required for the recording of maps, plats, etc., by the Clerk of Superior Court Act (Ga. Laws, 1978 Session) [O.C.G.A. § 15-6-67 et seq.] must be shown. All requirements specified by Georgia Plat Act (No. 1291) shall apply. (Accuracy statement and equipment used.)
- _____ 17. If a subdivision includes an approved private street, the plat of that subdivision must the contain a certification that the owner or owners of property within that subdivision will be responsible for the maintenance of all private streets in that subdivision; and furthermore, subdivider must demonstrate to the City that all deeds and deed covenants for property within that subdivision shall contain full and complete notice to all future property owners that they will be responsible for the maintenance of the private streets.
- _____ 18. DOT approval of entrance if on State route.
- _____ 19. As-built data submitted?
 - (a) As-built road profile, horizontal and vertical.
 - (b) Core-samples and laboratory test results for roadways.
 - (c) Compaction tests if applicable.
 - (d) Digital version of the Final Plat in a format acceptable to the City of Grantville delineating all improvements to the site including water, sewer and stormwater lines. As-built topography of the entire site is not required.
- _____ 20. Final Inspection by City staff or designee.
- _____ 21. Site built in conformance with Preliminary Plat and approved construction drawings?
 - (a) Tree preservation/buffer areas in tact?
- _____ 22. Maintenance bonds received?

Review Comments:

Approved: _____ Denied _____

Approved: _____ Denied _____



City of Grantville
123 Lagrange Street
Grantville, Georgia 30220

DEVELOPMENT PLANS APPLICATION

File Number: _____ (to be filled in by City Staff) Parcel #: _____

Project Name: _____

Project Address: _____

Description of project: _____

Applicant Name: _____

Applicant Address: _____

Applicant Phone Number: _____ Fax Number: _____

E-Mail Address: _____

_____ affirms that he is/ she is/ they are the owners/specifically authorized agent of the property located at: _____

_____ petitions the City of Grantville Planning and Zoning Commission to consider the proposed site preliminary plat located in a _____ Zoning district.

The applicant tenders herewith the sum of \$_____ to cover the expenses of staff administrative review, advertising, and public hearings.

Date Paid: _____

Signature of the Applicant: _____

Notary Public: _____

Does the proposed use consist of a restaurant facility (Yes / No)

If so, do you plan to serve alcohol? (Yes / No) If you plan to serve alcohol, what is the distance from the nearest church _____ school _____ residence _____ as measured following the guidelines set forth in the Grantville code of ordinances.

Public hearing is to be held on _____ at _____ p.m. at City Hall located at _____

Staff Signature: _____ Date: _____

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 - Existing drainage ditches, canals, water courses, and drainage easements on or adjacent to the property
 - Existing buildings, structures, and facilities on development property and adjacent property
 - All existing utility lines on or adjacent to the property
 - Adjacent property land uses, zoning and property owner names
- Six (6) 11"x17" copies of the site plan & elevations for Commission review.**
- TIFF of JPEG file of site plan & elevations
- Narrative describing nature & scope of project
- Compliance with Tree Protection Ordinance
- Wetlands boundary determination & certification (USACofE)
- Topographic Survey, drainage plan and stormwater runoff calculations
- Grading & utility plan, including:
- Final design & layout of underground electric, telephone, gas & cable TV utility lines
- Soil erosion & sediment control plan, including:
 - Detail sheets for soil erosion & sediment control facilities, stormwater management facilities and utility profiles
 - Stormwater Management Plan, showing downstream impact & final disposition of water
 - Existing & proposed fire hydrant locations
 - Proposed access to existing roads, circulation routes, parking space layout & dimensions
 - Proposed setbacks, buffers, open space areas & landscaped areas
 - Final water supply & sewage disposal plans
 - Letters of capability & commitment to serve water, sewer, electric, telephone & cable TV from the affected agencies
 - DNR permits & approvals
 - DOT encroachment permit
 - Fire safety standards approval by Fire Official
 - Other applicable agency permits or approvals listed below:

- *Applications will not be considered complete until all items have been supplied. Incomplete applications will NOT be placed on the Planning & Zoning Board agenda and will be returned to the applicant.*
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- *The City shall have five business days in order check applications for completeness.*



DEVELOPMENT PLANS CHECKLIST

Project Name: _____, Plan Revision Date _____

Designer: _____

Checked By: _____ Date: _____

Check list marks to be interpreted as follows:

√	O.K.	X	Revision Required	N/A	Not Applicable
		?	Additional Information Required		

General Comments

- 1. Connection to City of Grantville utilities (water, sewer, gas and electric), is required per Code of Ordinances, Section 38-6.
- 2. Site development plans will not be approved until all other governmental plan approvals are provided by the applicant. Provide approvals from other governmental jurisdictions for:
 - ES&PC Plans – by GA EPD / NRCS
 - Driveway Entrance Plan – by GA DOT
 - Coweta County Fire Marshall Review
 - Irrigation Well permit issued by GA EPD or GA Department of Public Health
- 3. Provide Fire Flow Test Report. Minimum fire flow required at this site is 1,250 GPOM at 20 psi residual pressure.
- 4. Water system extension is required to provide fire protection and domestic water supply. The minimum water main size is required to conform to Grantville Water System CIP requirements. Provide plans for the water system extension.
- 5. Sanitary sewer extension is required to connect the site to the public sewer system. Provide plans for the sanitary sewer extension.
- 6. The electric distribution system is required to extend to the site. Coordination with Grantville utilities is required for development of electric system extension

plans.

- 7. The natural gas system is required to extend to the site. Coordination with Grantville utilities is required for development of natural gas system extension plans.
- 8. Conformance to the requirements of the Hwy 29 Overlay Zoning district is required.

All Plans must include:

I. Cover Sheet

- 1. Provide initial and/or revision date.
- 2. Provide name & location of the subdivision (including land lot, district and parcel ID).
- 3. Show present and proposed zoning. ***(Revise to include the Hwy 29 Overlay Zoning District). Conformance to the requirements of the Hwy 29 Overlay Zoning district is required.***
- 4. Provide vicinity map.
- 5. Provide name, address and phone number of developer/owner and applicant.
- 6. Provide name, address, and phone number for 24-hour emergency contact.
- 7. Provide name, address, telephone number, GASWCC number, seal and certification of design professional preparing plan.
- 8. Note total and disturbed acreage of project or phase under construction.
- 9. Note total proposed wetland disturbance acreage of project or phase under construction, including lot construction. Provide statement if none.
- 10. Note state waters located on or within 200 feet of the project site. Provide statement if none.
- 11. Provide table of contents.
- 12. Reference FIRM panel.
- 13. Other jurisdictional approvals (wetlands, buffer variance, GDOT, GAEPD, etc.)
- 14. Plans sealed by Georgia registered engineer, landscape architect, or registered land surveyor.
- 15. Engineers cost estimate.
- 16. Include all zoning conditions that have been approved for the project.
- 17. Provide potable water use calculations. The applicant is responsible for all cost to

extend the water system to the site.

- 18. Provide sanitary sewer use calculations. The applicant is responsible for all cost to extend the sanitary sewer to the site.
- 19. Provide electric service requirements for the site. The applicant is responsible for all cost to extend electrical service to the site.
- 20. Provide natural gas service requirements for the site. The applicant is responsible for all cost to extend natural gas lines to the site.
- 21.

II. Existing Conditions

- 1. Boundary and topographic survey sealed by a registered land surveyor including:
 - 2. Exact boundary lines of the entire tract with bearings and distances.
 - 3. Ground elevations of the tract based on field surveys or photogrammetric methods from aerial photos.
 - 4. Natural features including drainage channels, bodies of water, etc.
 - 5. Land lot lines, or bearing and distance "tie" to land lot line.
 - 6. Location of MSL benchmark.
 - 7. Location of 100-yr floodplain or statement that no part of property lies within the 100-yr floodplain.
 - 8. Note that any structure that lies within the 100-yr floodplain will be elevated such that lowest finished floor shall be no less than 4-feet above the 100-yr water surface elevation.
 - 9. If any grading is proposed inside the 100-yr floodplain, provide calculations showing a "no-rise" certification.
 - 10. Identify state waters and all waters of the US.
 - 11. Show all of Grantville stream buffers: 25-foot state, 25-foot Grantville stream buffer, 25-foot impervious buffer.
 - 12. Show abutting City or County roads with existing R/W and pavement widths.
 - 13. Show existing easements, jurisdictional lines, utilities, etc.
 - 14. Include soil series and their delineation.
 - 15. Show all the existing structures on the tract.

- 16. Show all wetlands or provide note of none.
 - 17. Provide outline of proposed limits of disturbance.
- III. Erosion, Sedimentation, and Pollution Control (All items below are to be placed on these sheets regardless of being found on other plan sheets) ***Prior to plan approval, provide approved ES&PC Plans from GA EPD.***
- 1. Phase E&SC plans into an initial perimeter control plan, intermediate plan for mass grading, and a final phase plan showing all permanent measures and final stabilization.
 - 2. Provide name and number of 24-hour local erosion and sediment control contact.
 - 3. Provide description of existing land use at project site and description of proposed project. Describe critical areas and what extra measures will be utilized for these areas.
 - 4. Provide existing (Dashed line) and proposed (bold, solid line) contours at 2-foot intervals.
 - 5. Provide detailed construction activity schedule – show anticipated starting and completion dates for project events, **include temporary vegetation and mulching timeline.**
 - 6. Delineate all state waters located on or within 200 feet of the project site. Provide statement if none.
 - 7. Delineate all buffers and setbacks outlined in the Development Regulations, Watershed Protection Ordinance. This includes all State buffers.
 - 8. Delineate all wetlands. Provide statement on plans if none are present.
 - 9. Show double row type “C” silt fence between land disturbing activities and state waters, watershed buffers, wetlands, and the 100-yr floodplain.
 - 10. Note total and disturbed acreage of the project or phase under construction. Delineate the limits of disturbance.
 - 11. Show location of erosion and sediment control practices using uniform coding symbols from the Manual for Erosion and Sediment Control in Georgia, latest edition.
 - 12. Identify the project receiving waters and describe adjacent areas – neighboring areas such as streams, lakes, residential areas, etc. which might be affected.
 - 13. Show storm - drain pipe and weir velocities and provide appropriate outlet protection to accommodate discharges without erosion. Provide table showing the flow characteristics of the pipe at full flow including pipe diameter, flow rate (cfs), velocity (fps), and tailwater condition.

- 14. Provide 67 cubic yards per acre sediment storage. Include specific design information and calculations for all structural measures on site, such as temporary sediment basins, retrofitted detention ponds, and channels. **Silt fence is not to be included in sediment storage calculations.**
- 15. Delineate stockpile/borrow, storage, fueling, and concrete washout areas. Add all notes/or construction details necessary to convey proper use and protection of these areas. **Do not locate the areas in known future septic tank or conservation areas.**
- 16. Provide vegetative plan, noting all temporary and permanent vegetative practices. Include species, planting dates, and fertilizer, lime and mulching rates. Vegetative plans shall be site specific for the appropriate time of year that seeding will take place and for the geographic region of Grantville.
- 17. Provide detailed drawings for all structural practices. Specifications must, at a minimum, meet guidelines set forth in the Manual for Erosion and Sediment Control in Georgia, latest edition.

IV. The following notes shall be placed on the plans in **bold** font:

- 18. **“THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES AND PRACTICES PRIOR TO, OR CONCURRENT WITH, LAND DISTURBING ACTIVITIES.”**
- 19. **“EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.”**
- 20. **“ALL EROSION CONTROL MEASURES ARE TO CONFORM TO THE STANDARDS SET FORTH IN THE MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA, MOST RECENT EDITION.”**
- 21. **“ANY DISTURBED AREA LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS SHALL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING.”**
- 22. **“SILT FENCE IS TO BE PLACED ALONG BACK OF ALL CURB WITHIN 72 HOURS OF CURB INSTALLATION.”**
- 23. **“I CERTIFY THAT THE PERMITTEE’S EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN PROVIDES FOR AN APPROPRIATE AND COMPREHENSIVE SYSTEM OF BEST MANAGEMENT PRACTICES REQUIRED BY THE GEORGIA WATER QUALITY CONTROL ACT AND THE DOCUMENT “MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA”, PUBLISHED BY THE STATE SOIL AND WATER CONSERVATION COMMISSION AS OF JANUARY OF THE YEAR IN WHICH LAND DISTURBING ACTIVITY WAS PERMITTED, PROVIDES FOR THE SAMPLING OF THE RECEIVING WATER(S) OR THE SAMPLING OF THE STORM WATER OUTFALLS AND THE DESIGNED SYSTEM OF BEST MANAGEMENT PRACTICES AND SAMPLING METHODS IS EXPECTED TO MEET THE REQUIREMENTS CONTAINED IN THE GENERAL NPDES PERMIT NO. GAR 10000 (1,2,OR 3).”**

SIGNED: _____ DATE: _____
(DESIGN PROFESSIONAL

- 24. "INSPECTIONS BY QUALIFIED PERSONNEL PROVIDED BY PRIMARY PERMITTEE AND THE ASSOCIATED RECORDS SHALL BE KEPT ON SITE IN COMPLIANCE WITH GAR 10000_ (1,2, OR 3)
- 25. "I CERTIFY THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN WAS DESIGNED AFTER A SITE VISIT BY MYSELF OR ONE OF MY DESIGNEE'S UNDER MY DIRECT SUPERVISION.

SIGNED: _____ DATE: _____
DESIGN PROFESSIONAL

V. Grading and Drainage

- 1. Total site area.
- 2. Limits of Disturbance
- 3. Disturbed area.
- 4. Impervious area.
- 5. Existing and proposed topographic contours, clearly distinguishable.
- 6. Drainage areas contributing to studied area shall be shown.
- 7. Location and size of all existing and proposed drainage structures.
- 8. Show centerline profile of all storm sewers with structure number, % grade, size and material.
- 9. Water travel distance in street and/or gutter capacity/spread requirements satisfied.
- 10. Drainage at intersections indicated by flow arrows.
- 11. Check roadway overtopping due to backwater from culverts(100-yr design storm, no overtopping roadway).
- 12. Check for adequate inlet capacity (85% of 25-yr storm must be intercepted without exceeding ½ of travel lane).
- 13. Show distance between catch basins (250' on grades up to 7%, 400' on grades from 7% to 10%,500' on grades over 10%).
- 14. Pipe outfalls to extend at least 30' behind front building line or to 100-yr floodplain-whichever is less, unless approved by City Engineer.
- 15. Open ditches are to be designed to 100-yr storm capacity & 25-yr velocity protection. Outlet velocity should be less than or equal to 4.0 ft/sec or provide

energy dissipater. Provide table showing, or note, of the flow rate (cfs) and velocity (fps).

- 16. Show catch basin and pipe invert and top elevations.
- 17. Show existing and proposed ground surface over centerline of pipes.
- 18. Graphically show 25-yr Hydraulic Grade Line (HGL) on profiles.
- 19. Show impoundment detail.
- 20. Provide control structure details (weirs, retrofits, etc.)
- 21. Show drainage structure details (headwalls, yard drains, lateral sub-drains, etc.)
- 22. Provide construction details (bedding class, pipe gage, backfill methods, etc.).
- 23. Show centerline profile of all stream re-locations.
- 24. Pipe chart listing hydrologic, material, dimensions, and hydraulic parameters, including HGL.
- 25. Hydrology study sealed by Professional Engineer registered in Georgia.
- 26. North Arrow.
- 27. Graphic Scale.
- 28. Show roadway stationing at even 100-ft. intervals on Grading and Drainage sheet.

VI. Hydrology Study

- 1. Hydrology study should bear a stamp of a registered engineer or landscape architect registered in the State of Georgia.
- 2. Name of the project and its location.
- 3. Description of current and proposed uses and conditions.
- 4. Description of downstream (upstream as well if necessary) conditions and assessment of downstream capacities. Discuss how method of runoff control will not adversely affect downstream property.
- 5. Method used in analysis.
- 6. An existing condition map of the project with proposed topography shown, drainage basins delineated, acreages shown, Curve Numbers and Times of Concentration included. Offsite drainage information should be shown.
- 7. A proposed condition map of the project with proposed topography shown, drainage

basins delineated, acreages shown, Curve Numbers and Times of Concentration included. The detention pond should be shown along with pond by-pass shown and quantified. Offsite drainage information should also be included.

- 8. Time of concentration for each basin shown.
- 9. Curve Numbers for existing and proposed conditions. Include calculations.
- 10. Peak flows for all storm return events for existing and proposed conditions, pond by-pass, and allowable detention pond release rates.
- 11. Detention pond volume calculations (the conical method should be used).
- 12. Detention pond Stage-Storage-Discharge table.
- 13. Detention pond outlet control structure detail with all appropriate elevations and dimensions. Include invert elevation (s) of weirs and orifices, weir width, orifice diameter, outlet pipe diameter, 100-year pool overflow elevation, etc. The detail in the hydrology study should match that shown in the construction plans.
- 14. An emergency overflow device (which does not include the throttling device) for the detention pond shall be designed to pass the 100-year peak developed inflow without overtopping the dam. This can either be a pond spillway around the pond dam or an overflow on the outlet structure in which case the outlet pipe must be sized appropriately. Show all calculations.
- 15. Pond routing print-outs for each storm event.
- 16. Summary table comparing routed flows with allowable release rate flows for each storm event.

VII. Detention Pond Requirements

- 1. The detention pond should be clearly illustrated on the plans with topographic information, 100-year pool limits shown and elevation called out. The outlet structure location and any associated piping should be clearly illustrated. No utilities should run through the detention pond area.
- 2. It should be clear from the overall grading/drainage plan from contours and piping what areas flow to the pond and what by-passes the pond.
- 3. The detention pond shall be encompassed within a drainage easement.
- 4. If there are any walls associated with the pond, the engineering design should be included in the plans and certified by an engineer registered in the State of Georgia. All information required to build the wall should be included in the plans with the reinforcing bar schedules, illustrated cross-sections and profile of the wall and footing with all necessary dimensions and elevations, etc. Include calculations for factor of safety against overturning and sliding.
- 5. A fully illustrated outlet structure detail should be included in the plans which should match that included in the hydrology study.

- 6. If the pond is four feet or deeper, a chain link or privacy fence is required to a height of six feet.
- 7. Documentation and supporting calculations to show that the stormwater management system adequately meets the post-development stormwater management performance criteria per Grantville Code of Ordinances Sections 17-133 – 17-180.
- 8. A downstream peak flow analysis which includes the assumptions, results and supporting calculations to show safe passage of post-development design flows downstream.
- 9. The analysis of downstream conditions in the report shall address each and every point or area along the project site's boundaries at which runoff will exit the property.
- 10. The analysis shall focus on the portion of the drainage channel or watercourse immediately downstream from the project.
- 11. This area shall extend downstream from the project to a point in the drainage basin where the project area is 10 percent of the total basin area.
- 12. Identify the parts or components of a stormwater management facility or practice that need to be regularly or periodically inspected and maintained, and the equipment and skills or training necessary.
- 13. Include an inspection and maintenance schedule, maintenance tasks, responsible parties for maintenance, funding, access and safety issues.
- 14. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures shall be included in the plan.
- 15. Unless an on-site stormwater management facility or practice is dedicated to and accepted by the City of Grantville, the applicant must execute an easement and an inspection and maintenance agreement binding on all subsequent owners of land served by an on-site stormwater management facility or practice.

VIII. Street Design N/A

- 1. North Arrow
- 2. Show location and type of traffic signage with note: **All signage to conform to standards given in the Manual of Uniform Traffic Control Devices.**
- 3. Plan and profile of existing City or County roads at proposed entrance with City of Grantville minimum horizontal and vertical stopping sight distance requirements satisfied. The speed limit of the existing road shall be shown.
- 4. Show that sight distances for all internal streets are satisfied.

- 5. Show plan view above street profile. Include proposed grading.
- 6. Show centerline stationing at even 100-ft. intervals and stationing at PC, PT and the centerline of intersection of streets.
- 7. Give centerline curve data for proposed streets (to include delta, radius, arc, chord and tangent.)
- 8. Cul-de-sacs to conform to Grantville standard details.
- 9. Typical street cross sections to conform to Grantville standard details.
- 10. Decel lanes to conform Grantville standard details.
- 11. Show centerline profile of all streets with % grade, PVC, PVT, PVI and low point elevations.
- 12. Provide typical section of R/W with pavement design (shoulder widths, slopes, utility locations, etc.)
- 13. Provide typical section of curb and gutter (no roll-back curb is allowed)
- 14. Show all pipe crossings under streets. All pipes to be RCP under streets and in applications to create buildable lots. Aluminized steel, and HDPE everywhere else 18-inch or greater is allowed.
- 15. Proposed Street Grades.

IX. Water Layout – Not Provided

- 1. “Water System Addition and Expansion Form” must be filled out and submitted with plans.
- 2. Plans must be stamped by a Professional Engineer registered in Georgia.
- 3. All surveying and design must be based on National Geodetic Vertical Datum (NGVD). All topographic data must be reduced to Mean Sea Level. Temporary bench mark data will not be accepted.
- 4. All water piping must be Ductile Iron Pipe (DIP), and adequately labeled as such.
- 5. Minimum pipe size is 8-inch or larger as required to achieve minimum fire flow requirements.
- 6. All service line material shall be type “K” soft copper.
- 7. Give the proposed size, location and material of water mains and service laterals
- 8. No other information should appear on the water plan layout sheet if such information tends to confuse or complicate the plans.

- 9. Show and label fire hydrant locations (existing and proposed)
- 10. Fire hydrants must be spaced no greater than 500 feet.
- 11. Waterline Markers shall be installed every 250 L.F., approximately one-half between each fire hydrant.
- 12. Show and label every existing and proposed valve.
- 13. At every intersection-must be a valve in every direction (i.e. 3 valves at a 3-way intersection).
- 14. In line valves must be spaced no greater than 1000 feet.
- 15. Show and label the location, material and sizes of existing pipe lines surrounding the project.
- 16. Specify methods and tie-in location with existing mains. (i.e. tapping sleeve and valve labeled with the size)
- 17. Show the location of existing and proposed valves and other appurtenances.
- 18. Contours in feet above MSL shall be shown on Water plan. Contours shall not be greater than 2 feet.
- 19. Maximum scale shall be 1" = 100'.
- 20. Show proposed water meter sizes and locations.
- 21. Long side services are to be installed with 2" PVC sleeves under pavement.
- 22. Water meters shall be installed at the property line, maximum 3-feet past proper past the property line.
- 23. Clearly label all road rights-of-way (existing and proposed) and easements (existing and proposed).
- 24. Water mains under existing or proposed pavement must be called out to be in steel casing; the length of casing must be called out.
- 25. Clearly show and label existing and proposed topography and existing and proposed features pertinent to the design and layout along pipeline route.
- 26. Provide adequate dimensions, stations, and labels to clearly indicate proposed location of pipeline relative to features such as right-of-way, centerlines, edge of roads, coordinates, etc.
- 27. Minor stream/creek crossings are adequately designed: cross these under or beyond culvert piping. These installations require restrained joints. Provide plan view and cross section of the crossing showing the existing ground, vegetative buffer, proposed ground and side slopes, depth of cover, the creek and culvert,

elevations, the proposed pipeline and any fittings necessary. Additional easements may be necessary for this area.

- 28. Aerial crossings are not permitted.
- 29. Show Note: **“All water and sewer line construction shall be in accordance with the City of Grantville Development Regulations, latest edition”.**
- 30. Show note: **“All water and sewer facilities shall be installed by a licensed utility contractor in the State of Georgia”.**
- 31. Show note: **“All water and sewer construction shall be inspected and tested as per Grantville standards prior to final acceptance by the City”.**
- 32. Show note: **“As-built record drawings (hard copy and digital format) for this project must be submitted and approved prior to Final Plat recording. As-built drawings shall be tied to Georgia State Plane Coordinate System”.**
- 33. Show note: **“The City of Grantville Utility Department shall be notified at a minimum of 48 hours (Monday through Friday) prior to commencing any work, testing, and prior to making any connections to existing water lines”.**
- 34. Show note: **“Cities are not required to locate water and sewer lines that were installed by a developer or other persons that have not yet been accepted into the City’s ownership (Recording of Final Plat and Maintenance Period Satisfied). The person installing those lines is required to install and maintain visible, permanent markers (i.e. color coded wire flags, valve markers, service stub markers, etc.) in order to identify the water and sewer facilities at the time the lines are installed. Once the City has taken legal ownership of those water and sewer lines, the city is responsible for locating them when a request is received”.**
- 35. Show table of the following information: a column for all waterline sizes, column for corresponding water line material, a column for corresponding water line length.
- 36. Show roadway stationing on both the Water and Sewer sheets.

X. Sanitary Sewer Plan – **Not Provided**

- 1.0 Plans are stamped and signed by a professional engineer registered in Georgia.
- 2. All surveying and design must be based on National Geodetic Vertical Datum (NGVD). All topographic data must be reduced to Mean Sea Level. Temporary bench mark data will not be accepted.
- 3. Show all phases of the development. In the event the subdivision is developed in phases, the final construction plans for sewers may be submitted in phases or units. However, at the time the first phase is submitted, the engineer will need to submit one (1) copy of the preliminary layout of the entire sewer system. This layout shall show all lines required to serve any lots to be developed and any surrounding property that may be served through the property. The site plan for each phase or unit shall contain a location drawing showing the relationship of the phase or unit to

the total project and to the surrounding streets and sewer outfalls.

- 4. Plans shall consist of a single master plan view of entire sewer line plan showing lots, lot numbers, laterals, manholes and manhole numbers, etc.
- 5. No other information should appear on the sewer plan layout sheet if such information tends to confuse or complicate the plans.
- 6. Show and label the location, material and sizes of existing pipelines surrounding the proposed project.
- 7. Maximum plan view scale shall be 1" = 100'.
- 8. Sewer lines crossing perpendicular under existing or proposed pavement (County or State Roads) must be called out to be in steel casing; the size and length of casing must be noted.
- 9. The maximum allowable distance between manholes is 400'.
- 10. Gravity lines must be in the middle of the road for new subdivisions streets.
- 11. Minimum gravity size sewer = 8-inch, minimum slope = 0.40%.
- 12. Clearly label all road rights-of-way (existing and proposed) and easements (existing or proposed).
- 13. Clearly show and label existing and proposed topography and existing and proposed features pertinent to design and layout along the pipeline route.
- 14. Provide adequate dimensions, stations, and labels to clearly indicate proposed location of pipeline to features such right-of-way, centerlines, edge of roads, coordinates, etc.
- 15. Any sewer outside of right-of-way must be in at least a 20-foot easement. Could be more depends on the depth of sewer.
- 16. Aerial crossings not permitted unless there is no other alternative. Aerial line shall be above the 50-yr flood line, and shown as such on the plans.
- 17. Show size and location of all service laterals. Commercial and industrial services must discharge individually into a manhole.
- 18. Show size, location of grease traps; min. size = 1,500 gallons
- 19. No sewer lines shall be installed through detention ponds.
- 20. Show size, location and material of proposed force mains.
- 21. Show 100-yr. floodplain in critical areas.
- 22. GA EPA Sanitary Sewer Extension submittal form must be completed and submitted with plans.

- 23. Show note: **“All water and sewer line construction shall be in accordance with the City of Grantville Standard Specifications and Details, latest edition”.**
- 24. Show note: **“All water and sewer line construction shall be installed by a licensed utility contractor in the State of Georgia”.**
- 25. Show note: **“Marking Tape showing “Caution Buried Sewer line” shall be installed approximately 18-inches above all sewer lines”.**
- 26. Show note: **“All water and sewer construction is inspected and tested as per the City of Grantville Standards prior to final acceptance by the City”.**
- 27. Show note: **“As-built record drawings for this project must be submitted and approved prior to final acceptance by the City of Grantville”. As-built drawings shall be shall be tied to Georgia State Plane Coordinate System”.**
- 28. Show note: **“The Grantville Utility Department shall be notified at a minimum 48 hours (Monday through Friday) prior to commencing any work, testing, and prior to making any connections to existing sewer lines and manholes”.**
- 29. Show note: **“Cities are not required to locate water and sewer lines that were installed by a developer or other persons that have not yet been accepted into the City’s ownership (Recording of Final Plat and Maintenance Period Satisfied). The person installing those lines is required to install and maintain visible, permanent markers (i.e. color coded wire flags, valve markers, service stub markers, etc.) in order to identify the water and sewer facilities at the time the lines are installed. Once the City has taken legal ownership of those water and sewer lines, the city is responsible for locating them when a request is received”.**
- 30. Plan and profile sheets shall be provided for all sewers (except service laterals). Profiles shall have a horizontal scale of not more than one hundred (100) feet to the inch and a vertical scale of not more than twenty (20) feet to the inch. The plan view shall be shown on the same sheet as the profile. Plan and profile views should have line designations, station numbers, manhole numbers and any other indexing necessary to easily correlate the plan and profile views.
- 31. Show and label the proposed size, location and material of sewer lines on profiles.
- 32. All off-road manholes must be shown with rim elev. 1.5-feet above ground, unless located in landscaping or close to the edge of roadway.
- 33. Location and names of streets, sewers and drainage easements.
- 34. Line of existing and proposed ground surface, the grade of the sewer between each two adjacent manholes, invert of sewer in and out of each manhole, surface elevation of each manhole, and length between.
- 35. Sewer pipe shall be PVC (SDR 26) up to 15-feet depth, then Ductile Iron is required.
- 36. Sewers must have minimum of 5-feet of cover. If cover depth is less than 5-feet then DIP shall be used.

- 37. All manholes shall be numbered on the plan and correspondingly on the profile.
- 38. The location and elevation of adjacent parallel stream beds and adjacent lake/pond surfaces shall be shown on the plan and profile.
- 39. Sizes, locations and inverts of all special features such as connections to existing sewers, concrete encasement, collar walls, elevated sewers piers, etc.
- 40. All structures, both above and below ground, which might interfere with the proposed construction, particularly water mains, gas mains, storm drains, utility conduits, etc.
- 41. Minimum drop from invert in to invert out shall be 0.10-feet. Any drop from invert in to invert out equal to or greater than 3 feet shall be constructed as an outside-drop manhole.

XI. Additional Comments

- 1.
- 2.
- 3.



City of Grantville
123 Lagrange Street
Grantville, Georgia

PUMP STATION START-UP REPORT

This report is designed to insure the customer that customer service and a quality product are the number one priority.

Please answer the following questions completely and as accurately as possible.
Please mail this form to:

(Manufacturer's
Name and Address)

Pump Owner's Name: _____
Address: _____
Location of Installation: _____
Person in Charge: _____ Phone: _____
Purchased From: _____

Model: _____ Serial No.: _____
Voltage _____ Phase _____ Hertz _____ Horsepower _____
Rotation: Direction of Impeller Rotation (Use C/W for clockwise, CC/W for counter-clockwise): _____

Method Used to Check Rotation (viewed from bottom): _____
Does Impeller Turn Freely by Hand: Yes No

Condition of Equipment: Good Fair Poor
Condition of Cable Jacket: Good Fair Poor

Resistance of Cable and Pump Motor (measured at pump control):
Red-Black _____ Ohms Red-White _____ Ohms White-Black _____ Ohms
Resistance of Ground Circuit Between Control Panel and Outside of Pump:
_____ Ohms

*MEG Ohm Check of Insulation:
Red to Ground _____ White to Ground _____ Black to Ground _____

Condition of Equipment at Start-Up: Dry Wet Muddy
Was Equipment Stored: Yes No Length of Storage: _____
Describe Station Layout _____

Liquid Being Pumped: _____
Debris in Bottom of Station: _____
Was Debris Removed in Your Presence: _____
Are Guide Rails exactly Vertical: _____
Is Base Elbow Installed Level? _____

Liquid Level Controls: Model _____
Is Control Installed Away from Turbulence: _____

Operation Check:
Tip lowest float (stop float) all, pumps should remain off.
Tip second float (and stop float), one pump comes on.
Tip third float (and stop float), both pumps on (alarm on simplex).
Tip fourth float (and stop float), high level alarm on (omit on simplex).

If not our level controls, describe type of controls _____
Does liquid level ever drop below volute top? _____

Control Panel Model No. _____
Number of Pumps Operated by Control Panel: _____

*NOTE: At no time should hole be made in top of control panel, unless proper sealing Devices are utilized.

Control Panel Manufactured By Others: _____

Company Name: _____

Model No. _____

Short Circuit Protection _____ Type _____

Number and Size of Short Circuit Device(s) _____ Amp Rating _____

Overload Type _____ Size _____ Amp Rating _____

Do Protective Devices Comply with Pump Motor Amp Rating _____

Are All Connections Tight? _____

Is the Interior of the Panel Dry: _____ If "No", the Moisture Problem Must Be Corrected.

Electrical Readings:

Single Phase:

Voltage Supply at Panel Line Connection, Pump Off, L1, L2 _____

Voltage Supply at Panel Line Connection, Pump On, L1, L2 _____

Amperage, Load Connection, Pump On, L1 _____ L2 _____
 Three Phase:
 Voltage Supply at Panel Line Connection, Pump Off, L1-L2 _____ L2-L3 _____ L3-L1 _____
 Voltage Supply at Panel Line Connection, Pump Off, L1-L2 _____ L2-L3 _____ L3-L1 _____
 Amperage, Load Connection, Pump On, L1 _____ L2 _____ L3 _____

Final Check:
 Is Pump Seated on Discharge Properly? _____ Check for Leaks _____
 Does Check Valves Operate Properly? _____
 Flow: Does Station Appear to Operate at Proper Rate? _____
 Noise Level: High _____ Medium _____ Low _____
 Comments: _____

Equipment Difficulties During Start-Up:

Manuals:
 Has Operator Received Pump Instruction and Parts Manual? _____
 Has Operator Received Electrical Control Panel Diagram? _____
 Has Operator Been Briefed on Warranty? _____
 Address of Local Representative/Distributor _____

I Have Received the Above Information _____

Name of Company _____ Date _____

I Certify This Report To Be Accurate _____
 Name of Start-Up Man

Employed By _____ Date _____

Date and Time of Start-Up _____

Present at Start-Up:

() Engineer _____ () Operator _____

() Contractor _____ () Other _____

