
City of Gustine

**IMPROVEMENT
STANDARDS AND SPECIFICATIONS**

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CITY OF GUSTINE

IMPROVEMENT STANDARDS

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SECTION 1 – GENERAL

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SECTION 1

GENERAL

1.1 IMPROVEMENT STANDARDS

These Improvement Standards have been prepared by the City of Gustine to aid all persons engaged in the construction of public works within the city limits of Gustine. (Portions of these standards also apply to private work within the city limits.)

The data contained herein is not intended for use as Contract Documents for contracts between the City and a Contractor, or for contracts between a subdivider or private person and a Contractor. Rather, separate Contract Documents must be prepared for each project, with each such document containing a Special Provisions section applicable to that particular project.

Design Engineers and Contractors working in the City of Gustine should be familiar with these Improvement Standards. All Plans and Specifications for construction of improvements to be accepted by the City shall be prepared in accordance with these standards. Improvements shall be constructed in accordance with these standards.

These Improvement Standards do not cover all the work which may require acceptance by the City. Work which is not covered by these standards shall be designed in accordance with generally accepted engineering principles. It is recommended that the criteria for work which is to be accepted by the City and which is not covered by these Improvement Standards be reviewed with the City Engineer prior to the actual design to establish design criteria. (Design criteria will be based on current codes and regulations applicable to the work and the accepted principles of engineering. The City Engineer may require the Design Engineer to submit engineering calculations for the work.)

Nothing in these Improvement Standards is intended to reduce or modify applicable Federal, State or local laws, nor to create a standard to be applied retroactively to existing improvements except where specifically noted.

1.2 DEFINITIONS

When used for the construction of any improvements within the City of Gustine, the appropriate definitions and terms listed in Section 1 of the State Standards shall apply, with the following modifications:

CITY. The City of Gustine or any persons to whom the power of the City has been delegated.

CITY ENGINEER. The City Engineer of the City of Gustine acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

CONTRACTOR. An individual, firm, corporation, partnership or association duly licensed by the State of California who does work for City acceptance.

DESIGN ENGINEER. The registered engineer licensed by the State of California responsible for preparation of plans and specifications for work to be accepted by the City.

DEVELOPER. Any person, firm, corporation, partnership, or association who has applied for a permit or subdivision within the City of Gustine.

DIRECTOR. The Director of Public Works for the City of Gustine.

ENGINEER. The registered engineer licensed by the State of California in responsible charge of the project. (Normally this is the Design Engineer.)

ENGINEER'S ESTIMATE. The list of estimated quantities of work and the estimated cost to perform the work.

IMPROVEMENT STANDARDS. The Improvement Standards of the City of Gustine which include design standards, construction standards and specifications and standard drawings.

IMPROVEMENT PLANS. Plans of proposed improvements prepared by the Design Engineer, after they have been approved by the City Engineer.

SHOP DRAWINGS. All drawings, diagrams, illustrations, brochures, samples, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated or installed.

SPECIFICATIONS. Directions, provisions and requirements prepared by the Design Engineer pertaining to performance of the work.

STATE STANDARDS. Current edition of the State of California Standard Plans and Specifications as issued by the Department of Transportation (where "State" is referred to, substitute with "City of Gustine").

1.3 PLANS AND SPECIFICATIONS

All Improvement Plans, Specifications and Special Provisions shall comply with the requirements of the approved or conditionally approved development plan and/or tentative map and these Improvement Standards.

Improvement Plans submitted for preliminary review to the City or City Engineer shall be stamped, need not be signed, but should be complete. The following details and supplemental information shall be shown on plans submitted:

1. GENERAL REQUIREMENTS

- a. Improvement Plans shall show all existing activities and all improvements to be constructed.
- b. Size: The size of the Improvement Plan sheets shall be 24" x 36" or 22" x 34".
- c. Scale: The scales selected shall be sufficient to clearly show all required details when reproduced on Blueline. Preferred vertical scales are 1" = 4' in reasonably flat areas.
- d. Title Block: Each sheet within the set shall have a title block showing the project's name, sheet title, date of drawing and revisions, scale of drawings, sheet number, and the Design Engineer's name, registration number, expiration date of registration, and signature.
- e. Vertical Control: All elevations indicated in the Improvement Plans shall be based on Gustine datum. Benchmark location, number, and elevation shall be shown on the drawings.
- f. Orientation and Stationing: Insofar as practical, the plans shall be arranged so that the North shall be at the top or right edge of the sheet. The stationing on plan and profile sheets shall read from left to right or from bottom to top.

2. TITLE SHEET

- a. Title sheets shall be prepared for Improvement Plans exceeding two sheets per set, and shall show the following:
 - The entire project, drawn at a suitable engineering scale, including existing and proposed street names and lot numbers. Surrounding lot lines shall be shown within a minimum distance of 50 feet of the project.
 - Vicinity map and north arrow.

- Index of sheets.
- Legend of symbols.
- Location, description and elevation of the reference Gustine Benchmark as well as any temporary benchmark used for the project.
- Name, address, telephone number and designated agent of any agency whose facilities will be installed, utilized, interfered with, or crossed as part of the improvements, as well as a signature block for their approval. Where construction requires encroachment permits by other agencies, copies of signed encroachment permits together with evidence of any required insurance shall be submitted.
- Name, address and telephone number of the developer or his authorized representative.
- Signature block for approval by the City Engineer as follows:

APPROVED BY THE CITY ENGINEER, CITY OF GUSTINE REVIEWED FOR CONFORMANCE WITH CITY OF GUSTINE REQUIREMENTS ONLY. SINCE PLANS WERE PREPARED BY OTHERS, NO RESPONSIBILITY FOR THE ADEQUACY OF THE DESIGN IS EXPRESSED.

BY _____ DATE _____

- b. The following notes shall be placed on the title sheet:
- This set of Improvement Plans is valid for construction purposes only after being signed by the City Engineer and upon issuance of permits.
 - All Contractors and Subcontractors involved in the construction of this project shall attend a pre-construction conference arranged by the Developer at the Department of Public Works for construction and inspection coordination prior to commencement of any on-site construction activities.

- The current Gustine Improvement Standards that have been referenced in these plans shall be considered as part of these plans.

c. The following shall not be included in the title sheet:

- Quantities List.

3. TOPOGRAPHY SHEET

A topographical survey sheet shall be included in the improvement plan set and shall show spot elevations at an appropriate interval, fences, structures, pipelines, ditches, utility poles, trees, driveways, roads, pavement, wells, rights-of-way, easements, etc., and their disposition. Disposition of existing facilities may be indicated on the topographical survey sheet by reference to appropriate sheets within the Improvement Plans.

4. GRADING AND DRAINAGE SHEET

A grading and drainage sheet shall be included in the Improvement Plans set and shall show the following:

- a. A typical lot grading detail. (Specific lots may be required to provide an independent grading plan.)
- b. Proposed lot corner elevations as well as any elevation differential between the project boundaries and the adjoining properties.
- c. Gutter or ditch flow arrows, slopes, and grade break elevations.
- d. Storm drainage pipes, manholes, valley gutters, and catch basins.
- e. Location and height of any retaining walls or retaining fences. Concrete or masonry retaining walls shall be provided where the difference in grade at property line exceeds 12 inches. For grade differentials of 12 inches or less, a grading strip with a 6 horizontal:1 vertical slope may be utilized.

5. UTILITIES SHEET

A utilities sheet shall be included in the set of Improvement Plans and shall show street lights, fire hydrants, water lines, valves, blowoffs, sanitary sewer lines, manholes and clean outs, sewer and water service locations, water wells, power lines, gas lines, TV cable lines, street light conduit, utility boxes, mail boxes, telephone lines, PUE's, driveways, centerline monuments, street signs, etc. Some of the above utilities may not be finalized prior to improvement plan approval. In this case, these utilities shall be shown on the required Record Drawings. Utility company Record Drawings may be accepted in lieu of required Record Drawings provided sufficient detail is provided to coordinate the electrical, gas, telephone and TV cable line locations with other utilities as determined by the Director of Public Works.

6. PLAN AND PROFILE SHEET

A plan and profile sheet shall be included in the set of Improvement Plans showing the existing and proposed profiles of all roadways and other improvements in public rights-of-way. This sheet shall show elevations, grade breaks, vertical curves, slope, road stationing, storm drainage lines, water lines, sewer lines, irrigation lines and any areas of possible conflict between underground utilities. Indicate length and type of all sewer and storm drain pipes and catch basins. Show elevations of pipe inverts in manholes and catch basins. Indicate length and type of all water system pipes and locations of valve junctions.

7. DETAIL SHEET

A detail sheet shall be included in the set of Improvement Plans showing typical construction details. Construction details included in the Improvement Standards, that are applicable to the work, shall be reproduced and included on the detail sheet(s).

8. COMBINING REQUIRED SHEETS

Sheets may be combined or omitted depending on the complexity of the project.

1.4 SUPPLEMENTAL INFORMATION

The following supplemental information shall be submitted with the initial sets of Improvement Plans unless otherwise indicated in these Standards.

1. SOILS REPORT

The required soils report shall be prepared by a Civil or Geotechnical Engineer legally authorized to practice in the State of California. Three (3) copies shall be submitted. The soils report shall include:

- a. The results of "R" value tests taken in the project site and a recommendation by the Civil or Geotechnical Engineer for design "R" values for road pavement sections.
- b. Depths to groundwater measurement or other records of depth to groundwater. Civil or Geotechnical Engineer's recommendations for elevations of roads above groundwater.

2. MISCELLANEOUS CALCULATIONS

Submit calculations for pavement structural section determination plus any calculations used in the design of any retaining walls or other miscellaneous items not covered in these standards, such as domestic water flow, fire flow, sewage flow, and storm drainage calculations.

3. QUANTITIES LIST AND ENGINEER'S ESTIMATE

Quantities list and engineer's estimate shall show estimated costs, descriptions and total costs of each item of work. Engineer's estimate shall be separated into items that deal with storm drainage, domestic water systems, sanitary sewers, etc., and shall include a separate 10% contingency for the total value of work to be done.

4. PRODUCT SPECIFICATIONS

When a product is mentioned in the Improvement Plans such as pumps, motors, street lights, etc., the Design Engineer shall submit the manufacturer's specifications upon request.

1.5 DEPARTMENTAL REVIEW

The Design Engineer shall submit for review to the Planning Department the number of Blueline sets of Improvement Plans requested, together with the initial plan check fee. When corrections are required, one set will be returned to the Design Engineer showing required changes. The Design Engineer shall then

resubmit the corrected Improvement Plans for review. The number of sets resubmitted will be determined by the City Engineer. In order to reduce the man-hours required in checking resubmittals of Improvement Plans, the Design Engineer shall highlight, in yellow, all changes that have been made on one of the required Blueline sets resubmitted. The City will make every reasonable effort to provide all pertinent comments and identify all necessary corrections during the first improvement plan review. However, the Design Engineer's changes in response to the comments may themselves require further comments and corrections, and may necessitate changes in other areas of the design. Thus, the Design Engineer is cautioned not to assume all the changes have been identified during the first submittal review cycle.

After all corrections have been made to the satisfaction of the City Engineer and other departments, the entire set of originals shall be signed by the Design Engineer and a number of plan sets as determined by the City Engineer submitted to the City for approval.

1.6 START OF CONSTRUCTION

Prior to any construction activities, including clearing and/or grubbing, the following shall be completed:

1. Improvement Plans shall be approved by the City Engineer.
2. Contractor shall attend a pre-construction conference with the City.
3. The City shall issue a notice to proceed or permit.

1.7 SHOP DRAWINGS AND SUBMITTALS

The Contractor shall provide the Design Engineer with Shop Drawings required by the Specifications or Improvement Plans or as otherwise submitted for custom design work including but not limited to pumping stations, bridges and other structures. The Design Engineer shall promptly review all Shop Drawings submitted and return reviewed Shop Drawings directly to the Contractor; two copies of favorably reviewed Shop Drawings shall be sent directly to the City Engineer for construction monitoring.

The City Engineer may request to review Shop Drawings for City acceptability of major components and assemblies. If such a request is made, the Design Engineer shall submit the requested Shop Drawings to the City Engineer following favorable review by the Design Engineer. The City Engineer shall promptly review the requested submittals, make a determination on acceptability and return the submittals to the Design Engineer.

The Contractor shall submit to the City Engineer all proposed substitutions of items in these Improvement Standards where an "or equal" option is not explicitly permitted. The City Engineer shall promptly review these proposed substitution submittals, make a determination on whether or not the proposed substitutions are acceptable, and return the reviewed submittals directly to the Contractor.

1.8 CONSTRUCTION REVIEW

All work accomplished and all materials furnished under these Improvement Standards shall be subject to the inspection and approval of the City Engineer. Such inspection and approval of work and materials shall not relieve the Contractor of any of his obligations to complete the work specified. Work and materials not meeting these requirements shall be corrected.

The City Engineer shall have access to the work at all times and shall be furnished every reasonable opportunity for ascertaining that the methods, materials and workmanship are in accordance with the requirements and intent of these Improvement Standards. The Contractor or his authorized agent shall be in charge of and responsible for all phases of work while it is in progress.

The City Engineer shall be notified in writing by the Contractor at least two working days prior to beginning any of the stages of work listed below and shall be notified when each of the stages has been completed. Subsequent stages shall not begin until the City Engineer has approved the previous stage.

1. Placement of culvert pipes, storm drains, sanitary sewer, waterlines and other utilities. Upon completion of the backfill of all trenches in the public rights-of-way, the Geotechnical firm providing compaction testing shall furnish the City a letter, that all trench backfill was accomplished per the recommendations of the Geotechnical Report and met the minimum compaction requirements per these Improvement Standards.
2. Placement of any layer of subbase, base or surfacing material, including the preparation of the subgrade for streets and roads, curb, gutters, and sidewalks.
3. Installation of reinforcing steel and preparation of structural subgrade.
4. Placement of concrete.
5. Placement of structure backfill material.
6. Testing and start up.

In addition to the above, the Contractor shall notify the City Engineer whenever improvement work is to be performed on Saturdays, Sundays or holidays or during hours of the day when such work is normally not performed so that inspection may be provided.

The Contractor shall give the City Engineer sufficient notice regarding proposed sources of materials to be used in the work so that such tests and inspections as the City Engineer deems necessary can be performed to determine that the materials comply with these standards.

All tests of materials and work to determine compliance with these standards shall be in accordance with City approved methods and procedures. If required, the Contractor shall furnish to the City Engineer, without charge, samples of all materials to be used in the work. Samples of material from which tests are to be made shall be taken under the supervision of the City Engineer by a recognized laboratory.

The Contractor shall be responsible for coordinating all required testing, shall notify the City Engineer when testing is to be performed and shall be responsible for the testing laboratory submitting results in a timely manner. Subsequent work shall not be started until all tests pass and written reports are filed with the City Engineer.

The Developer, Contractor or Utility shall inspect and repair all defective work done in the public rights-of-way for a period of one year from the date the work is accepted by the City, or if subsequent repairs are required, one year from the date the repairs are complete and acceptable.

1.9 RECORD DRAWINGS

Prior to the City's acceptance of the improvements, the Design Engineer shall compile and submit a set of Record Drawings showing final improvement details, corrected improvement elevations and locations, as well as any changes that occurred during construction. Record Drawings shall consist of film positive or mylar sepias (paper sepias will not be accepted). Original data that has been superseded shall be crossed out, but not eradicated. All utilities that could not be shown on the construction plans shall be drawn on the Record Drawings. The Design Engineer shall provide final elevations of all catch basins, storm drainage pipe inverts, sewer flowline elevations at manholes and curb and gutter flowline. All lettering must be clear and legible. Extensive changes which cannot be shown clearly on an original sheet shall be drawn on a supplemental sheet. All supplemental sheets shall be signed by the Design Engineer and included as part of the Record Drawings. The Design Engineer shall sign the Record Drawings. An electronic CAD file of the Record Drawings shall also be provided to the City. The Record Drawings will be retained by the City.

1.10 EQUIPMENT OPERATION AND MAINTENANCE SUBMITTALS

Prior to the acceptance of the improvements by the City, the Developer shall compile and submit information and materials related to each maintainable piece of equipment, equipment assembly, or sub-assembly provided and dedicated to the City in conjunction with his work. This requirement generally applies to such items as pumps, lift stations, irrigation systems, and similar equipment and systems. It also includes valves, fire hydrants, and similar items not specifically listed in the Improvement Standards that have been provided on an "or equal" basis, where operation and maintenance of such items differs from listed items and replacement parts and special tools are not directly interchangeable with those for listed items.

1. OPERATION AND MAINTENANCE MANUALS

Two sets of operation and maintenance manuals shall be provided for each maintainable piece of equipment, equipment assembly or sub-assembly which covers the following subjects in detail:

General

- Names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts.

In addition, one or more of the following items of information shall be provided as applicable, to the satisfaction of the Director of Public Works:

Operating Instructions

- Safety precautions
- Operator prestart
- Startup, shutdown, and post shutdown procedures
- Normal operations
- Emergency operations
- Operator service requirements
- Environmental conditions

Preventive Maintenance

- Lubrication data
- Preventive maintenance plan and schedule

Corrective Maintenance

- Troubleshooting guides and diagnostic techniques
- Wiring diagrams and control diagrams
- Maintenance and repair procedures
- Removal and replacement instructions
- Spare parts and supply list
- Corrective maintenance man-hours

Appendices

- Parts identification
- Warranty information
- Personnel training requirements
- Testing equipment and special tool information

2. ROUTINE MAINTENANCE ITEMS AND SUPPLIES

Consumables, lubricants, gaskets, fuses, and similar routine maintenance items and supplies (not including fuel) sufficient for one (1) year operation.

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2Z TREE PLANTING
2AA DEAD END STREET BARRICADE

SECTION 2

STREETS

2.1 GENERAL

Street Improvements in the public rights-of-way shall only be constructed by a Developer or Contractor and shall conform to these Improvement Standards:

1. Only a Developer or Contractor with an appropriate license and required insurance may perform the work described herein.
2. Any Street Improvement damaged by the Developer or Contractor shall be repaired by the Developer or Contractor at his expense as required by the City Engineer.

2.2 GEOMETRIC DESIGN

The street widths shall conform with these Improvement Standards.

The gutter grade shall not be less than 0.30%. In special situations, the grade may be reduced if approved by the City Engineer.

The standard street cross slope shall be 2%. In special situations, the cross slope grade may be modified with the approval of the Engineer.

The street shall be designed to collect storm water at intersections whenever possible.

Top of curb fall, in feet, around curb returns shall be in accordance with the following table:

Curb Return Radius	Minimum	Maximum
20	0.20	0.60
25	0.25	0.80
30	0.30	0.90
35	0.35	1.00
40	0.40	1.10
45	0.45	1.20
50	0.50	1.30

Minimum curb return radii, in feet, for street intersections shall be in accordance with the following table:

	Residential	Collector	Arterial
Residential	25	25	--
Collector	25	30	30
Arterial	--	30	35

Horizontal curves shall have the following minimum radii:

Residential and Cul-de-Sac Streets	-	300 feet
Collector Streets	-	500 feet
Minor Arterial Streets	-	1,100 feet
Major Arterial Streets	-	1,400 feet

There shall be a tangent between reversing curves of at least 150 feet on arterial streets and 50 feet on residential and collector streets.

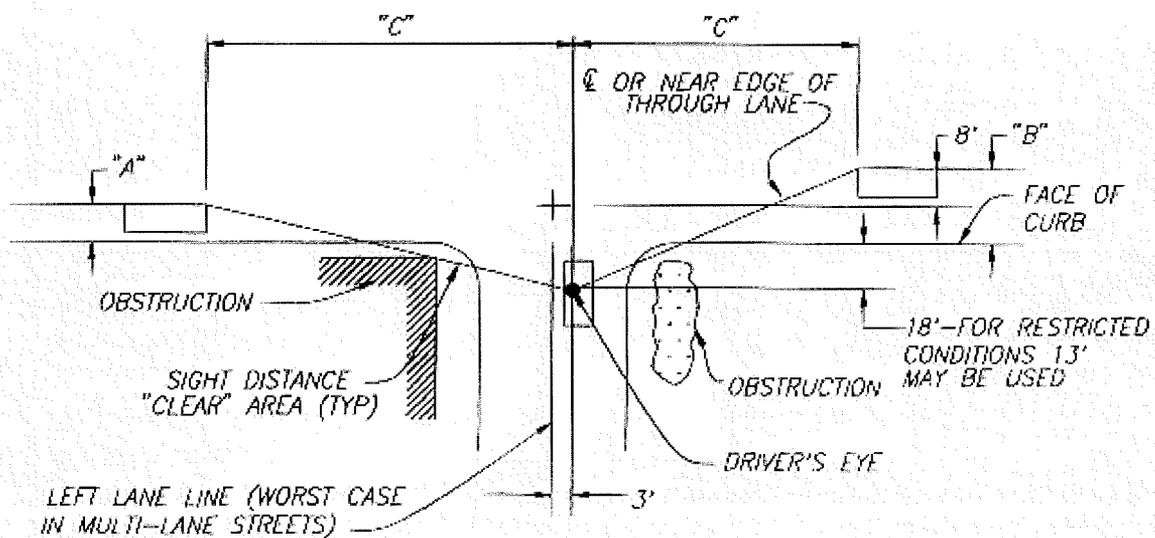
Street intersections shall be as near right angles as practical. In no case shall the angle of an intersection be less than 70 degrees. Streets located on opposite sides of an intersecting street shall have a continuous centerline or have their centerline separated by not less than 125 feet. Greater distances may be required on higher classification streets based on anticipated turning volumes.

Where offset intersections are collector streets or arterial streets, offset intersections shall be designed to avoid conflicting left turns.

Requirements for street intersection and commercial/industrial driveway sight distances are shown in the following table:

SIGHT DISTANCE REQUIREMENTS

Street Classification	Design Speed (MPH)	Distance (ft)		
		A	B	C
Residential	25	16	28	250
Collector	35	18	30	350
Arterial	45	18	40	500



Planned intersection controls shall be considered in determining the appropriate sight distance. For example, where a traffic signal is planned, and the intersection will be initially controlled with a two-way stop, the minimum sight distance may be provided at the “stop” legs of the intersection.

Sight distances shall also be provided at median openings as appropriate.

Right-of-way or sight easements shall be provided at new reverse frontage fences, signs or other obstructions as appropriate. The “clear” area shall not contain shrubbery, mounds, signs or other obstructions over 30” high. Poles and trees shall be spaced far enough apart to provide adequate sight and tree limbs shall be at least 7 feet above the ground.

The maximum length of a cul-de-sac shall be 400 feet as measured from the centerline of the intersecting street to the radius point of the cul-de-sac.

Cul-de-sacs shall be open-end design to allow pedestrian access to adjacent streets unless otherwise approved by the Planning Director.

2.3 STRUCTURAL DESIGN

The R-value design method used by the California Department of Transportation shall be used as a basis to determine the structural section of the streets. Whenever the pavement calculations produce more than 8-inches of base rock, a safety factor may be used at the option of the Engineer.

The Traffic Index (T.I.) shall be determined from traffic counts where they are available, or as determined by the City Engineer. A 10-year design life shall be used.

Where sufficient information is not available to determine the structural section using the above data, the following minimums shall be used.

<u>Street</u>	<u>T.I.</u>
Arterial	9
Collector	8
Residential	6
Cul-de-sac	5

In no case shall the ultimate thickness of asphalt concrete be less than 3 1/2 inches for arterial streets and less than 2 1/2 inches for all other streets.

In no case shall the thickness of aggregate base be less than 6 inches for any street.

2.4 CLEARING

Clearing and grubbing shall be done in accordance with Sections 16-1.01, 16-1.02 and 16-1.03 of the State Standards.

2.5 EARTHWORK

Earthwork shall be performed as set forth in Sections 19-1 and 19-2 of the State Standards and in accordance with the recommendations of the geotechnical engineering investigation report prepared for the project.

All compaction of fill materials shall be in accordance with Section 19-5 of the State Standards; except that the Contractor or Developer will only be required to strip the original ground of vegetation and compact the top 6 inches of original ground in place to not less than 95% maximum density in accordance with ASTM Designation D1557 before the fill is placed.

2.6 SUBGRADE

All clods shall be broken and all rocks, hard ribs and earth lumps over 2 1/2 inches in greatest dimension and other unsuitable material such as roots shall be removed from the job site. The subgrade material shall be compacted to a firm, stable condition with approved equipment until a relative compaction of not less than 95% has been obtained to a depth of 6 inches. Special Provisions may require a greater depth for 95% compaction.

The finished subgrade shall not vary more than 0.05 foot above the planned grade at any point. Care shall be taken to obtain compaction around existing manholes and water valves.

Relative compaction shall be tested in accordance with ASTM Designation D1557.

2.7 AGGREGATE BASE

The aggregate base material shall conform to the requirements of Section 26 of the State Standards for Class 2, 3/4-inch maximum combined grading.

An exception to Section 26-1.04 shall be that a single layer up to 0.7 foot may be permitted to be placed.

Motor graders may be permitted to spread and shape the aggregate base materials, provided this method does not result in segregation of material. The aggregate base shall be maintained in a well-mixed optimum moisture condition.

Contractor shall furnish the City a Certificate of Compliance for all aggregate base used.

Relative compaction shall be tested in accordance with ASTM Designation D1557.

2.8 ASPHALT CONCRETE

The asphalt concrete shall conform to the requirements of Section 39 of the State Standards. Asphalt concrete used in all but the final course shall be Type B with 3/4-inch maximum medium grading. Asphalt concrete used in the final course shall be Type B as follows:

- Arterial Streets - 3/4-inch maximum, medium grading
- Collector and Residential Streets - 1/2-inch maximum, medium grading

The asphalt grade shall be AR 4000 as specified by the latest revision of the State Standards unless otherwise approved by the City Engineer.

Contractor shall furnish the City a Certificate of Compliance for all asphalt concrete used.

2.9 ASPHALT PAINT BINDER (tack coat)

An asphalt paint binder shall be applied in conformance with Section 39-4.02 of the State Standards.

2.10 HEADER BOARDS AND BARRICADES

Header boards shall be constructed to protect the edges of the asphalt concrete where streets are partially completed.

The boards shall be either Redwood or Douglas Fir with an American Wood Preservers Bureau Stamp indicating its use for ground contact and application of LP22 water borne preservative or approved equal.

The boards shall be 2-inch x 6-inch nominal dimension of appropriate material.

Permanent street closures and temporary closures in new developments at dead end streets shall have barricades installed as shown on Drawing No. 2-AA.

2.11 CONCRETE

Portland Cement concrete, unless otherwise specified, shall be Class 3 as defined in the State Standards with a minimum 28-day compressive strength of 2,500 pounds per square inch and a maximum slump of 3 inches. Concrete shall consist of Portland cement, water and aggregate. Portland Cement shall be Type II. Aggregate shall be washed before use and be free from any foreign matter.

The aggregate shall be graded to provide a plastic, workable mixture of maximum size aggregate of 3/4-inches. The water shall be potable and no admixtures shall be used without approval of the Design Engineer and the City Engineer.

The cement, water and aggregates shall be combined at the batch plant and be thoroughly mixed. No water shall be added to the mixture after leaving the batch plant without approval of the Engineer. All concrete shall be in place within 1-1/2 hours from the time the cement is added to the aggregate.

The temperature of concrete as mixed and placed shall not be less than 55° Fahrenheit nor greater than 90° Fahrenheit.

The concrete shall be consolidated by tamping or vibrating. Concrete which has rock pockets or honeycombing after curing shall be removed and replaced.

All concrete shall be cured in accordance with Section 90-7 of the State Standards.

The Contractor shall furnish the City a Certificate of Compliance for all Portland cement concrete used.

2.12 CURBS, GUTTERS AND SIDEWALKS

Curbs, gutters and sidewalks shall be constructed in accordance with these Improvement Standards and Section 73 of the State Standards.

Native material bases and subbases under curbs, gutters and sidewalks shall be conditioned in accordance with the recommendations of the soils report prepared for the project. Prior to placement of concrete, the Geotechnical Engineer shall provide the City Engineer a written certification that the native material bases and subbases for the curbs, gutters and sidewalks were conditioned in accordance with the recommendations of the soils report.

Sidewalks shall have a cross-slope toward the curb face of 1/8-inch per foot (1.0%) minimum to 1/4-inch per foot (2.0%) maximum. Sidewalks shall be fixed form construction in accordance with 73-1.05A of the State Standards. The Developer or Contractor shall be responsible for protecting the work against damage and insuring the safety of the public.

Sidewalks which are required against the edge of right-of-way shall be placed 1 inch from the property line to provide space for lot corner monuments.

2.13 DRIVEWAY APPROACHES

Approaches shall be constructed in accordance with these Improvement Standards and Section 73 of the State Standards.

Commercial/industrial or other high volume driveway approaches on arterial and collector streets shall be located as far as practical from the nearest curb return and may be prohibited within 200 feet where the intersection is signalized or planned for signalization. If permitted, residential driveway approaches located on arterial and collector streets, shall be a minimum of 25 feet from the end of the curb return.

Approaches shall be located so they will not interfere with intersecting sidewalks, traffic signals, light poles, fire hydrants, or other public improvements unless specific approval is given by the City Engineer and the necessary adjustments to the improvements are accomplished without cost to the City.

Subgrade preparation and certification of subgrade preparation shall be required as for curbs, gutters and sidewalks.

2.14 ALLEYS

Alleys shall be constructed in accordance with these Improvement Standards.

The subgrade, aggregate base and asphalt concrete shall be constructed as required in Sections 2.6, 2.7 and 2.8 respectively of these Improvement Standards.

2.15 VALLEY GUTTERS

Valley gutters designed to permit drainage across a street shall be constructed as shown on Drawing No. 2-P.

2.16 WHEELCHAIR RAMPS FOR THE PHYSICALLY CHALLENGED

Wheelchair ramps for the physically challenged shall be constructed at all intersections as shown on Drawings No. 2-T, 2-U or 2-V as applicable.

The ramps must comply with Section 3307 "Ramps" of the California State Accessibility Standards, State Architects Office.

2.17 RAISING UTILITY BOXES

Utility boxes and manholes shall be raised by the Developer or Contractor to conform to these Improvement Standards. Utility boxes include, but are not limited to, sewer manholes, sewer cleanouts, water valves, storm drain manholes and survey monuments.

Where existing utility boxes are in the work area, their frames and covers shall be removed before subgrade compaction is made and a cover shall be placed to prevent dirt and loose materials from entering the facility.

Base and surface material shall be placed over the covers, after which the frames and covers shall be set to finish grade.

2.18 TESTING

Material testing to show conformance with these Improvement Standards shall be done in accordance with Section 1.8 of these Improvement Standards.

2.19 ACCESS CONTROL WALLS

Where required by the City, access control walls shall be constructed. Access control walls shall be reinforced masonry or concrete and shall be a minimum of 6 feet in height. Architectural approval of the wall design is required from the Planning Director.

Walls shall be shown on the Improvement Plans. A building permit shall be obtained by the Developer from the Chief Building Official prior to commencement of work on the walls located outside public rights-of-way.

2.20 MONUMENTS

All survey monuments shall be visibly marked or tagged with the certificate number of the surveyor or civil engineer setting them, according to Section 8772 of the Professional Land Surveyors Act.

Permanent survey monuments set in pavement areas shall conform to Drawing No. 2-Y. Monuments found in a perishable condition shall be rehabilitated with a permanent monument according to Section 8773.3 of the Professional Land Surveyors Act.

The instructions as set forth in the 1973 "Manual of Instructions for the Survey of Public Lands of the United States", published by the Bureau of Land Management, Department of Interior, Washington, D.C., shall be followed for the restoration of lost or obliterated corners, for those corners that were established based on the Public Lands Surveying System.

Survey monuments shall be set at all lot corners, angle points and points of curvature. Monuments shall be 1-inch O.D. (3/4-inch I.D.) galvanized iron pipe, 24 inches in length set 6 inches below grade.

Subdivision boundary monuments, except those set in street pavement, shall be 1-1/2 inches O.D. (1-1/4-inches I.D.) galvanized iron pipe, 24 inches in length, set 12 inches below finish grade. Survey boundary monuments in street pavement shall conform to Drawing No. 2-Y.

Permanent survey monuments shall be set at all street centerline intersections, angle points and points of curvature. They shall also be placed at all section and quarter corners within the subdivision.

Section and quarter corner monuments shall be constructed and marked according to the 1973 "Manual of Instruction". Monuments located within street sections shall utilize a monument box conforming to Drawing No. 2-Y.

2.21 PAVING ADJACENT TO EXISTING STREETS

Whenever new curb and gutter is constructed along an existing street, paving of the adjacent roadway is required. Pavement structural sections shall be designed in accordance with the traffic index of the street.

If the structural section of the existing street along which curb and gutter is to be constructed is inadequate or substandard, the street shall be reconstructed to the centerline or brought to standard by calculated overlay thickness.

If the adjacent road conforms to current standards, the paving may extend to the existing edge of pavement.

Apr 16, 2012 - 11:05am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

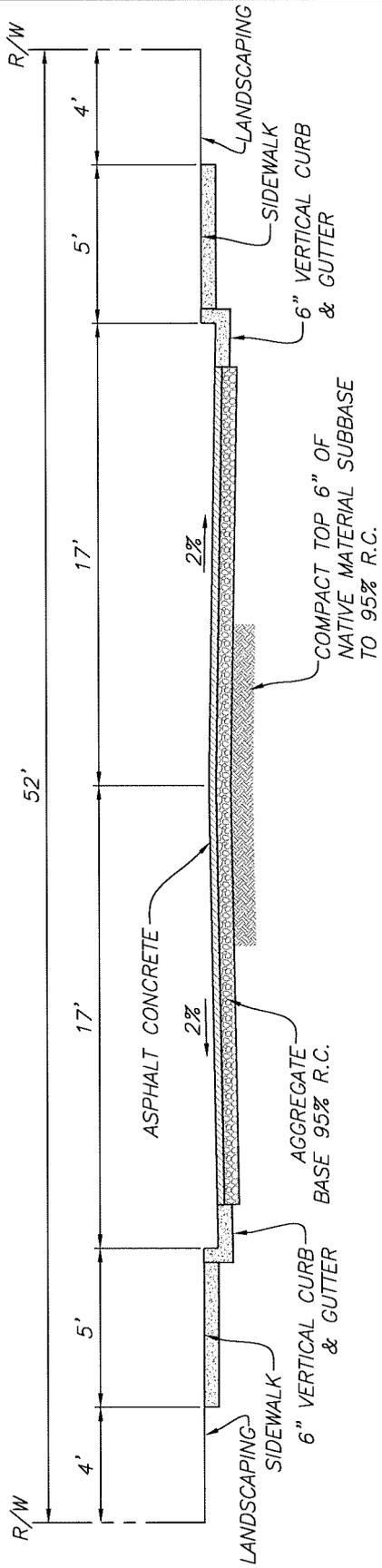
TYPICAL RESIDENTIAL STREET SECTION

APPROVED BY:

DATE:

DRAWING NO.

2 - A



52' RESIDENTIAL AND CUL-DE-SAC STREET



CITY OF GUSTINE IMPROVEMENT STANDARDS

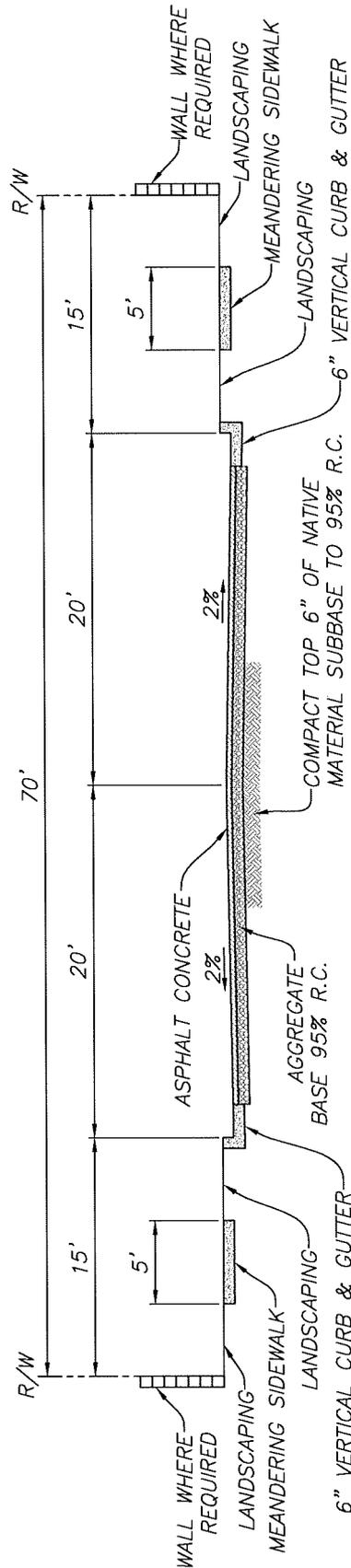
TYPICAL COLLECTOR STREET SECTION

APPROVED BY:

DATE:

DRAWING NO.

2 - B



70' RESIDENTIAL COLLECTOR STREET

Apr 16, 2012 - 11:08am
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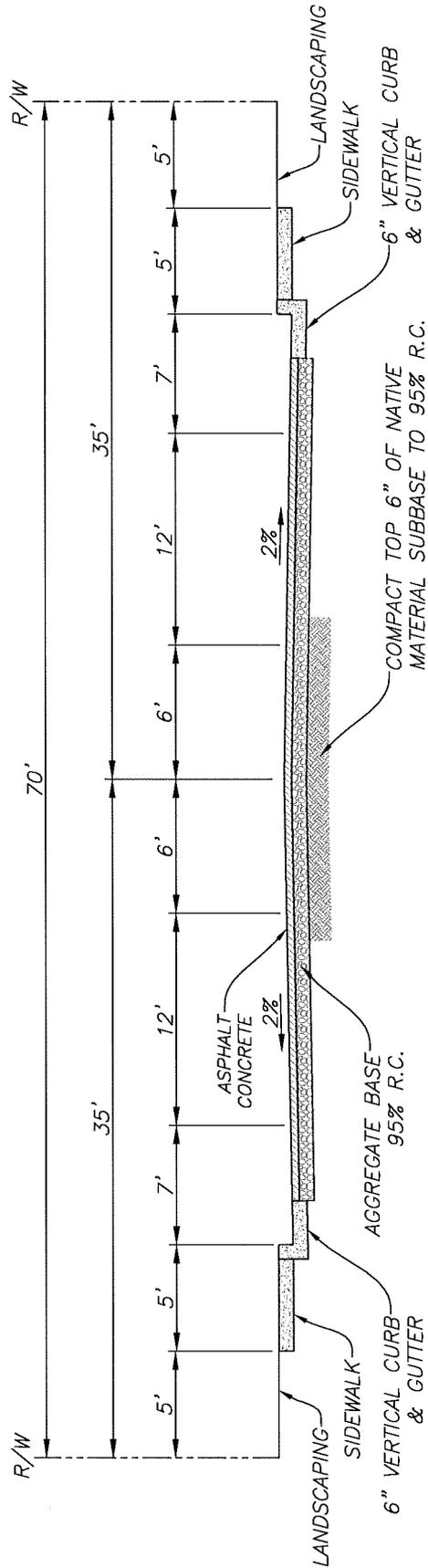
CITY OF GUSTINE IMPROVEMENT STANDARDS
COMMERCIAL / INDUSTRIAL STREET SECTION

APPROVED BY:

DATE:

DRAWING NO.

2 - C



70' COMMERCIAL/INDUSTRIAL COLLECTOR STREET



CITY OF GUSTINE IMPROVEMENT STANDARDS

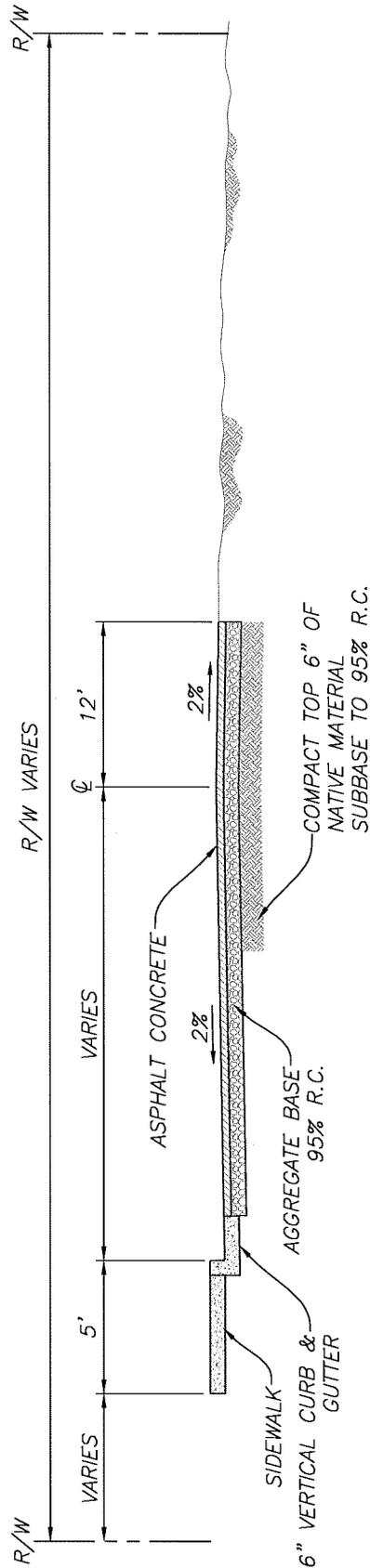
TYPICAL PARTIAL WIDTH STREET SECTION

APPROVED BY:

DATE:

DRAWING NO.

2 - D



PARTIAL WIDTH STREET

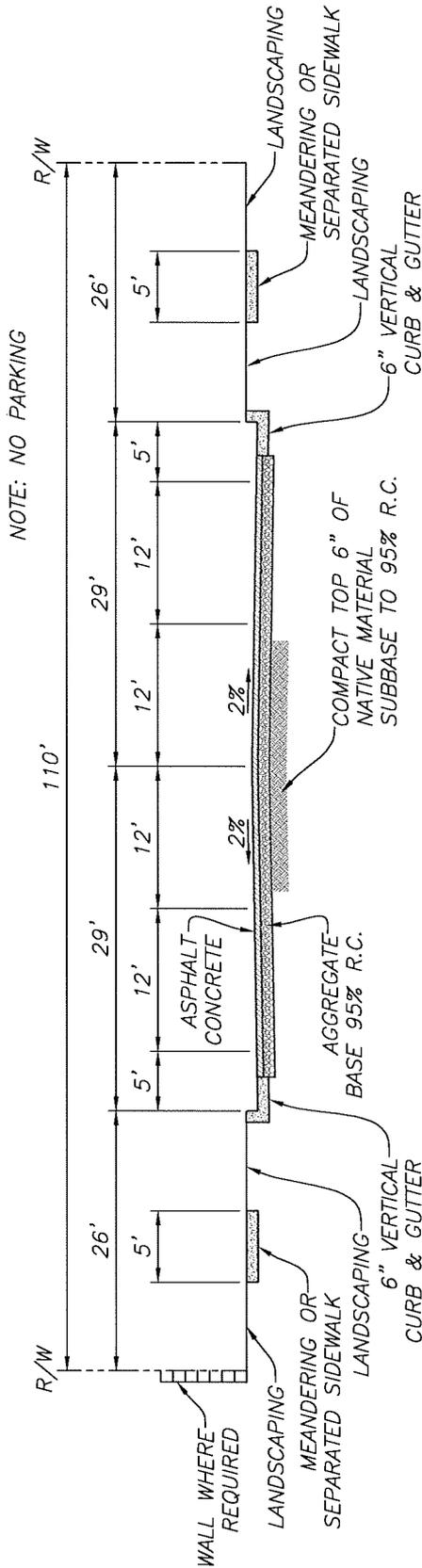
NOTES:

1. THE PARTIAL WIDTH STREET SECTION IS ONLY PERMITTED WHERE APPROVED BY THE DIRECTOR OF PUBLIC WORKS.
2. PARTIAL WIDTH STREET SECTIONS MUST BE DESIGNATED ON THE PLANS AS "PARTIAL WIDTH" ADJACENT TO THE STREET NAME.

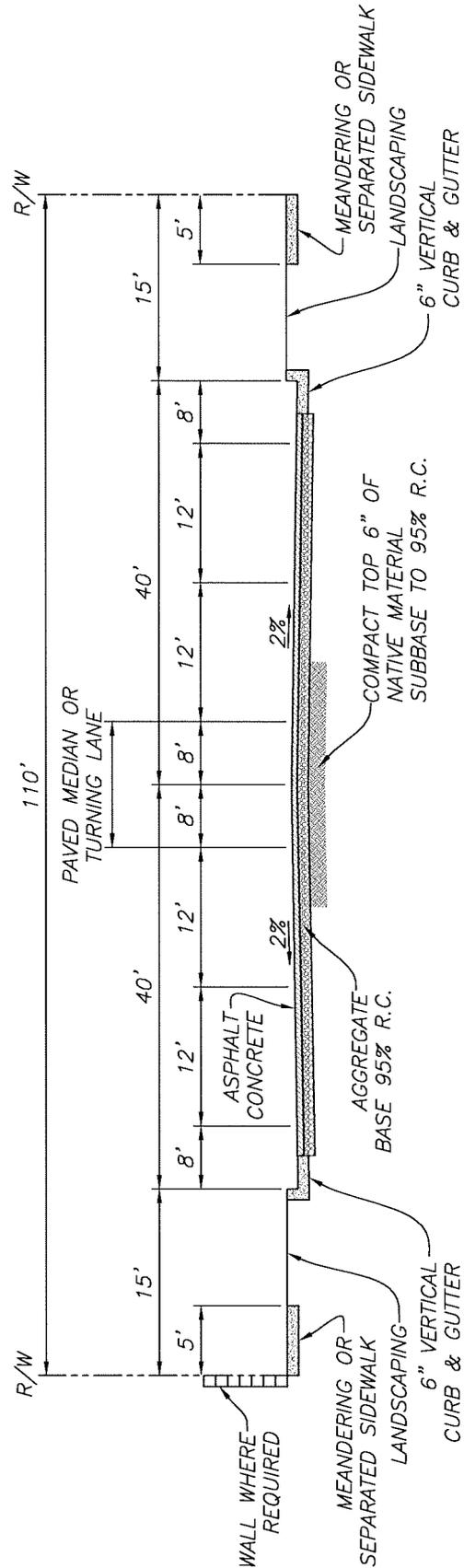


CITY OF GUSTINE IMPROVEMENT STANDARDS

4 AND 5 LANE ARTERIAL STREET SECTIONS



110' 4 LANE ARTERIAL STREET



110' 5 LANE ARTERIAL STREET

APPROVED BY:

DATE:

DRAWING NO.

2 - E

Apr. 16, 2012 - 11:42am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

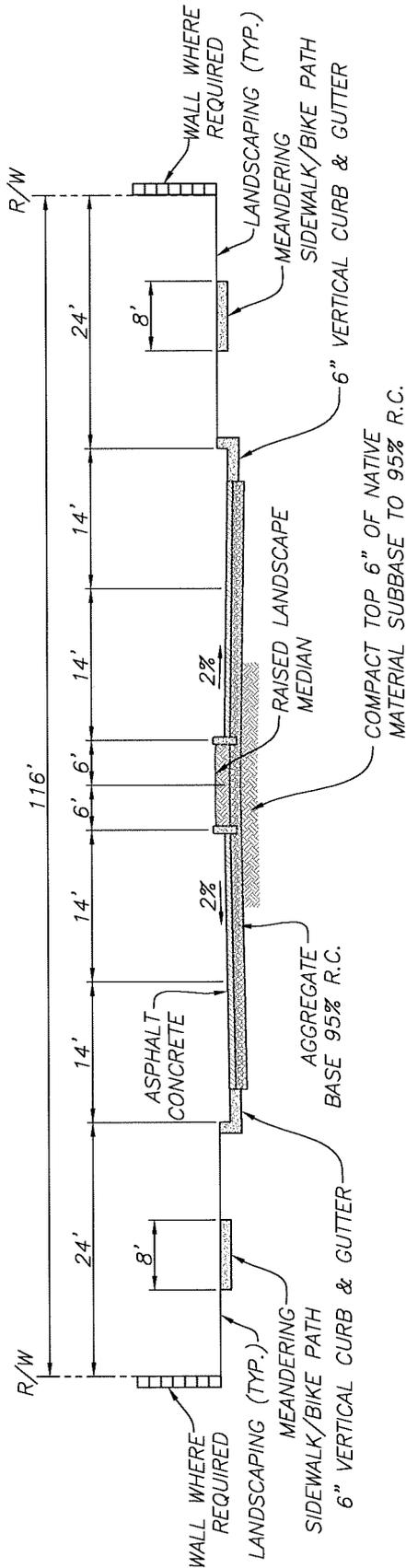
4 LANE MAJOR ARTERIAL STREET SECTION

APPROVED BY:

DATE:

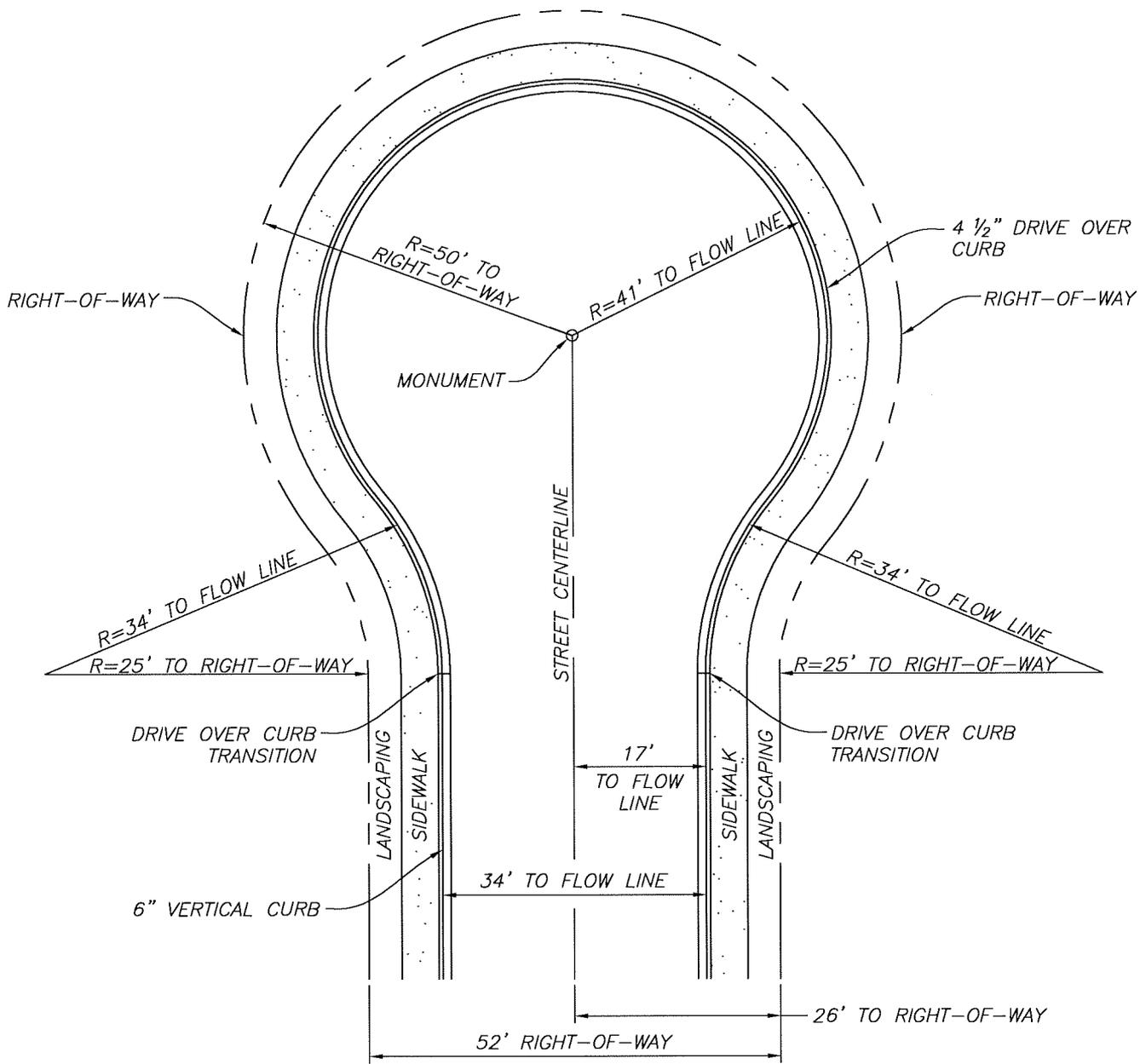
DRAWING NO.

2 - F



4 LANE ARTERIAL MAJOR STREET

NOTE: NO PARKING



Apr 16, 2012 - 11:46am
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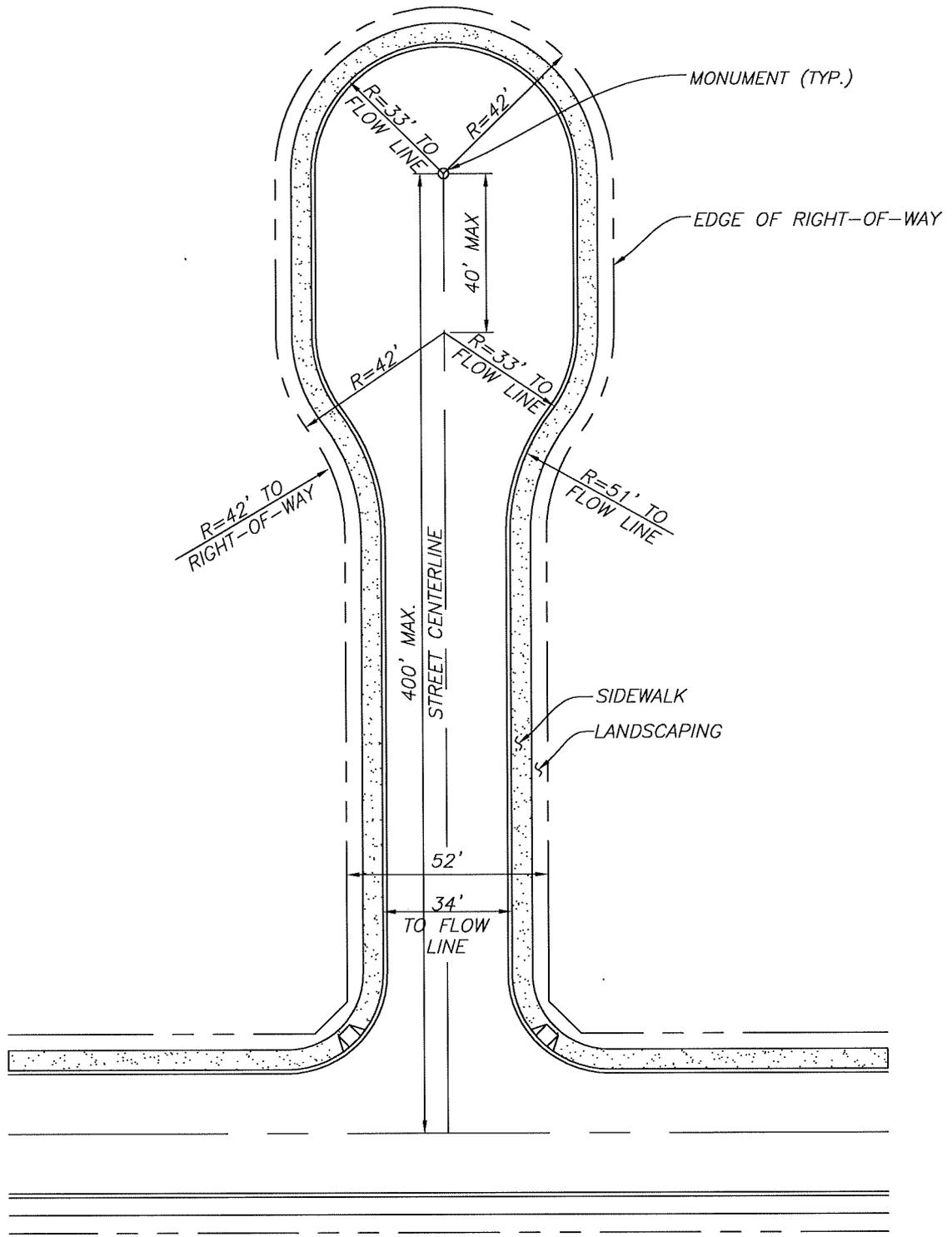


CITY OF GUSTINE IMPROVEMENT STANDARDS

CUL-DE-SAC GEOMETRY

APPROVED BY: _____ DATE: _____

DRAWING NO. **2 - G**



Apr 16, 2012 - 11:08am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

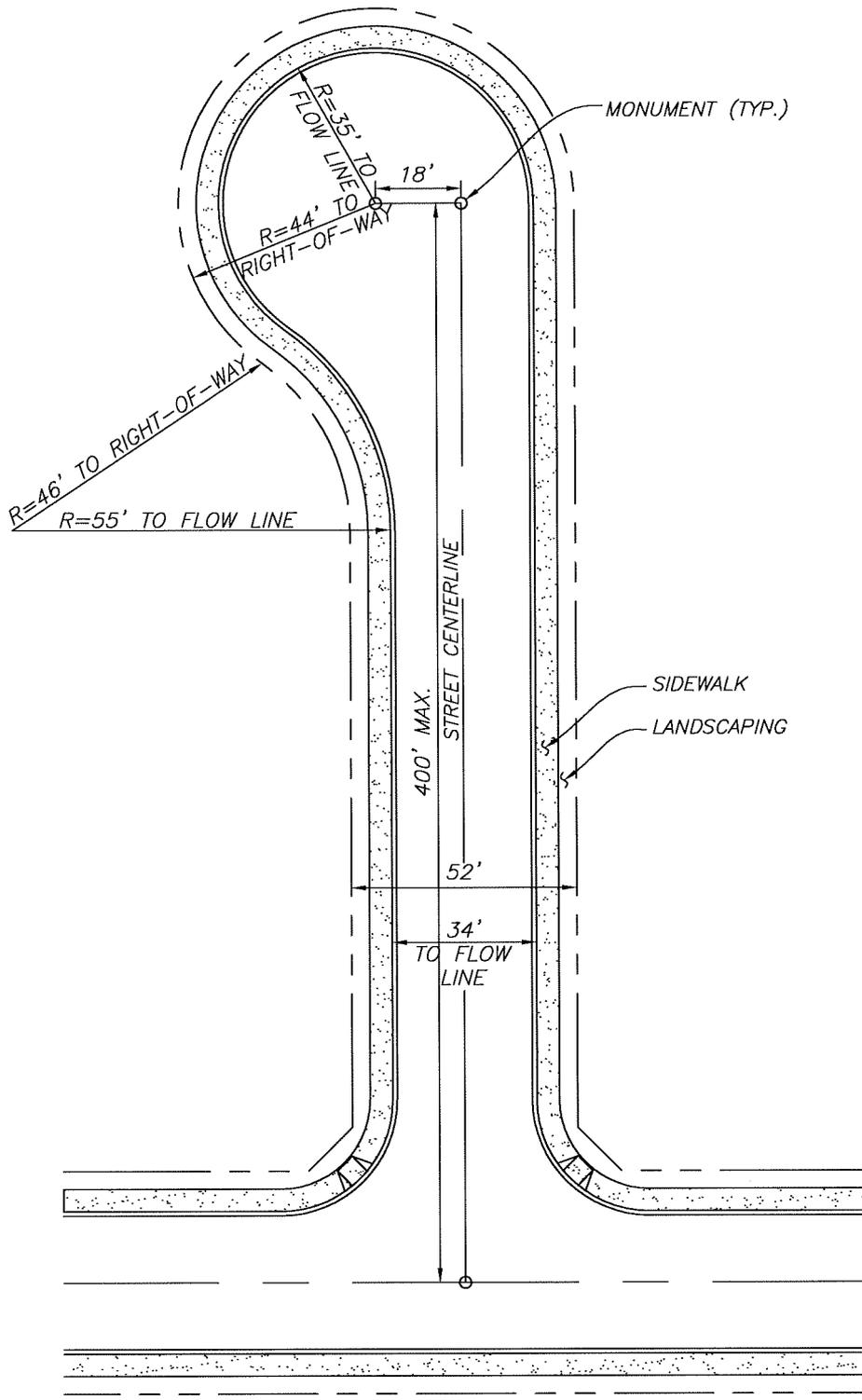
CUL-DE-SAC ELONGATED

APPROVED BY:

DATE:

DRAWING NO.

2 - H



Apr 16, 2012 - 11:08am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

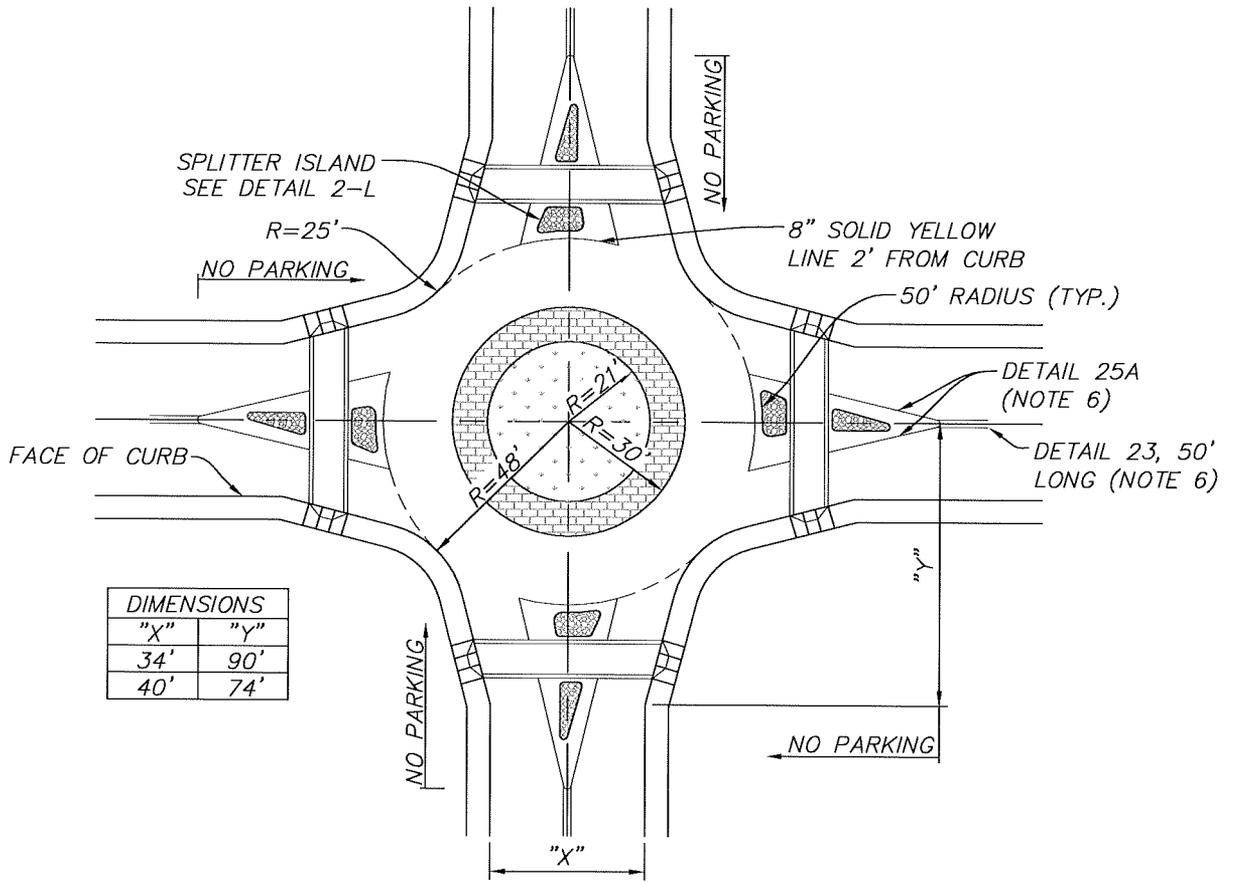
CUL-DE-SAC TANGENT ONE SIDE

APPROVED BY:

DATE:

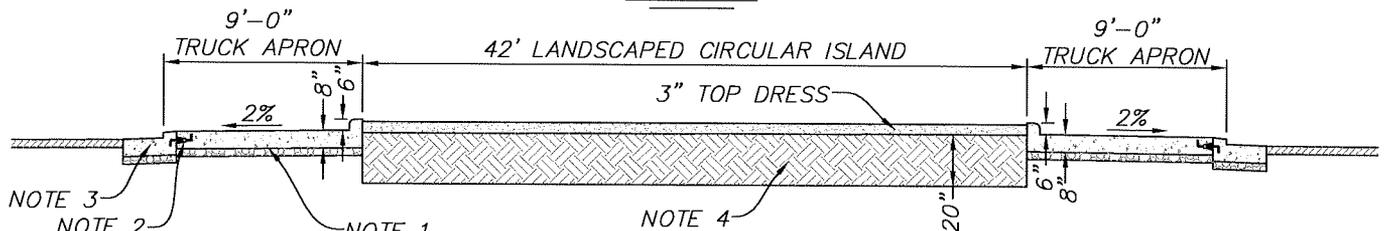
DRAWING NO.

2-1



DIMENSIONS	
"X"	"Y"
34'	90'
40'	74'

PLAN

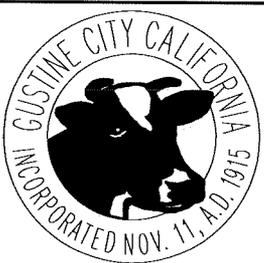


TYPICAL SECTION OF CIRCULAR ISLAND

NOTES:

1. STAMPED AND COLORED CONCRETE SHALL BE USED FOR TRUCK APRON. PATTERN AND COLOR TO BE APPROVED BY PLANNING DIRECTOR. REINFORCE WITH No. 4 BARS AT 12-INCH O.C. EACH WAY. PROVIDE 2-INCH DEEP RADIAL CONTRACTION JOINTS ON APPROXIMATE 8-FOOT CENTERS. (EQUAL SPACING)
2. No. 4 BARS 24-INCHES LONG, 24-INCH O.C. 12-INCH EMBEDMENT IN CURB AND GUTTER.
3. ROUNDABOUT CURB AND GUTTER, SEE DRAWING No. 2-L.
4. REMOVE EXISTING SOIL AND REPLACE WITH TOP SOIL APPROVED BY PUBLIC WORKS DIRECTOR. ALLOW FOR 3-INCH TOP DRESS AND 1-INCH OF FREEBOARD AT CURB.
5. INSTALL TYPE H REFLECTORS AROUND CIRCULAR ISLAND ON APPROXIMATELY 3-FOOT CENTERS.
6. STRIPING AND REFLECTOR DESIGNATION IS PER STATE STANDARDS.

Apr 16, 2012 - 1:05pm
V:\COG\city_standards\cod\2 - K.dwg



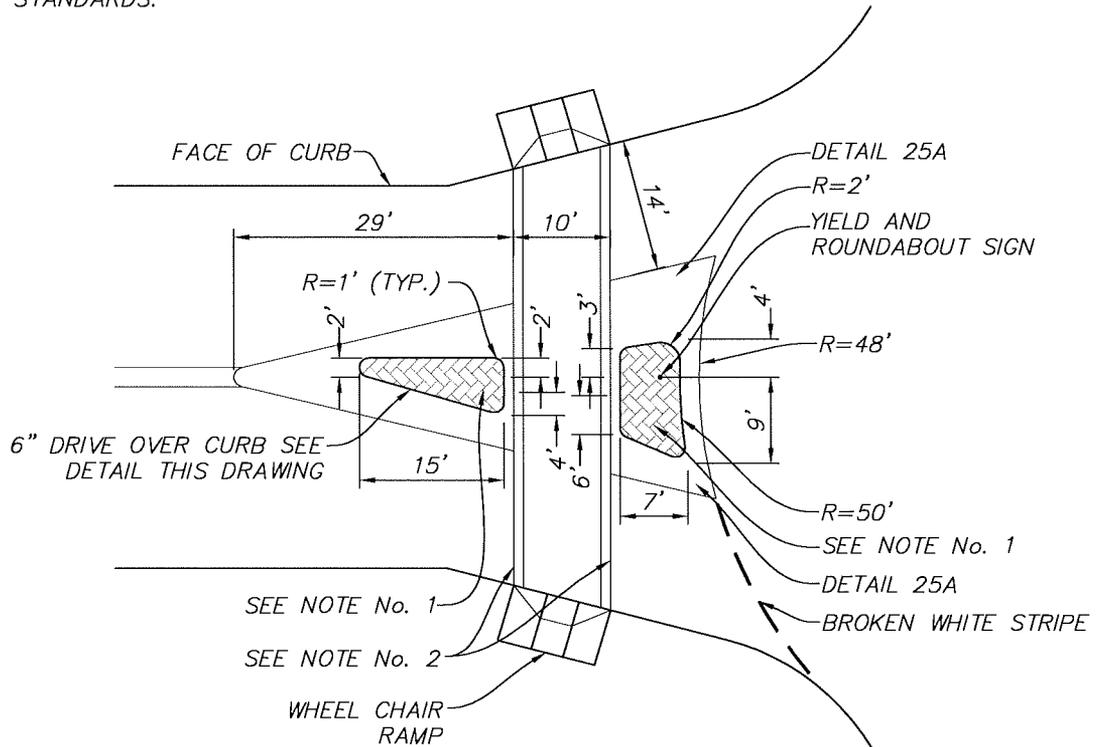
CITY OF GUSTINE IMPROVEMENT STANDARDS

TYPICAL ROUNDABOUT

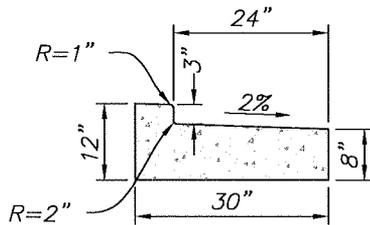
APPROVED BY:	DATE:	DRAWING NO. 2-K
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NOTES:

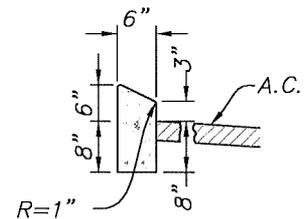
1. STAMPED AND COLORED CONCRETE PATTERN AND COLOR AS APPROVED BY THE PLANNING DIRECTOR.
2. THERMOPLASTIC CROSSWALK MARKING. (12 INCHES WIDE - 8 FEET CLEAR BETWEEN STRIPES.)
3. STRIPING AND REFLECTOR DESIGNATION IS PER STATE STANDARDS.



SPLITTER ISLAND DETAIL



COMBINATION CURB AND GUTTER



6" CURB

Apr 16, 2012 - 11:59am
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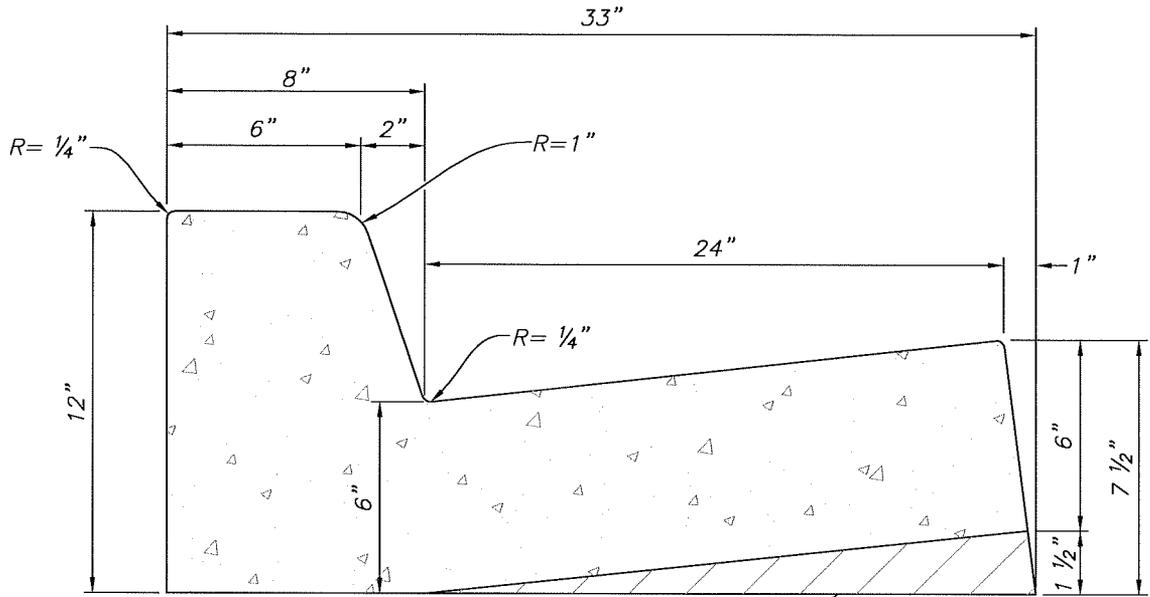


CITY OF GUSTINE IMPROVEMENT STANDARDS

ROUNDABOUT DETAILS

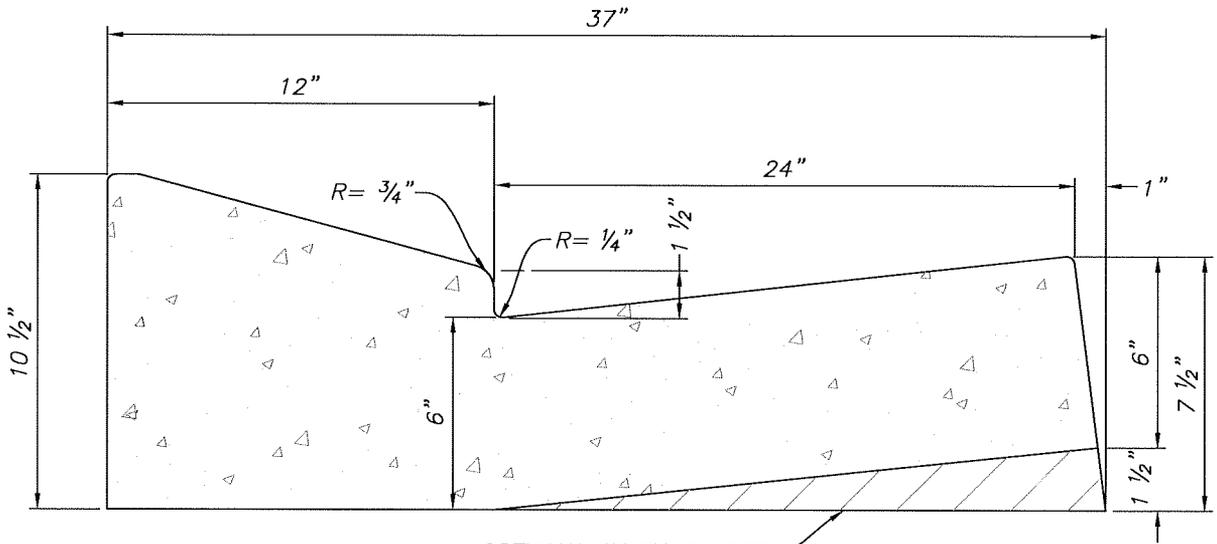
APPROVED BY: _____ DATE: _____

DRAWING NO. **2 - L**



OPTIONAL WHEN PLACED WITH SLIP FORM MACHINE.

VERTICAL CURB AND GUTTER



OPTIONAL WHEN PLACED WITH SLIP FORM MACHINE.

DRIVE-OVER CURB AND GUTTER

NOTE: SEE DRAWING No. 2-0 FOR BASE AND SUBBASE REQUIREMENTS.

Apr 16, 2012 - 11:09am
 V:\COG\city_standards\cad\2 - M.dwg

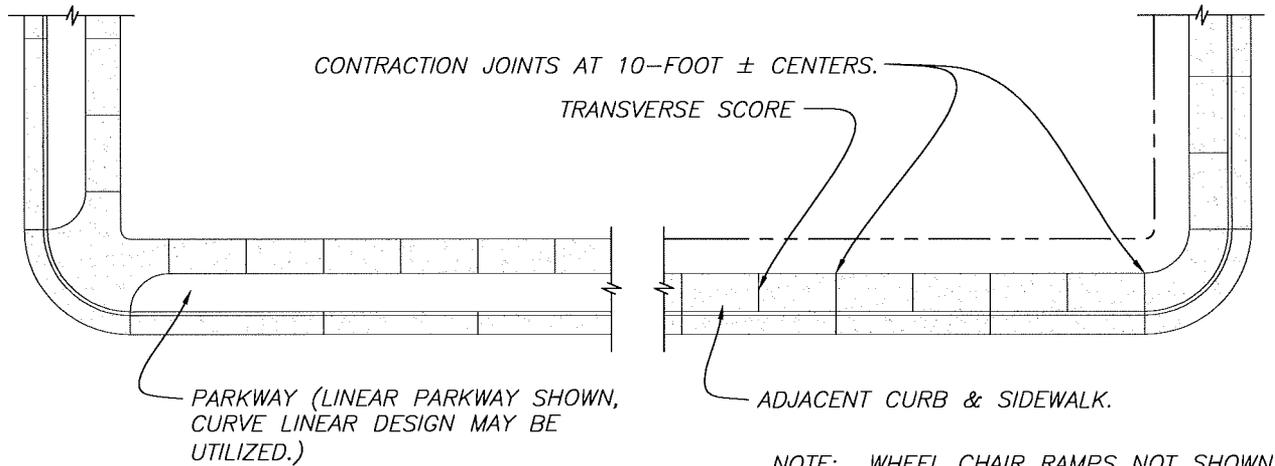


CITY OF GUSTINE IMPROVEMENT STANDARDS

**6" VERTICAL CURB AND GUTTER AND
 4 1/2" DRIVE-OVER CURB AND GUTTER**

APPROVED BY: _____ DATE: _____

DRAWING NO. **2 - M**



TYPICAL SIDEWALK PLAN

NOTES:

1. EDGES TO HAVE $\frac{3}{4}$ -INCH RADIUS.
2. TRANSVERSE SCORES NOT LESS THAN $\frac{3}{8}$ -INCH DEEP EXCEPT AT CONTRACTION JOINTS WHICH SHALL BE $1\frac{1}{2}$ -INCHES DEEP.
3. CONTRACTION JOINTS MAY BE SAWED.
4. SIDEWALK TO BE REMOVED SHALL BE SAWCUT. CONCRETE SHALL BE REMOVED TO THE NEAREST TRAVERSE SCORE OR CONTRACTION JOINT.
5. CITY SHALL APPROVE SUBGRADE PREPARATION PRIOR TO PLACEMENT OF CONCRETE.

Apr 16, 2012 -- 1:13pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

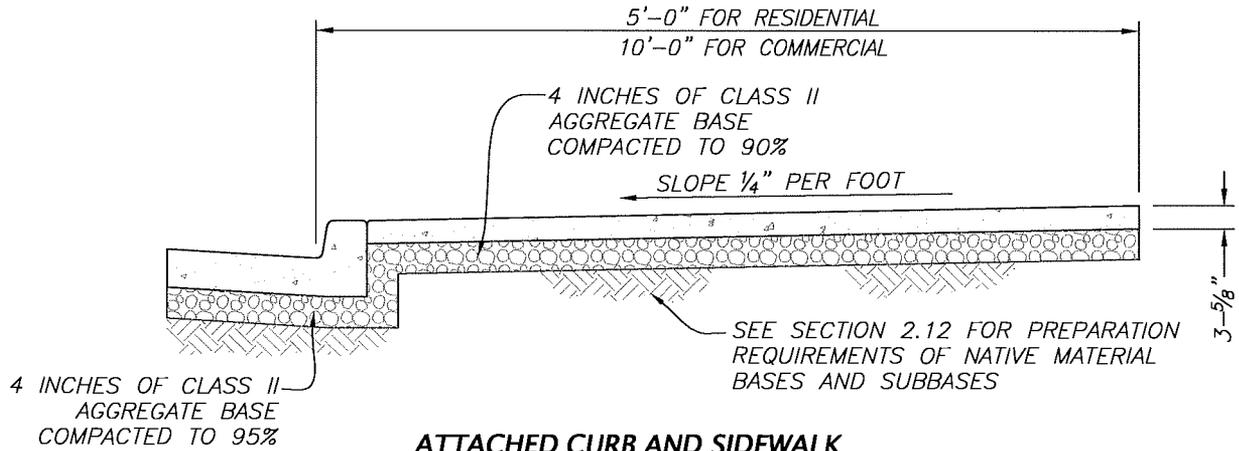
SIDEWALK CONSTRUCTION

APPROVED BY:

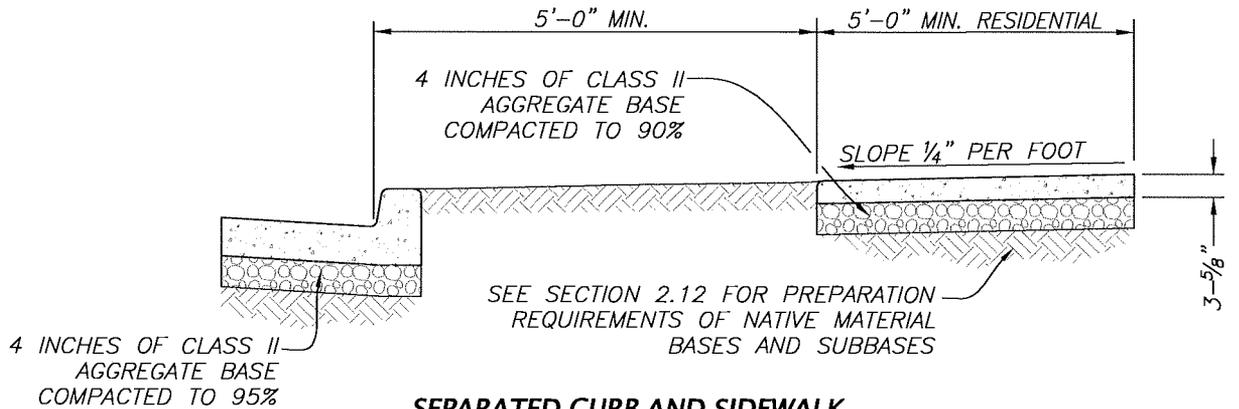
DATE:

DRAWING NO.

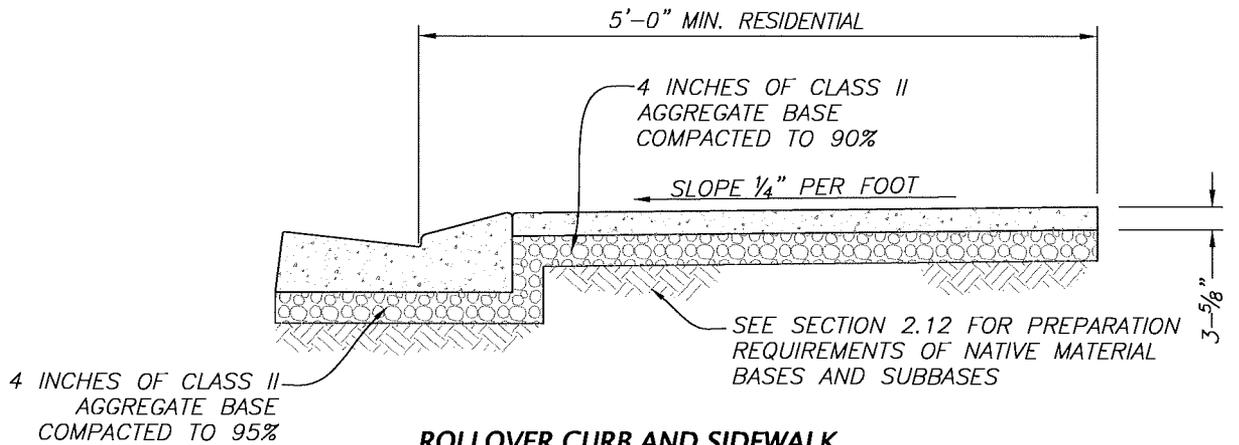
2 - N



ATTACHED CURB AND SIDEWALK



SEPARATED CURB AND SIDEWALK



ROLLOVER CURB AND SIDEWALK

NOTE: SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557.

Apr 16, 2012 - 1:15pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

SIDEWALK SECTIONS

APPROVED BY:

DATE:

DRAWING NO.

2 - 0



CITY OF GUSTINE IMPROVEMENT STANDARDS

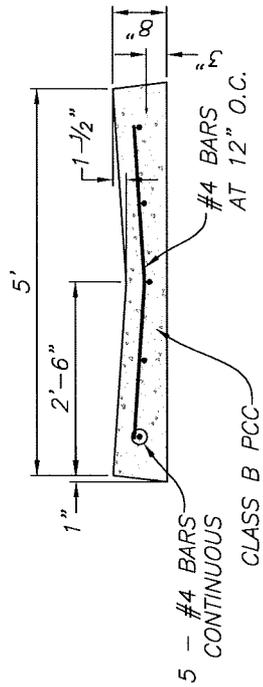
VALLEY GUTTER

APPROVED BY:

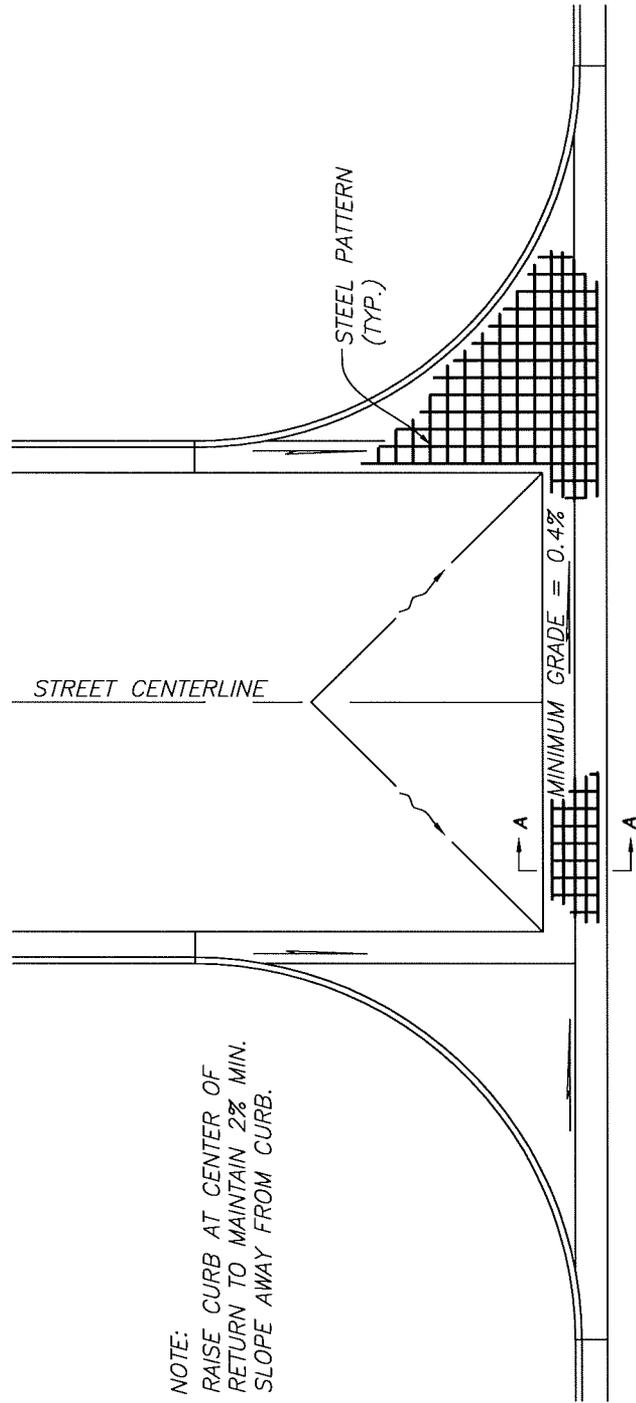
DATE:

DRAWING NO.

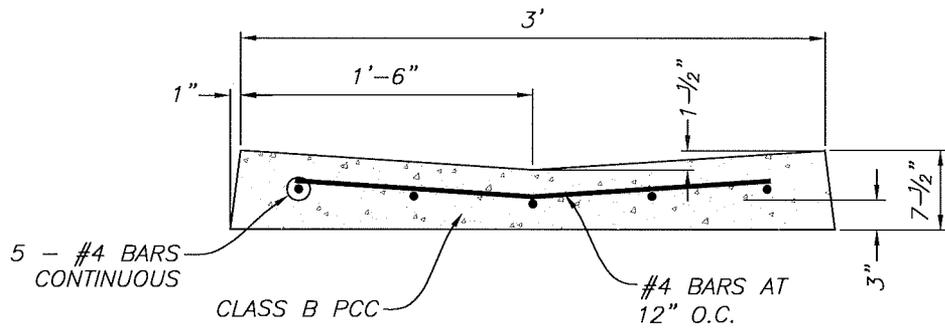
2 - P



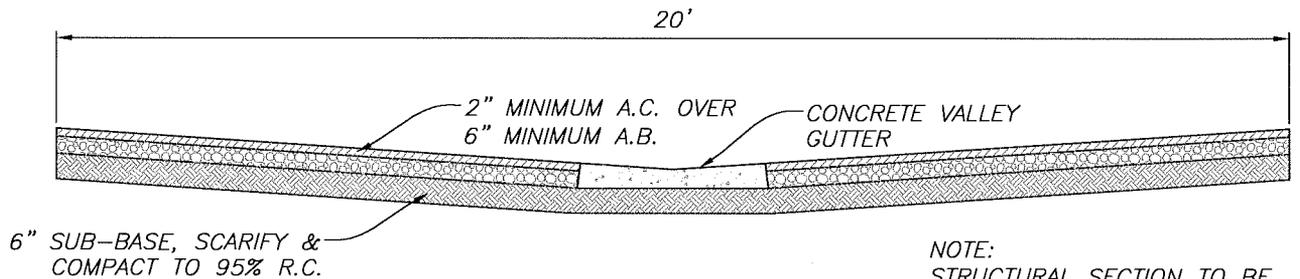
SECTION A-A



NOTE:
 RAISE CURB AT CENTER OF
 RETURN TO MAINTAIN 2% MIN.
 SLOPE AWAY FROM CURB.



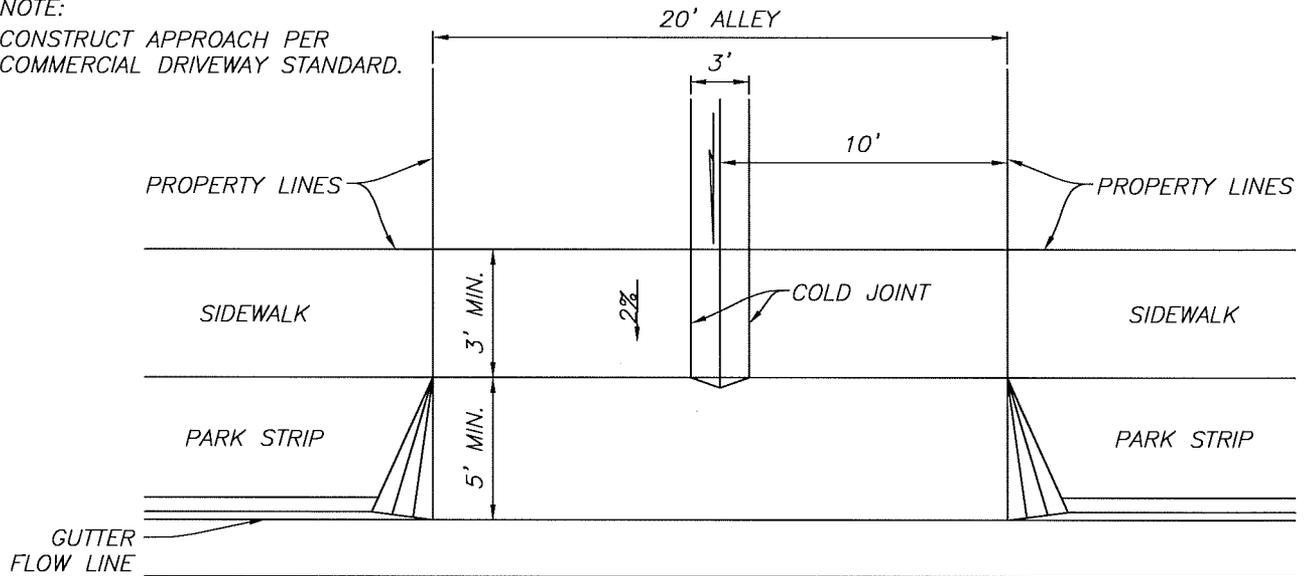
CONCRETE VALLEY GUTTER DETAIL



ALLEY INTERSECTION

NOTE:
STRUCTURAL SECTION TO BE
DESIGNED ACCORDING TO SECTION
3.3 OF THESE STANDARDS

NOTE:
CONSTRUCT APPROACH PER
COMMERCIAL DRIVEWAY STANDARD.



PLAN

Apr 16, 2012 - 1:29pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

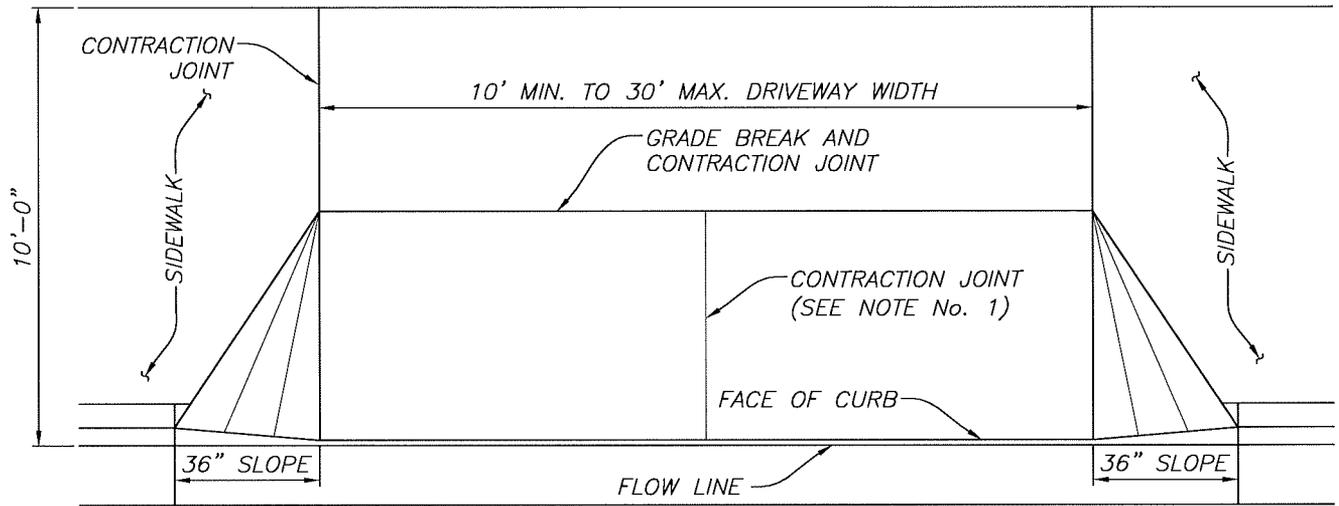
ALLEY APPROACH

APPROVED BY:

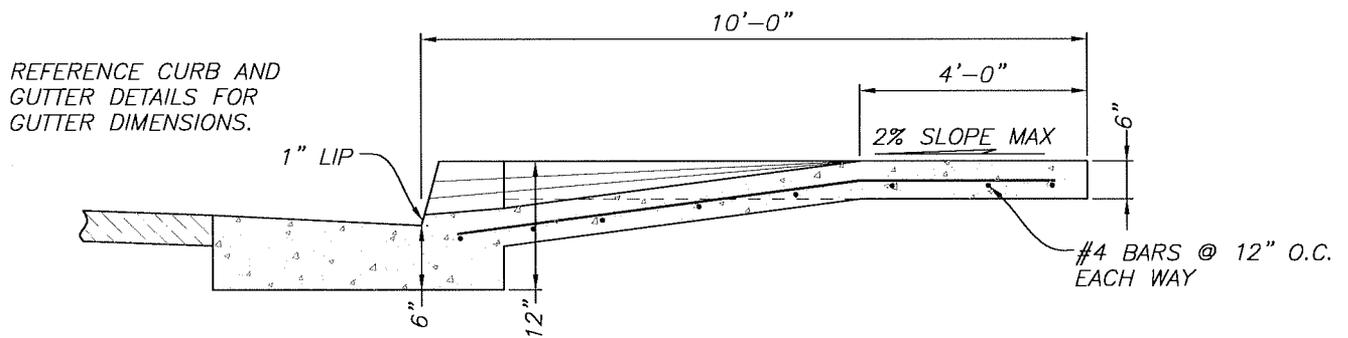
DATE:

DRAWING NO.

2 - Q



PLAN



SECTION

NOTES:

1. CONTRACTION JOINT TO BE ADDED TO CENTER OF APPROACH IF IT IS OVER 20' WIDE.
2. DRIVEWAYS SHALL BE CONSTRUCTED OF CLASS "3" PORTLAND CEMENT CONCRETE.

Apr 16, 2012 - 1:32pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

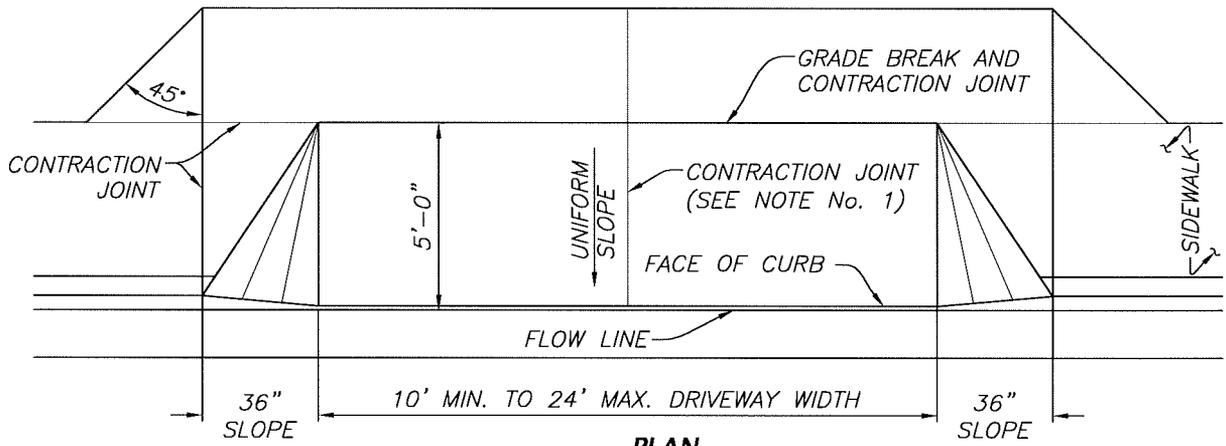
COMMERCIAL / INDUSTRIAL DRIVEWAY

APPROVED BY:

DATE:

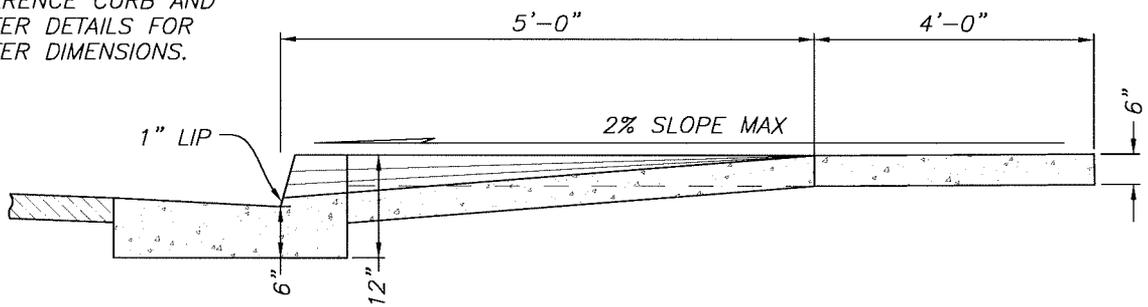
DRAWING NO.

2 - R



PLAN

REFERENCE CURB AND GUTTER DETAILS FOR GUTTER DIMENSIONS.



SECTION

NOTES:

1. CONTRACTION JOINT TO BE ADDED TO CENTER OF APPROACH IF IT IS OVER 20' WIDE.
2. DRIVEWAYS SHALL BE CONSTRUCTED OF CLASS "3" PORTLAND CEMENT CONCRETE.

Apr 16, 2012 - 1:36pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

**RESIDENTIAL DRIVEWAY
(CURB AND GUTTER ATTACHED)**

APPROVED BY:

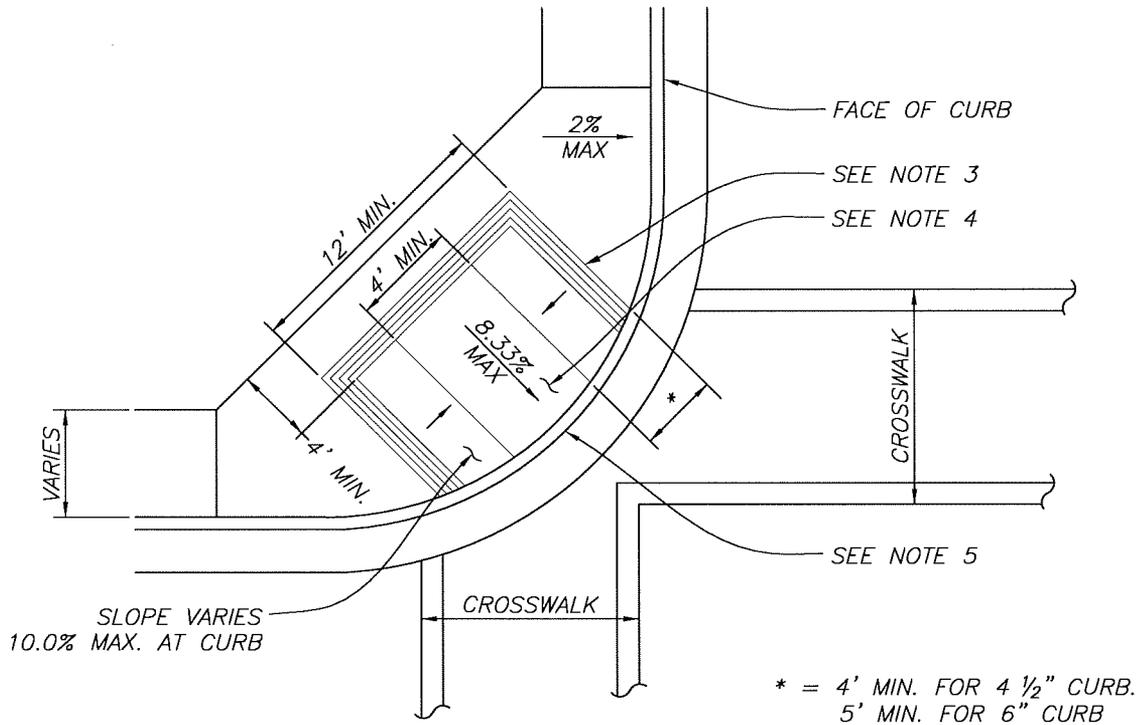
DATE:

DRAWING NO.

2 - S

NOTE

DETAIL SHOWN FOR ATTACHED CURB AND SIDEWALK. SIMILAR FOR SEPARATED CURB AND SIDEWALK.



NOTES:

1. WHEEL CHAIR RAMP TYPE 1 IS FOR NEW CONSTRUCTION.
2. SIDEWALK AND WHEEL CHAIR RAMP IN RETURN AREA SHALL BE 5 1/2" THICK MINIMUM.
3. TOP OF CURB SHALL BE FLUSH WITH GUTTER FLOWLINE AT RAMP.
4. SLOPES, SCORING, DETECTABLE WARNINGS, FINISH ETC. SHALL CONFORM WITH THE LATEST REQUIREMENTS OF TITLE 24, CALIFORNIA STATE ACCESSIBILITY STANDARDS, STATE ARCHITECTURAL REGULATIONS FOR THE PHYSICALLY HANDICAPPED.

Apr 16, 2012 - 1:38pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

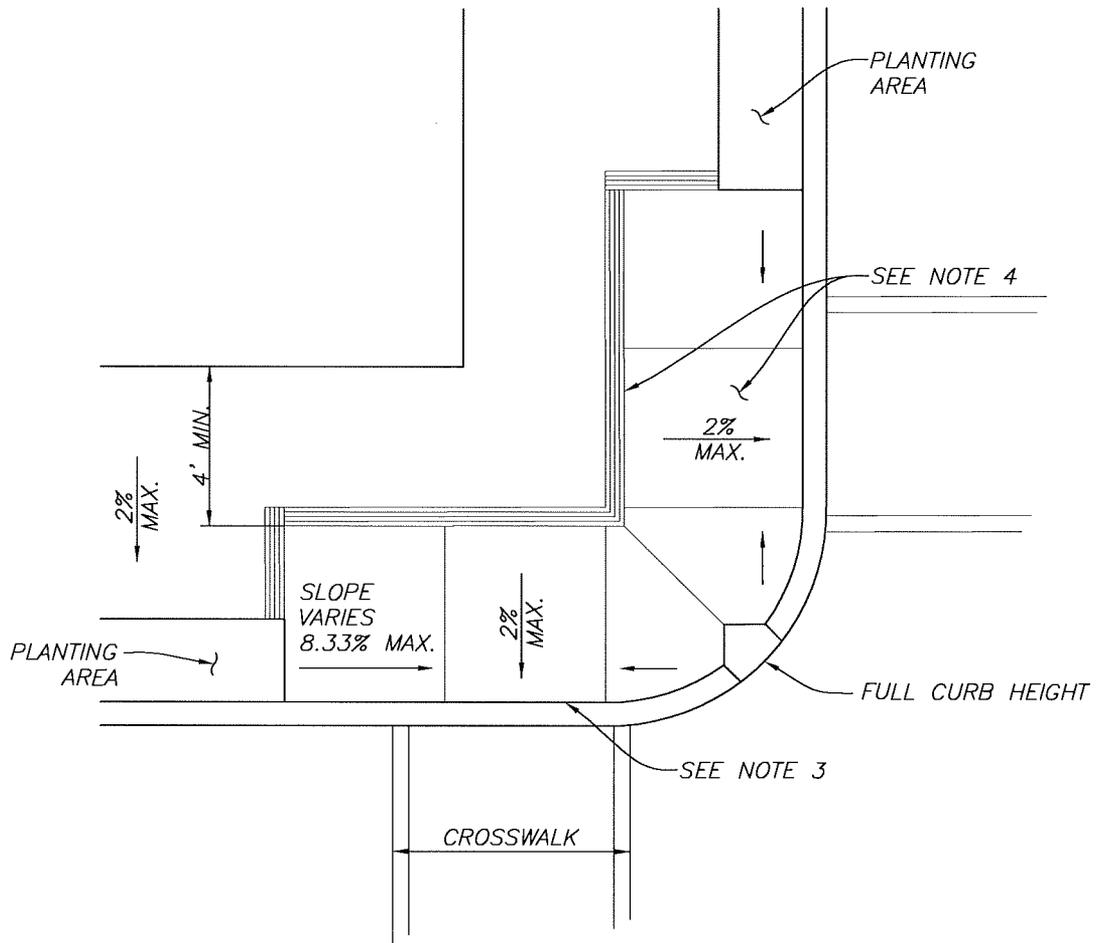
WHEEL CHAIR RAMP - TYPE 1

APPROVED BY:

DATE:

DRAWING NO.

2 - T



NOTES:

1. WHEEL CHAIR RAMP DESIGN IS FOR RETROFIT ONLY.
2. WHEEL CHAIR RAMP SHALL BE 3 5/8" THICK MINIMUM.
3. TOP OF CURB SHALL BE FLUSH WITH GUTTER FLOW LINE AT RAMP.
4. SLOPES, SCORING, DETECTABLE WARNINGS, FINISH, ETC. SHALL CONFORM WITH THE LATEST REQUIREMENTS OF TITLE 24, CALIFORNIA STATE ACCESSIBILITY STANDARDS, STATE ARCHITECTURAL REGULATIONS FOR THE PHYSICALLY HANDICAPPED.

Apr 16, 2012 - 11:09am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

WHEEL CHAIR RAMP - TYPE 2

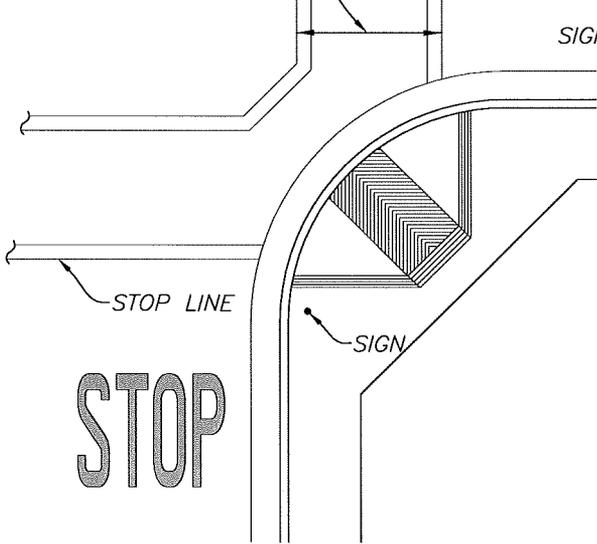
APPROVED BY:

DATE:

DRAWING NO.

2 - U

CROSSWALK STRIPING
IF REQUIRED. (TYP.)

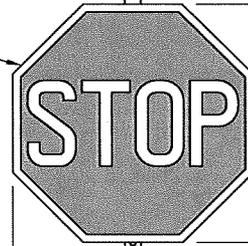


STOP

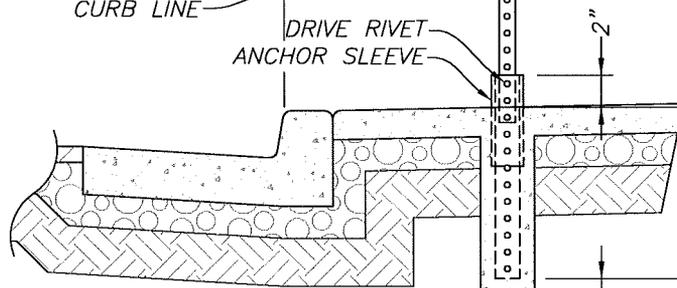
DIMENSION 'A' SHALL BE SUCH THAT THE MINIMUM CLEARANCE BETWEEN CURB LINE AND THE FURTHEST PROTRUSION OF THE SIGNS TOWARD THE STREET SHALL BE NOT LESS THAN 8".

STOP SIGN, YIELD SIGN, OR OTHER SIGN AS PER PLANS

ROBIN ST. 900



2" SQUARE POST



NOTE: INSERT POST 4" INTO SLEEVE.

12" DIA.

2" MIN.

NOTES:

1. SEE DWG. No. 2-X FOR ADDITIONAL INFORMATION ON STREET NAME SIGN ASSEMBLY.
2. CONCRETE FOOTING NOT REQUIRED IF POST INSTALLED IN CONCRETE.
3. STOP SIGNS SHALL BE REFLECTIVE TYPE: 3M ENGINEER GRADE REFLECTIVE MATERIAL OR EQUAL.
4. "STOP", PAVEMENT MARKING STOP LINE AND CROSS WALK STRIPING SHALL BE OF THERMOPLASTIC MATERIAL IN ACCORDANCE WITH SECTION 84-2, OF THE STATE STANDARD SPECIFICATIONS.
5. LOCATE POLE IN CONCRETE AREA UNLESS SHOWN OTHERWISE ON PLANS.
6. SIGN POST SHALL BE 14 GAUGE 2-INCH SQUARE PERFORATED GALVANIZED STEEL WITH 6 GAUGE 2 1/4-INCH SQUARE PERFORATED GALVANIZED STEEL ANCHOR SLEEVE AS MANUFACTURED BY UNISTRUT CORPORATION.

CITY OF GUSTINE IMPROVEMENT STANDARDS

STOP SIGN INSTALLATION

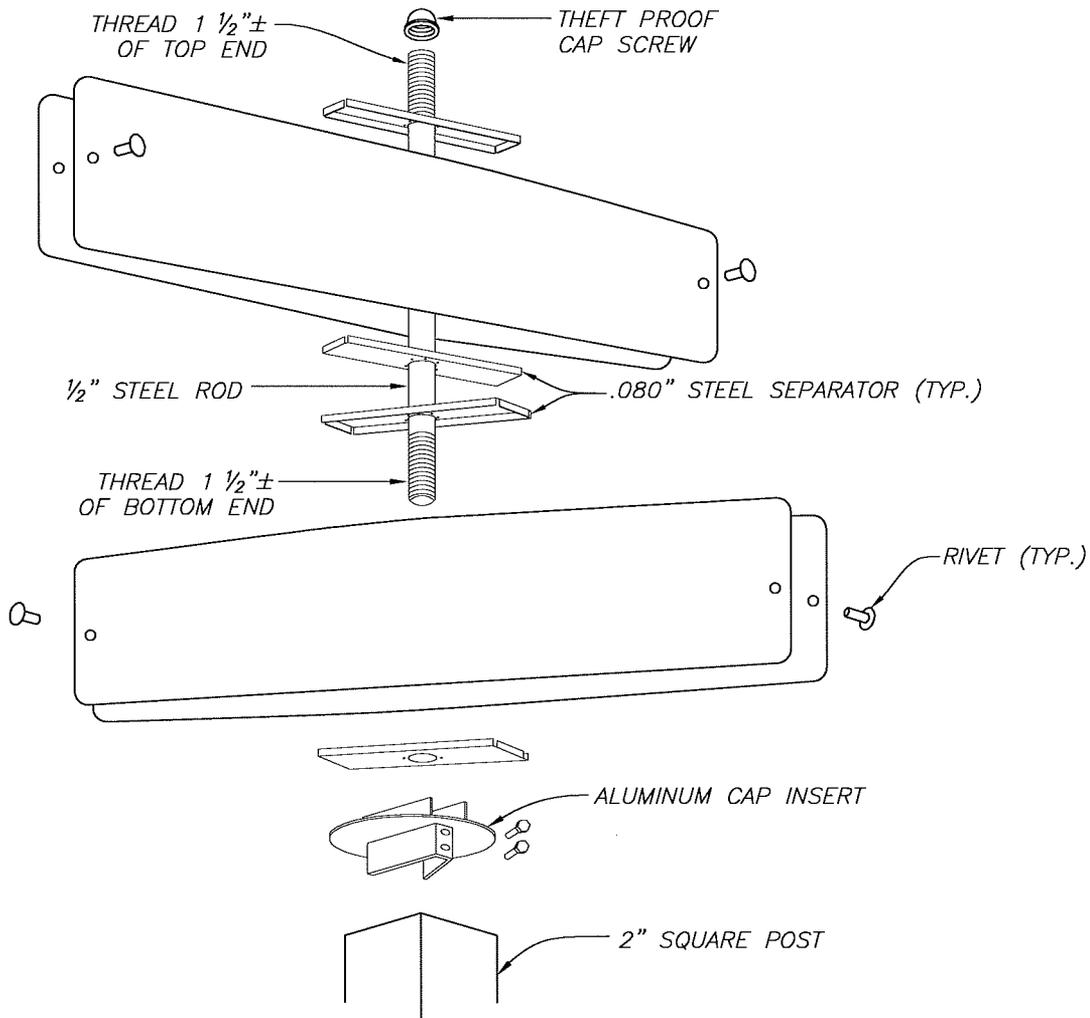
DRAWING NO.

2 - W

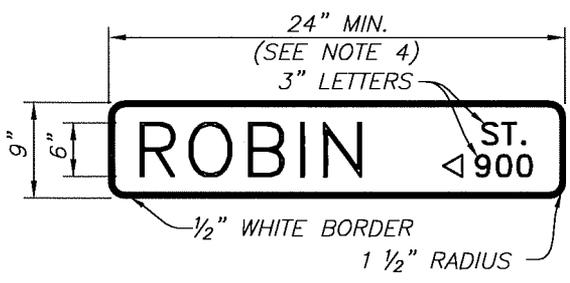
APPROVED BY:

DATE:





STREET NAME SIGN HARDWARE



STREET SIGN

NOTES:

1. STREET NAME SIGN TO BE PLACED 7'-6" ABOVE GROUND.
2. SEE DRAWING No. 2-W FOR MOUNTING LOCATIONS AND INSTALLATION DETAILS.
3. STREET NAME SIGN SHALL BE 0.080-INCH ALUMINUM. BACKGROUND SHALL BE ENGINEERING GRADE 3M REFLECTIVE VINYL SHEETING. SIGN PLATE COLOR SHALL BE GREEN WITH A 1/2" REFLECTIVE WHITE BORDER. SIGN LEGEND SHALL BE 3M REFLECTIVE WHITE VINYL "C" HIGHWAY GOTHIC LETTERING.
4. LENGTH OF 30" AND 36" MAY BE USED TO ACCOMMODATE LONGER STREET NAMES.

Apr 16, 2012 - 1:51pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

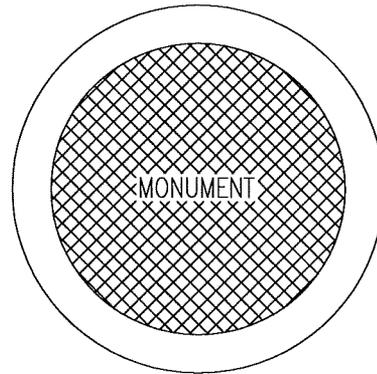
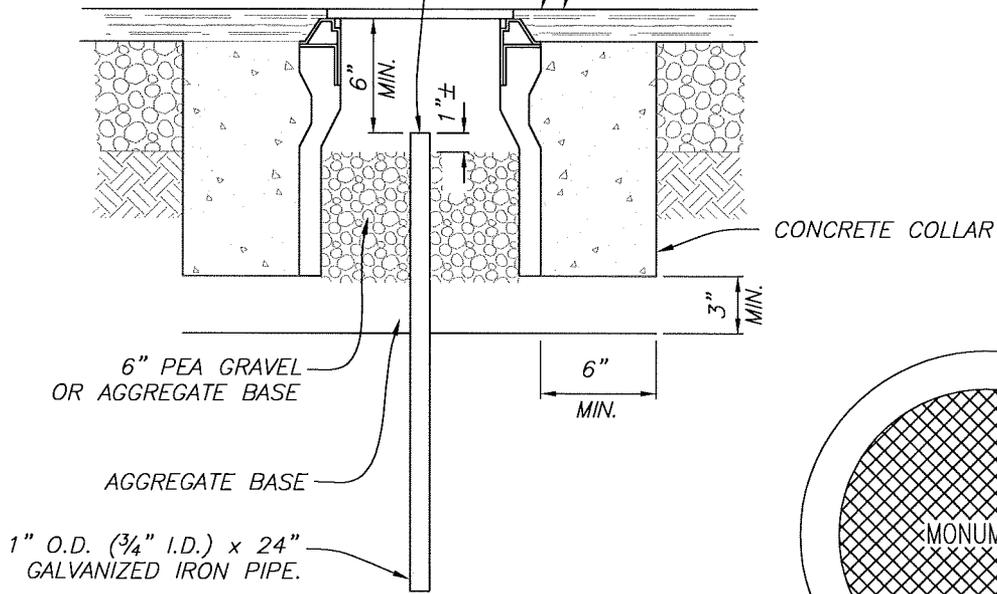
STREET NAME SIGN

APPROVED BY: _____ DATE: _____

DRAWING NO. **2 - X**

MARKED OR TAGGED WITH
CERTIFICATE NUMBER OF
L.S. OR APPROVED R.C.E.

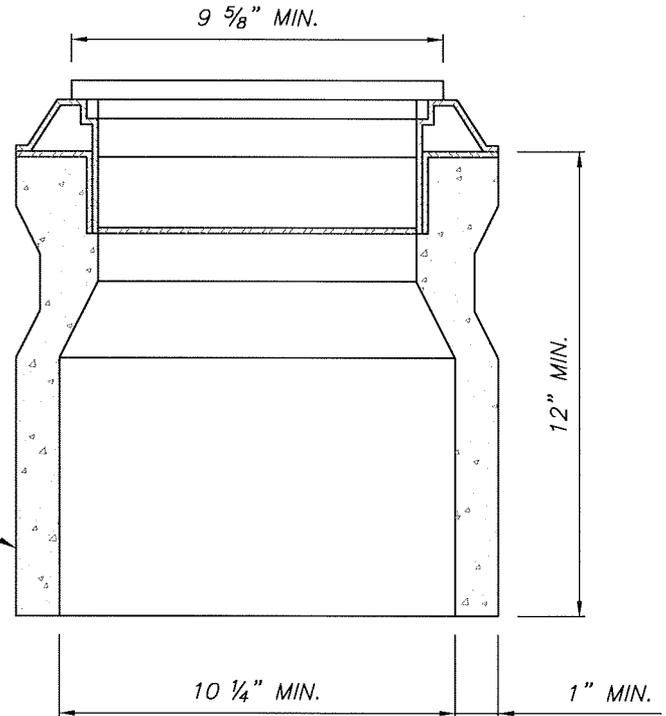
FINISHED GRADE
ASPHALT CONCRETE



NOTE:

1. FOR INSTALLATION INSIDE STREET SECTIONS ONLY.

CHRISTY G5 OR BROOKS 3RT
TRAFFIC BOX.



Apr 16, 2012 - 1:59pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

SURVEY MONUMENT AND WELL

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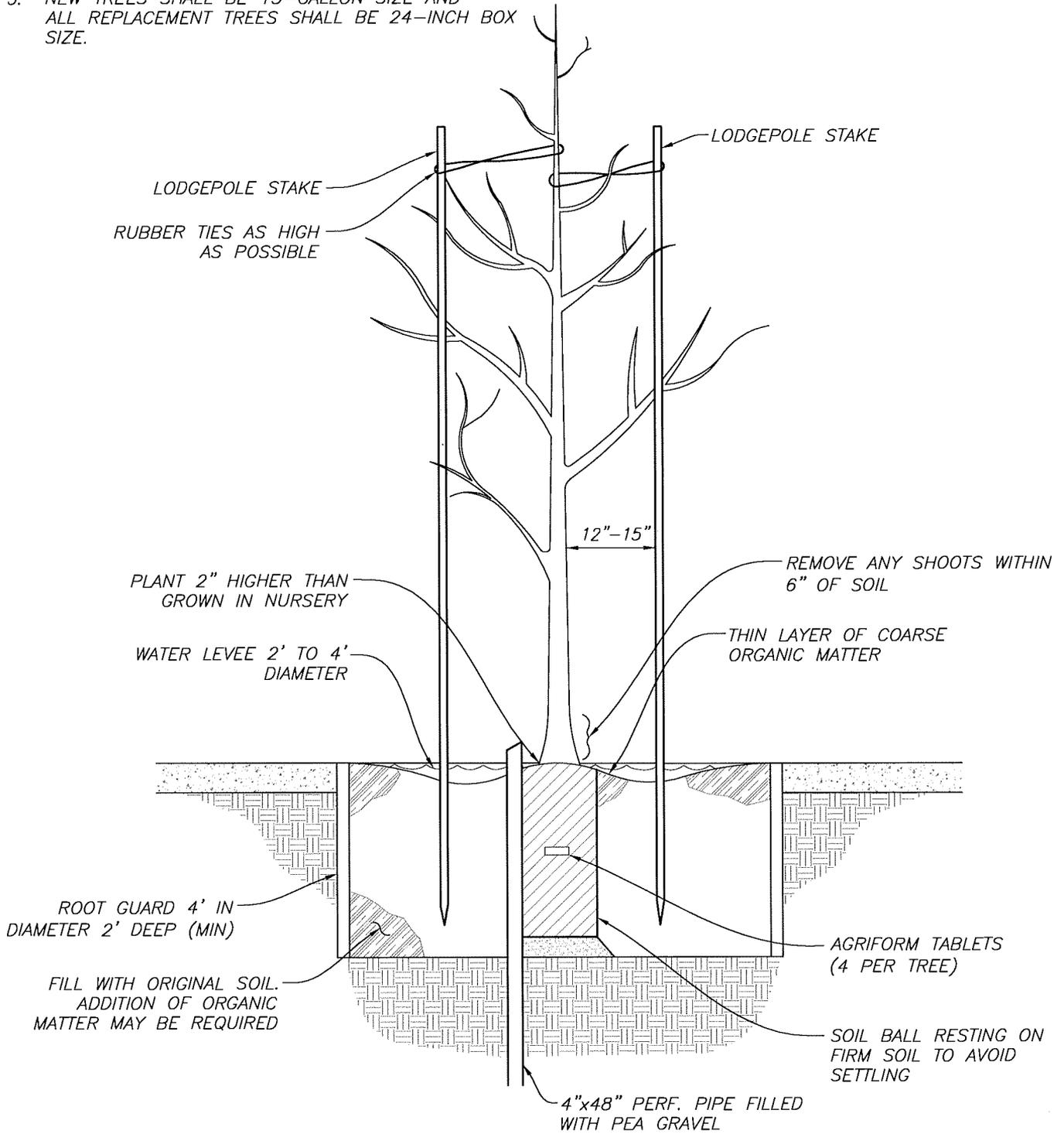
DATE:

DRAWING NO.

2 - Y

NOTES:

1. PLACE STAKES SUCH AS TO PREVENT BRANCHES FROM RUBBING ON THEM.
2. TIES AS APPROVED BY PUBLIC WORKS DIRECTOR.
3. NEW TREES SHALL BE 15-GALLON SIZE AND ALL REPLACEMENT TREES SHALL BE 24-INCH BOX SIZE.



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CITY OF GUSTINE IMPROVEMENT STANDARDS

TREE PLANTING

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DRAWING NO.

2 - Z



CITY OF GUSTINE IMPROVEMENT STANDARDS

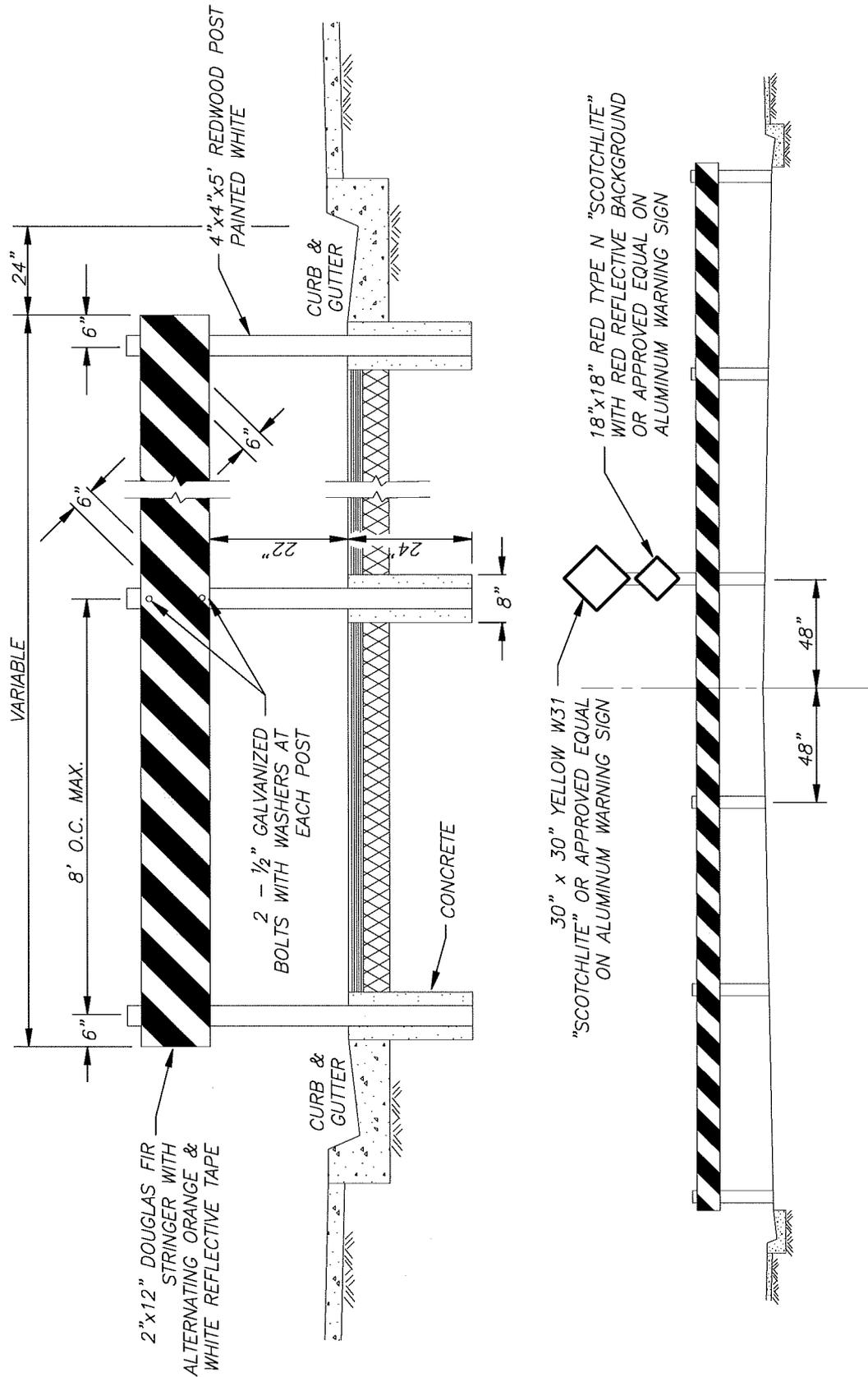
DEAD END STREET BARRICADE

APPROVED BY:

DATE:

DRAWING NO.

2 - AA



SECTION 3 - LIGHTING

SPECIFICATIONS:

3.1	GENERAL	3-1
3.2	DESIGN	3-1
3.3	REGULATIONS AND CODES	3-1
3.4	EXCAVATION AND BACKFILL	3-1
3.5	CONDUIT	3-1
3.6	PULL BOXES... ..	3-2
3.7	FOUNDATIONS	3-2
3.8	ANCHOR BOLTS	3-2
3.9	CONDUCTORS	3-2
3.10	WIRING	3-2
3.11	POLES	3-3
3.12	ELECTROLIERS	3-3
3.13	PHOTOELECTRIC CELLS	3-3
3.14	TESTING	3-4
3.15	RECORD DRAWINGS	3-4

DRAWINGS:

3A	ELECTROLIER LOCATIONS
3B	ELECTROLIER LOCATIONS
3C	ELECTROLIER
3D	DECORATIVE ELECTROLIER
3E	STANDARD ELECTROLIER BASE DETAIL
3F	DECORATIVE ELECTROLIER BASE DETAIL
3G	ELECTROLIER STREET NAME SIGN ARM BRACKET

SECTION 3

LIGHTING

3.1 GENERAL

Street lighting shall be installed in conformance with these Improvement Standards by a Developer or Contractor holding an appropriate license for such work under the provisions of the State of California Business and Professions Code. All street lighting shall be owned by the City of Gustine.

Electroliers utilized for the project shall be either standard or decorative as determined by the City.

3.2 DESIGN

The lighting system shall be designed to best serve the area and to minimize the length of service runs from the points of connection to the street lights.

All street lights to be installed shall be shown on the Improvement Plans. The location of the power source and of all conduit runs shall also be shown on the plans.

The spacing and location for standard electroliers shall be as shown on Drawings No. 3-A and 3-B. For decorative electroliers, spacing and location shall be as determined by the Engineer and as approved by the City Engineer.

3.3 REGULATIONS AND CODES

Regulations and codes shall conform to Section 86-1.02 of the State Standards.

3.4 EXCAVATION AND BACKFILL

Excavation and backfill shall be in accordance with Section 86-2.01 of the State Standards.

3.5 CONDUIT

All conductors shall be installed in conduit except inside poles. Conduit shall be in accordance with applicable sections of Section 86-2.05 of the State Standards and shall be sized in accordance with the National Electrical Code; however, in no case shall the conduit be smaller than that indicated in Section 86-2.05b of the State Standards. Conduit shall be installed in accordance with the applicable sections of Section 86-2.05c of the State Standards. All risers shall be rigid steel.

3.6 PULL BOXES

Pull boxes shall be in accordance with Section 86-2.06 of the State Standards, except that all pull boxes shall be concrete. Pull boxes shall be located where shown on the plans or where required by regulations or codes. Pull boxes shall be Christy N16 with N16J lids or equivalent if located outside of vehicular travel areas. Where located inside vehicular travel areas, lids shall be Christy N16-61J or equivalent. All pull box covers shall be marked "Street Lighting," and installed at finished grade. Pull boxes shall be placed on a bed of pea gravel of 12-inch minimum thickness to allow drainage. Sufficient extensions shall be used to provide connection of conduits without offsets. A fused splice connector shall be used to connect the street light to the line in accordance with Section 86-2.095 of the State Standards.

3.7 FOUNDATIONS

Foundations for poles shall conform to Drawing No. 3-E for standard electroliers and Drawing No. 3-F for decorative electroliers. Foundations shall be placed monolithically to within 4-inches of the sidewalk grade. After the pole is set, a square cap equal to the foundation diameter shall be installed to bring the foundation to sidewalk grade.

3.8 ANCHOR BOLTS

Anchor bolts for standard electroliers shall be 1-inch in diameter, 36 inches long with a 4-inch "L" bend at the bottom end. Anchor bolts for decorative electroliers shall be $\frac{3}{4}$ -inch in diameter, 19 inches long. All anchor bolts shall conform to ASTM Designation A-307.

3.9 CONDUCTORS

Conductors shall conform to Section 86-2.08 of the State Standards.

3.10 WIRING

Wiring shall be in accordance with Section 86-2.09 of the State Standards. In addition, the Contractor shall pull through a test mandrel to remove any foreign matter that may damage the insulation before pulling the conductor. No conductors shall be pulled until the conduit run is complete. Extreme care shall be exercised when pulling conductors and cable into conduits to avoid kinking, twisting, nicking or scratching of the conductors and insulation, or the placement of extreme stress on the conductors or cable.

3.11 POLES

Standard electrolier poles shall be hot-dip galvanized steel. Thirty foot poles, shall be Ameron Catalog No. N-3015, Pacific Union Metal Manufacturing Company Catalog No. FS1130 P15 or an approved equal. Twenty-five foot poles shall be Ameron Catalog No. N-2512, Pacific Union Metal Manufacturing Company No. 71041-Y3-12 or an approved equal.

Decorative electroliers poles shall be 14-foot Hadco Catalog No. P-2560 or approved equal.

Poles shall not be installed until the foundation has set at least five (5) days. Poles shall be plumbed by adjusting the leveling nuts; leveling shims shall not be used.

Poles shall have hand-holes near their bases facing the street.

3.12 ELECTROLIERS

Standard electroliers shall be located according to size as shown on Drawings No. 3-A and 3-B. The luminaries shall be as follows or an approved equal:

200 watt	I.E.S. Type III	G.E. C798N806 Landmark 25-62J3
150 watt	I.E.S. Type III II-4	C760N510 Landmark CD56262-00C
100 watt	I.E.S. Type II	G.E. C760N526 Landmark CD56212-00C

Luminaries shall have high pressure sodium vapor lamps, glass refractors, built-in receptacles for photoelectric cells, and regulator or auto-regulator type ballasts with a power factor of not less than 92%.

Decorative electroliers shall be Hadco Lighting Catalog No. R51BABA (Narrow Body Refractive Globe).

3.13 PHOTOELECTRIC CELLS

Photoelectric cells shall be adjustable, compatible with related equipment and adequate for the load. They shall be General Electric C402G400 or an approved equal for standard electroliers. For decorative electroliers, they shall be Hadco Lighting M004.

3.14 TESTING

All streetlights shall be tested a minimum of 48 hours before acceptance by the City.

3.15 RECORD DRAWINGS

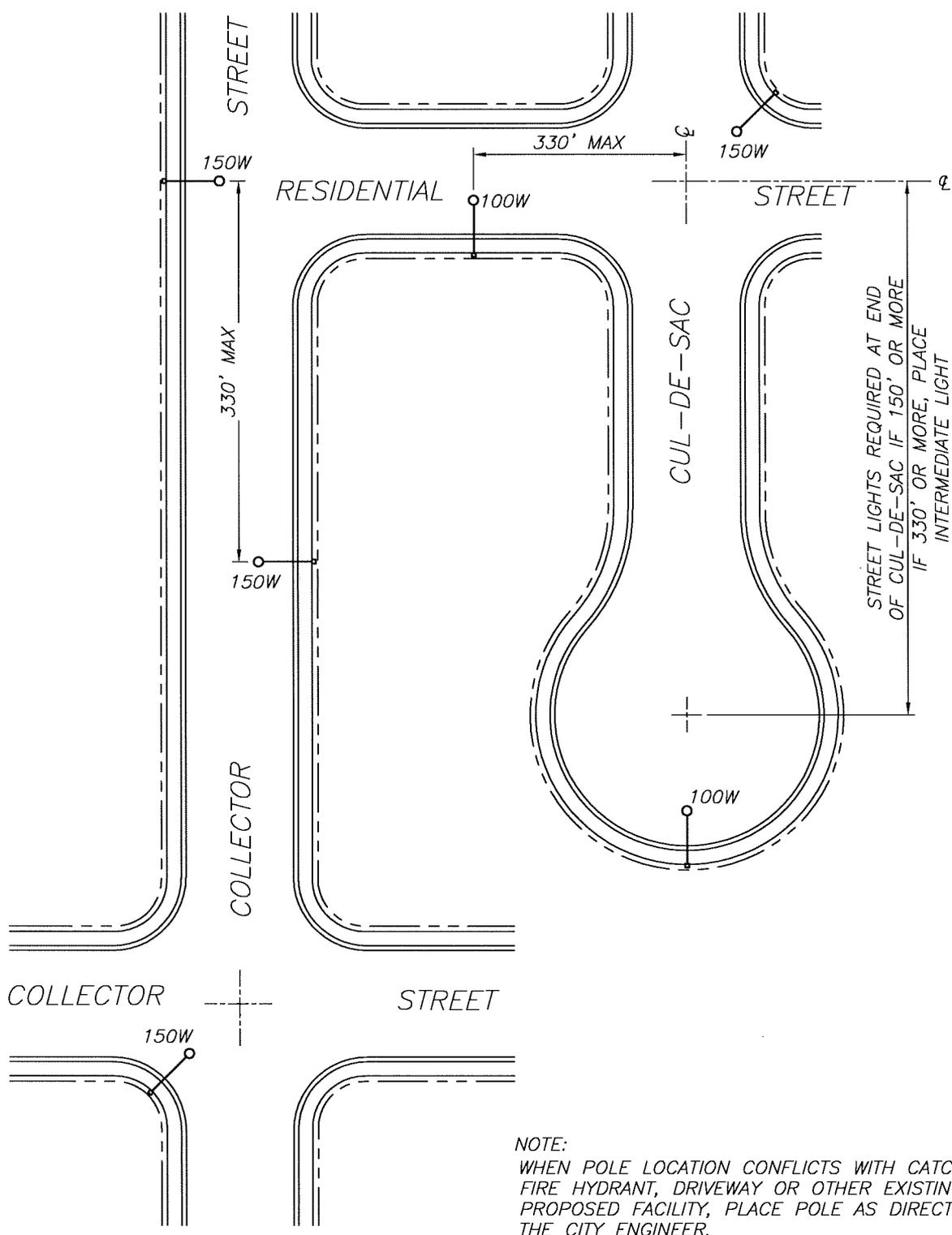
The Contractor shall provide the Design Engineer one (1) set of "Record Drawings" showing locations of all pull boxes, conduits, and street lights. The Design Engineer shall include this information on the Record Drawings in accordance with Section 1.9 of these Improvement Standards.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

ELECTROLIER LOCATIONS

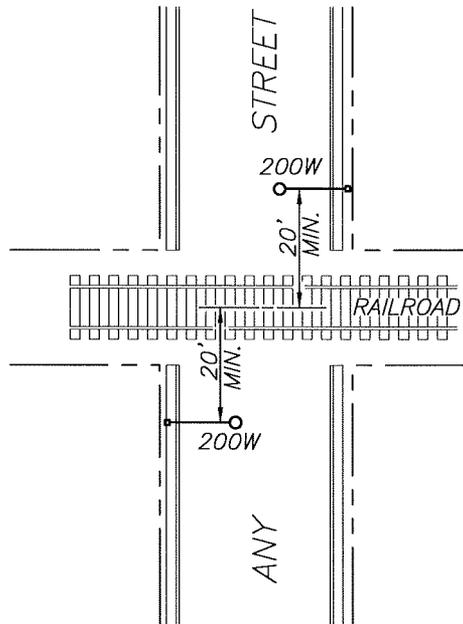
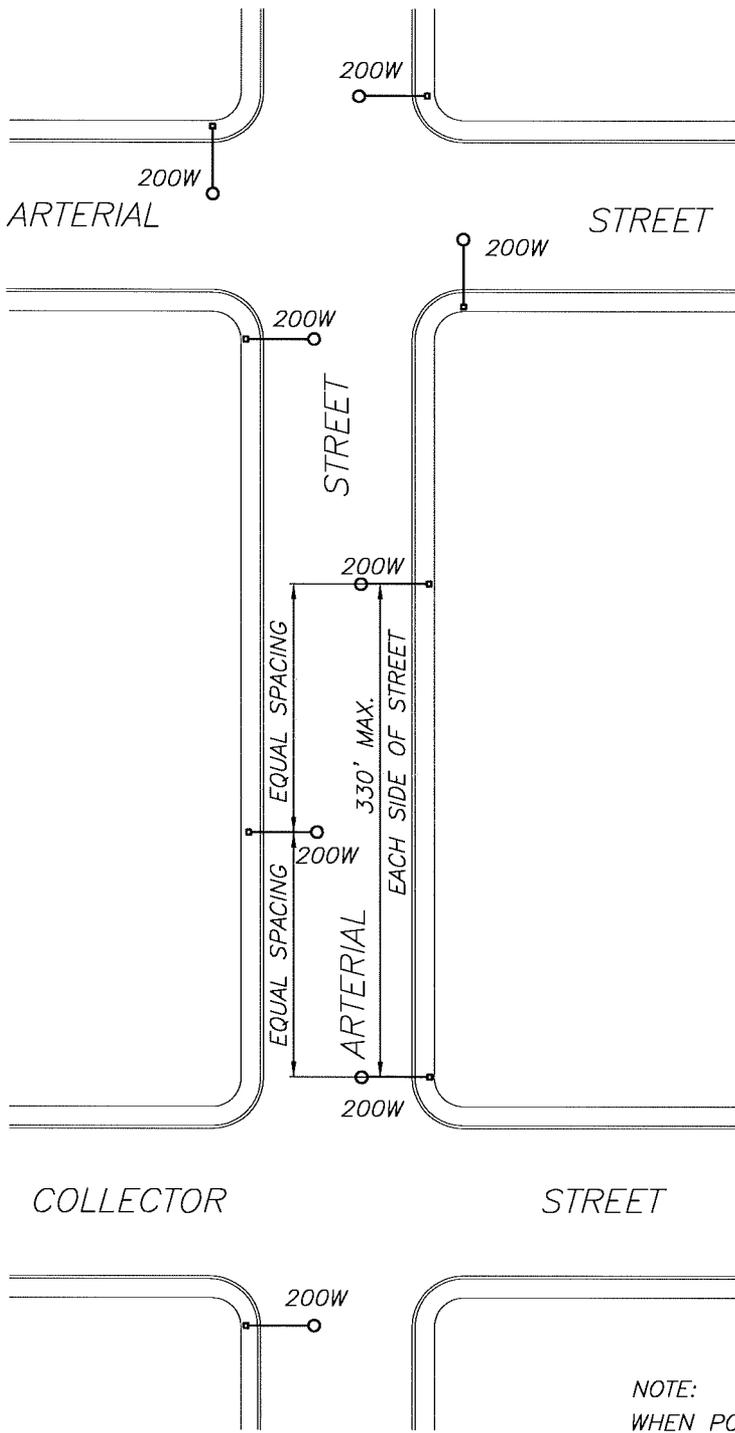


APPROVED BY:

DATE:

DRAWING NO.

3 - A



NOTE:
 WHEN POLE LOCATION CONFLICTS WITH CATCH BASIN,
 FIRE HYDRANT, DRIVEWAY OR OTHER EXISTING OR
 PROPOSED FACILITY, PLACE POLE AS DIRECTED BY THE
 CITY ENGINEER.

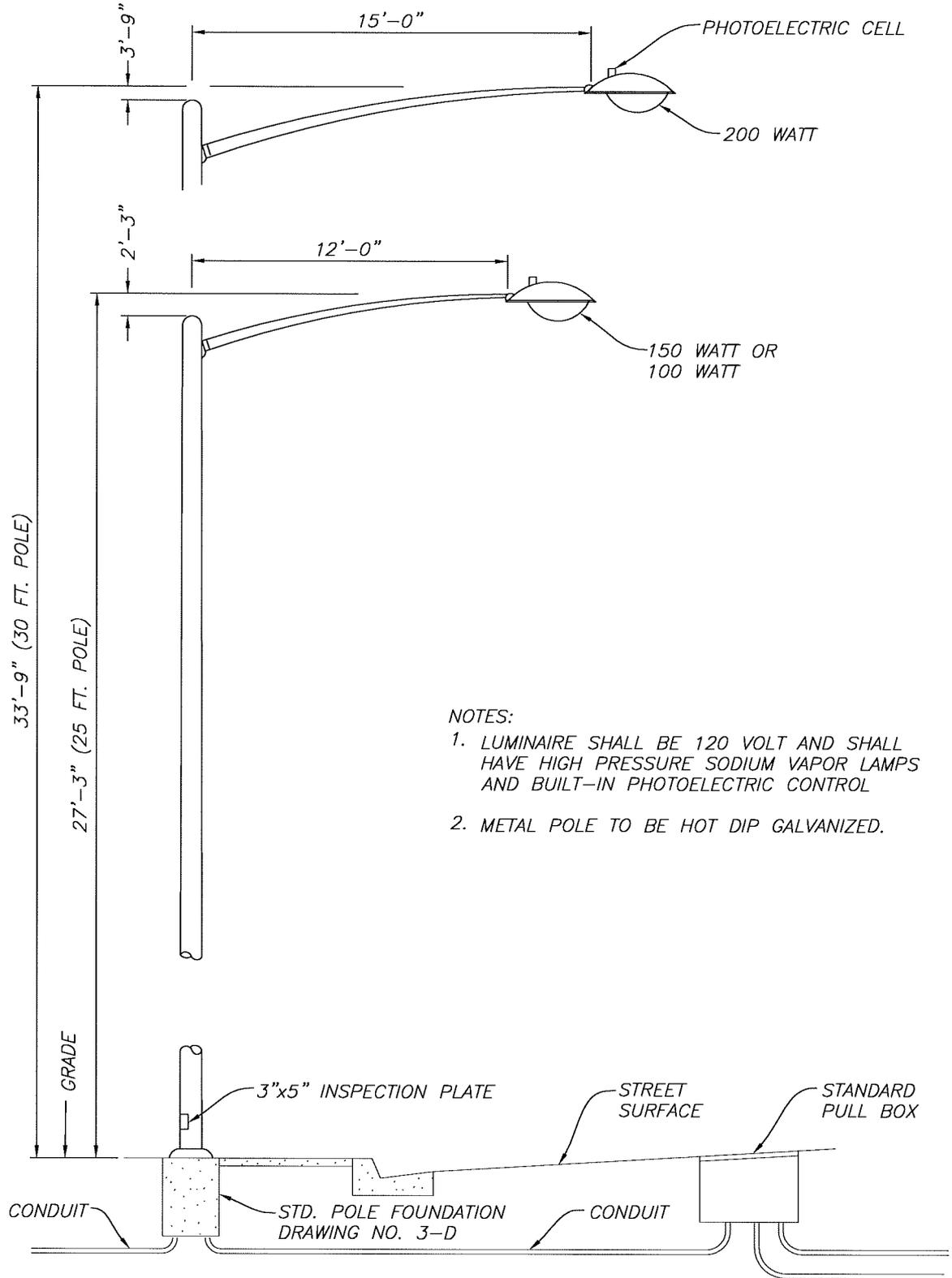
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CITY OF GUSTINE IMPROVEMENT STANDARDS

ELECTROLIER LOCATIONS

APPROVED BY:	DATE:	DRAWING NO. 3 - B
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- NOTES:
1. LUMINAIRE SHALL BE 120 VOLT AND SHALL HAVE HIGH PRESSURE SODIUM VAPOR LAMPS AND BUILT-IN PHOTOELECTRIC CONTROL
 2. METAL POLE TO BE HOT DIP GALVANIZED.

Apr 16, 2012 - 11:10am
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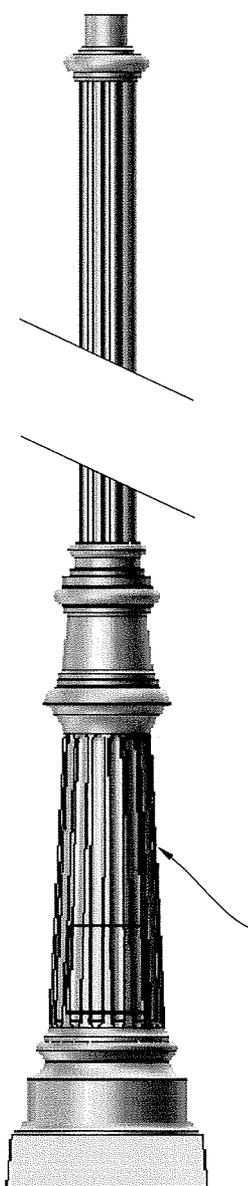
CITY OF GUSTINE IMPROVEMENT STANDARDS

ELECTROLIER

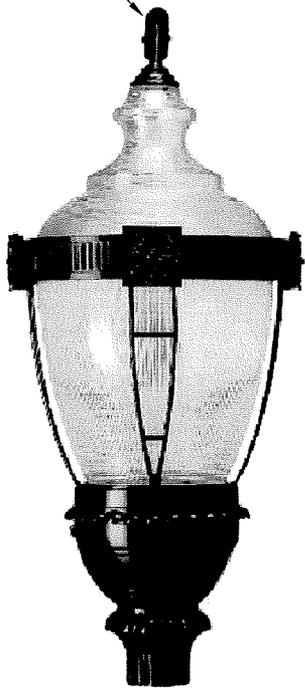
APPROVED BY: _____ DATE: _____

DRAWING NO. **3 - C**

HADCO LIGHTING NARROW BODY
REFRACTIVE GLOBE MODEL No. R51BABA



HADCO LIGHTING 14-FOOT
POLE MODEL No. P-2560



Apr 16, 2012 - 2:44pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

DECORATIVE ELECTROLIER

APPROVED BY:

DATE:

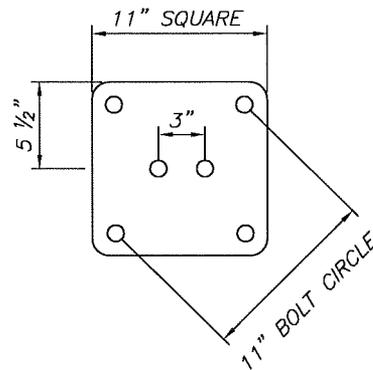
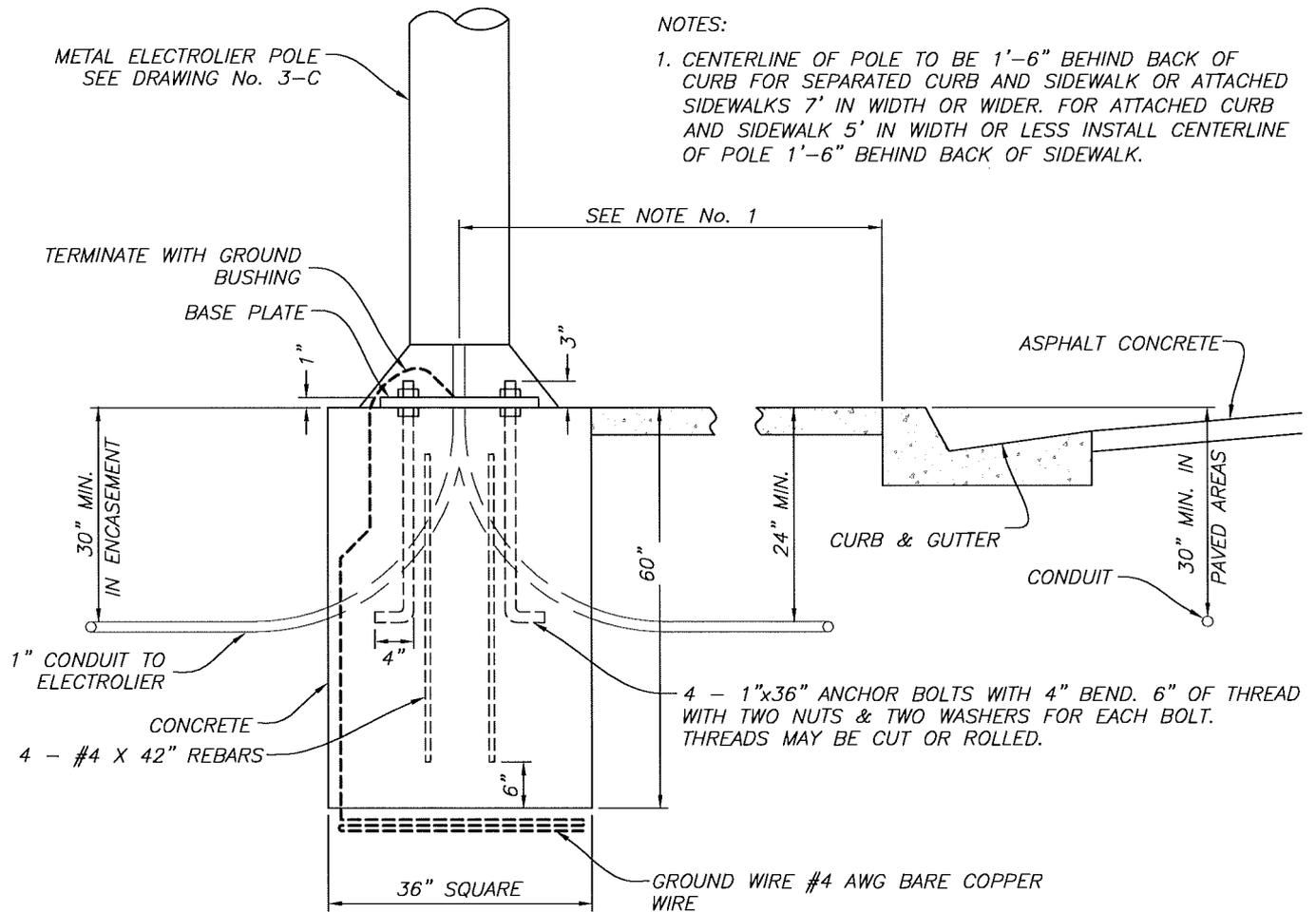
DRAWING NO.

3 - D

METAL ELECTROLIER POLE
SEE DRAWING No. 3-C

NOTES:

1. CENTERLINE OF POLE TO BE 1'-6" BEHIND BACK OF CURB FOR SEPARATED CURB AND SIDEWALK OR ATTACHED SIDEWALKS 7' IN WIDTH OR WIDER. FOR ATTACHED CURB AND SIDEWALK 5' IN WIDTH OR LESS INSTALL CENTERLINE OF POLE 1'-6" BEHIND BACK OF SIDEWALK.



BASE PLATE

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CITY OF GUSTINE IMPROVEMENT STANDARDS

STANDARD ELECTROLIER BASE DETAIL

APPROVED BY:

DATE:

DRAWING NO.

3 - E

METAL ELECTROLIER POLE

NOTES:

1. CENTERLINE OF POLE TO BE 1 FOOT 6 INCHES BEHIND BACK OF CURB FOR SEPARATED CURB AND SIDEWALK OR ATTACHED SIDEWALKS 7 FEET IN WIDTH OR WIDER. FOR ATTACHED CURB AND SIDEWALK 5 FEET IN WIDTH OR LESS INSTALL CENTERLINE OF POLE 1 FOOT 6 INCHES BEHIND BACK OF SIDEWALK.

TERMINATE WITH GROUND BUSHING

BASE PLATE

SEE NOTE No. 1

ASPHALT CONCRETE

30" MIN. IN ENCASEMENT

CURB & GUTTER

CONDUIT

30" MIN. IN PAVED AREAS

CONDUIT TO ELECTROLIER

CONCRETE

4 - #4 X 36" BARS

4"

4 - 3/4" x 19" ANCHOR BOLTS WITH 2" BEND. 6" OF THREAD WITH TWO NUTS & TWO WASHERS FOR EACH BOLT.

GROUND WIRE #4 AWG BARE COPPER WIRE

24" DIAMETER

12 3/4" SQUARE

14" BOLT CIRCLE

BASE PLATE

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CITY OF GUSTINE IMPROVEMENT STANDARDS

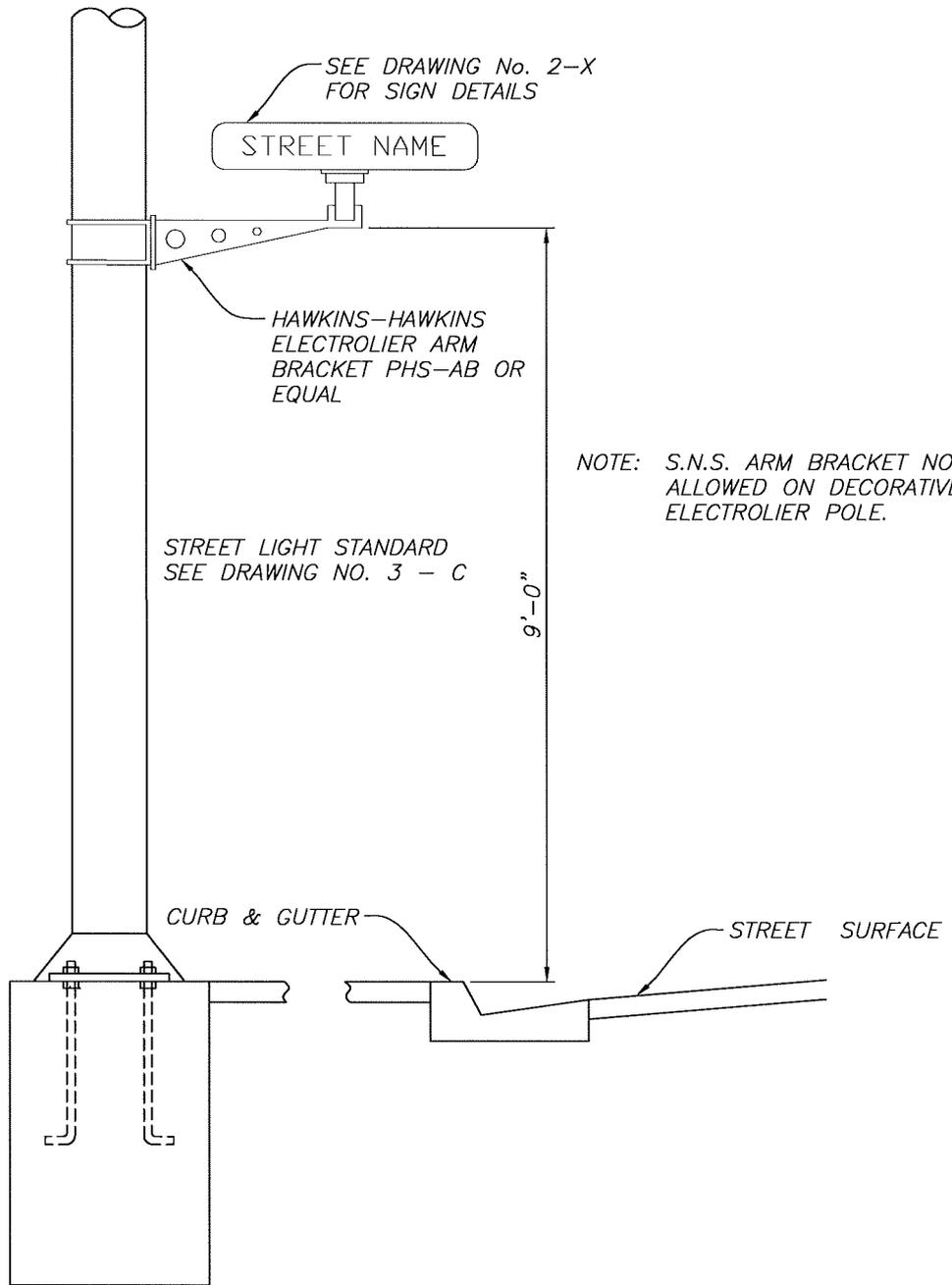
DECORATIVE ELECTROLIER BASE DETAIL

APPROVED BY:

DATE:

DRAWING NO.

3 - F



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CITY OF GUSTINE IMPROVEMENT STANDARDS

ELECTROLIER S.N.S. ARM BRACKET

APPROVED BY:

DATE:

DRAWING NO.

3 - G

SECTION 4 - WATER

SPECIFICATIONS:

4.1	GENERAL	4-1
4.2	DESIGN SUBMITTALS	4-1
4.3	DESIGN FLOW	4-1
4.4	PIPE DESIGN	4-2
4.5	PIPE	4-4
4.6	FITTINGS	4-4
4.7	VALVES AND VALVE BOXES	4-5
4.8	SERVICES	4-5
4.9	TRENCH EXCAVATION	4-5
4.10	WATER IN TRENCH	4-6
4.11	LAYING AND JOINTING OF PIPE	4-6
4.12	HANDLING OF PIPE ACCESSORIES	4-7
4.13	SERVICE INSTALLATION	4-7
4.14	FIRE HYDRANTS	4-7
4.15	TEMPORARY AND PERMANENT BLOW-OFFS	4-8
4.16	CONNECTIONS WITH EXISTING WATER LINES	4-8
4.17	INSPECTION	4-8
4.18	BEDDING AND BACKFILL OF TRENCHES	4-10
4.19	RESTORING SURFACE	4-10

DRAWINGS:

4A	1" DIAMETER WATER SERVICE
4B	2" DIAMETER WATER SERVICE
4C	WATER METER SERVICE DETAIL
4D	DOUBLE CHECK VALVE BACKFLOW PREVENTER
4E	REDUCED PRESSURE BACKFLOW PREVENTER
4F	WATER LINE GATE VALVE ASSEMBLY
4G	FIRE HYDRANT ASSEMBLY
4H	WATER LINE BLOW-OFF ASSEMBLY
4I	THRUST BLOCKS DETAIL
4J	WATER LINE TRENCH DETAIL

SECTION 4

WATER

4.1 GENERAL

These Improvement Standards apply to all public water facilities designed for installation within a public right-of-way (ROW) or public utility easement (PUE) in the City and are limited to mains and services 12-inches or less in diameter. Standards and requirements for larger sizes will be determined by the City Engineer. In all developments, on-site mains and hydrants for fire protection shall be public. Other on-site facilities, unless specifically noted in these Improvement Standards or as required as part of project approval, shall be private and shall be designed and constructed in accordance with the provisions of the Uniform Plumbing Code, as adopted by the City.

Water lines shall be designed in accordance with acceptable engineering principles, California OSHA Standards, and California Department of Health Service Regulations, Title 22, Chapter 16, California Waterworks Standards, and shall conform to these Improvement Standards.

4.2 DESIGN SUBMITTALS

Prior to submittal of Improvement Plans for the first phase of construction, a master water plan for the entire development shall be submitted to the City Engineer for review and approval. The plan shall include water flow and pressure calculations.

4.3 DESIGN FLOW

Unless other water usage figures are required or approved by the City, the following water demands shall be used for design calculations:

<u>Development</u>	<u>Average Daily Demand</u>	<u>Peaking Factors</u>	
		<u>Max. Day</u>	<u>Max. Hour</u>
Single Family Detached	600 gpud	2.0	4.00
Single Family Attached	600 gpud	2.0	4.00
Multi Family, 2-4 Units	500 gpud	2.0	4.00
Multi Family, 5 Units or More	400 gpud	2.0	4.00
Commercial, Industrial & Others	*	2.0	4.00

gpud = gallons per unit per day
* = To be determined on a case-by-case basis.

Design fire flows shall be as follows unless otherwise approved by the City Fire Chief:

<u>Land Use</u>	<u>Fire Flow</u>
Low Density Residential	2000 gpm
Medium & High Density Residential	2000 gpm
Commercial & Industrial	3500 gpm

4.4 PIPE DESIGN

The minimum size pipe used for new water mains shall be 6 inches. Larger water lines may be required based on required fire flow, service demand or planned extension of the City's distribution system.

Permanent dead-end runs shall be no longer than 500 feet unless specifically approved by the City Engineer. Reasonable looping of water mains will be required.

The system shall be designed to maintain a minimum residual pressure of 20 psi at the service point or fire hydrant under the following demand conditions:

- maximum day flow plus fire flow, or;
- peak hour flow.

The Hazen-Williams formula shall be used to calculate design flow, pressure loss, velocity and pipe diameter relationships. The coefficient of friction, "C", shall be 130.

There are no slope requirements for water mains. However, inverts and pipe slopes shall be shown on the profile sheets of the Improvement Plans.

All high points within the system shall be located at fire hydrants or air release valves.

The minimum cover over water mains shall be 3 feet in both paved and unpaved areas. The maximum cover over water lines should be 5 feet.

When crossing a wastewater or storm line, it is desirable that the water main be installed above the other pipeline with a clearance of 12 inches. If the desired clearance cannot be maintained, the water main shall be designed in accordance with the requirements of the California Department of Health Services for separation between water mains and sanitary sewers.

Water mains shall be installed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline wherever possible.

Permanent easements shall be provided on all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. The main shall be located in the center of the easement unless otherwise required by the Director.

Water mains shall not be placed in easements across low density or medium density residential lots.

A minimum horizontal clearance of 10 feet shall be maintained between water mains and wastewater or storm drain lines, unless otherwise approved by the City Engineer. If the 10-foot separation is waived by the City Engineer, the requirements of the California Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

Curved water mains are allowed; however, joint deflection or pipe curvature shall not exceed the pipe manufacturer's recommendations.

Valves on mains shall be spaced and located in conformance with the following criteria:

1. Water mains shall be valved on each side of railroad, highway and canal right-of-way crossings. (These valves shall be located outside of the right-of-way being crossed unless otherwise approved by the City Engineer.)
2. At "tees", valves are required as follows:
 - 2 valves where one leg is less than 10 inches in diameter, with one of the valves installed on the smaller leg.
 - 3 valves where all legs are 10 inches in diameter or larger.
3. At "crosses", valves are required as follows:
 - 3 valves where one or more legs is less than 10 inches in diameter with valves on each of the smaller legs.
 - 4 valves where all legs are 10 inches in diameter or larger.
4. At ends of mains or on stubs such that future extensions will not interrupt service.
5. At all fire hydrant assemblies.

The valving requirements mentioned above are minimum. Additional valves may be required.

Fire hydrants shall be spaced and located in accordance with the following criteria:

- At approximately 500 foot spacing in residential areas along one side of the street. Hydrants shall normally be placed at street intersections.
- At approximately 300 foot spacing in industrial areas.
- On streets classified as arterial or greater, the above spacing shall apply to both sides of the street. If buildings are separated from the street by a 6-foot or higher restrictive wall, hydrants shall be placed only at street intersections.
- At the ends of cul-de-sacs and permanent dead-end mains.

In commercial developments, locations and spacing shall be determined on a project-by-project basis by the City Fire Chief and City Engineer.

4.5 PIPE

The following standard pipe materials shall be used for water main construction and shall conform to the latest edition of appropriate American Water Works Association (AWWA) Standards:

<u>Pipe Materials</u>	<u>Standard</u>
Ductile Iron	AWWA C151
w/Cement Mortar Lining & Seal (std. thickness)	AWWA C104
Polyethylene Encasement	AWWA C105
PVC (iron pipe O.D.)	AWWA C900, DR 18 (Class 150) minimum

4.6 FITTINGS

Bends, tees and other fittings shall be ductile iron conforming to AWWA C153.

Fittings shall be furnished with a joint type suitable for attaching to valves or other pressure pipe. Adaptor gaskets are not acceptable. Thrust blocking shall be constructed at bends, tees, dead-ends and where changes in pipe diameter occur. Blocking shall be made of Class 3 concrete, and shall be placed between undisturbed ground and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be that required by Drawing No. 4-I. The blocking shall be placed so that the joints of the pipe and fittings will be accessible for repair.

4.7 VALVES AND VALVE BOXES

Valves and valve boxes shall be installed at the locations shown on the plans.

All valves shall be Dresser "450" or resilient seated gate valve or Mueller A-2380 gate valve, or approved equal, and shall be the rubber-seated, tight-closing type conforming to the current AWWA Standard C-504. Valves shall open left and be equipped with a 2-inch AWWA approved operating nut.

Valve boxes shall be Christy G5 with Christy Iron Cover or approved equals. All valve boxes shall be installed to finished grade as per Drawing No. 4-F.

4.8 SERVICES

Each parcel shall have individual water service. In general, only one service is to be provided per parcel served. Four exceptions are as follows:

- For residential developments with on-site public mains, one standard service per dwelling unit may be provided.
- In parcels with separate buildings, one standard service per building may be provided (individual shut-offs per unit are required).
- In non-residential developments, separate water service(s) shall be provided for landscaped areas.
- In multi-family residential developments of 5 units or more, separate water service(s) shall be provided for landscape areas.

Due to the variety of building and main configurations and backflow requirements, the above requirements/exceptions are not specific. Details of each project shall be specifically approved by the City Engineer.

All water services shall be metered.

Size of service is to be determined by the Design Engineer for the parcel being served. (Minimum service size is 1-inch.)

A minimum horizontal clearance of 10 feet shall be maintained between water services and wastewater services, unless otherwise approved by the City Engineer.

4.9 TRENCH EXCAVATION

The Contractor shall, prior to beginning construction, obtain from the Division of Industrial Safety the permit required by California Labor Code, Section 6500, and

pay any fee charged for such permit. In addition thereto, whenever the work under the Contract involves trench excavation 5-feet or more in depth, the Contractor shall submit for approval to a registered civil or structural engineer representing the City, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer. Nothing in this section shall be deemed to allow the use of shoring, sloping or other protective system less effective than that required by the Construction Safety Orders. Nothing in this section shall be construed to impose tort liability on the City, City Engineer, or any of their officers, agents or employees.

The pipe trench shall be dug with side walls sloped or otherwise supported in a safe manner in accordance with the Department of Industrial Relations, Division of Occupational Safety and Health Administration regulations pertaining to trenching.

Excavated material shall be placed on only one side of the trench unless otherwise directed. Separation distance between piles of excavated material and trench shall be consistent with the Construction Safety Orders.

The alignment and grade for the bottom of the trench shall be properly established before the trench is excavated and shall be approved by the City before the pipe is laid. Trenches shall be true to line and grade, and the bottom shall be even and free from all objectionable material.

4.10 WATER IN TRENCH

When water is encountered in the trench, it shall be removed by draining or by pumping. Should water get into the trench before the pipe is laid, the laying of pipe shall be postponed until the trench has dried sufficiently to provide a firm foundation for the pipe or else, the mud or softer material shall be removed and grade re-established by backfilling and compacting with suitable material as determined by the City.

4.11 LAYING AND JOINTING OF PIPE

Laying and jointing of pipe shall be in accordance with the manufacturer's recommendations and as approved by the City. Joint deflections shall not exceed 80% of the maximum recommendations of the manufacturer.

Where rubber gaskets are used for jointing pipe, a feeler gauge shall be used to check the position of the rubber gasket upon each closure. The interior of the pipe shall be cleared of all debris, and exposed pipe ends shall be closed by a suitable pipe plug when pipe laying is not in progress.

The pipe shall be laid on a trench bottom shaped to provide adequate and uniform support of the pipe except at coupling or bell holes. The use of prepared mounds to facilitate laying of the pipe is not approved.

Where pipe is to be encased or have concrete bedding, suitable concrete blocks shall be used to support the pipe in the proper location while placing concrete.

4.12 HANDLING OF PIPE ACCESSORIES

Proper implements, tools, and facilities satisfactory to the City shall be provided and used by the Developer or Contractor for the safe and efficient execution of the work. All pipe, fittings, valves, hydrants and accessories shall be lowered into the trench in such a manner as to prevent damage to pipe fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. All foreign matter or dirt shall be removed from the interior of pipe before lowering into position in the trench. Pipe shall be kept clean by means approved by the City Engineer during and after laying. All pipe and accessories shall be inspected for defects prior to lowering into trench. Any defective, damaged or unsound pipe or accessory shall be repaired or replaced at the Developer's or Contractor's expense.

4.13 SERVICE INSTALLATION

The services shall be installed per Drawings No. 4-A, 4-B and 4-C.

Special care shall be exercised to insure proper compaction is made under curb stop so it is vertical and the meter idler is level. Compaction shall be made under and around the meter box so it remains level and at the finished sidewalk grade.

4.14 FIRE HYDRANTS

Fire hydrants shall be installed at the locations shown on the plans in conformance with Drawing No. 4-G. Hydrants shall be a "traffic type" with a replaceable breakaway section immediately above the groundline.

The Contractor shall adjust the "bury length" of the hydrant to provide proper installation. The pumper nozzle shall be rotated to face the street after installation.

Fire hydrants shall be Clow Model 960, or approved equal and shall conform to the latest AWWA Standard, C-503, for wet-barrel fire hydrants. All hydrants shall be furnished with a factory traffic yellow enamel finish coat.

4.15 TEMPORARY AND PERMANENT BLOW-OFFS

Temporary and permanent blow-offs shall be installed at the locations shown on the plans in conformance with Drawing No. 4-H unless otherwise required by the City Engineer. The final length of pipe, prior to the blow-off, shall be 18 to 39 inches.

All salvaged temporary blow-offs shall become the property of the Developer or Contractor and shall be removed from the job site before completion.

4.16 CONNECTIONS WITH EXISTING WATER LINES

The Contractor shall make all excavations for connection to existing water lines and shall make connections to existing water line in the presence of the City.

Developer shall use an approved double check backflow preventer between the existing water main and the new line to fill lines of chlorination. City personnel must be the only ones to open or close existing water valves.

Connections shall be made at such times as designated by the City and in such a manner as to insure the least inconvenience to water users. No connection shall be made until the new work has been tested and disinfected as specified hereinafter. The Contractor shall be responsible for safeguarding the existing system from all damage and possible contamination in the performance of his work.

4.17 INSPECTION

1. All water lines shall be inspected for proper installation by the City Engineer, prior to backfilling of trenches.
2. HYDROSTATIC TEST

After installing pipe and prior to complete backfilling of trenches, the entire length of each line shall be subjected to a hydrostatic pressure of not less than 150 psi for a period of not less than 2 hours. Curb stops, idler fittings and fire hydrant units shall also be included in the hydrostatic test. No pipe installation will be accepted if leakage for the section is greater than the allowable leakage determined by using one of the following formulas, as applicable:

$$\text{For Polyvinyl Chloride Pipe - } L = \frac{ND\sqrt{P}}{7400}$$

(L = Allowable leakage in gallons per hour. N = Number of joints in length of pipeline. D = Nominal diameter of the pipe in inches. P = Average test pressure in pounds per square inch.), or

$$\text{For Ductile Iron Pipe - } L = \frac{SD\sqrt{P}}{133,200}$$

(L = Allowable leakage in gallons per hour. S = Length of pipe tested in feet. D = Nominal diameter of the pipe in inches. P = Average test pressure in pounds per square inch.)

Water for testing may be taken from the nearest blow-off, fire hydrant or other approved source. All pipe, fittings, valves, couplings, and other materials needed to fill the test lines with water shall be supplied and installed by the Developer or Contractor. Care shall be taken not to contaminate the existing system.

The pump, gauge, pipe connection, and all necessary apparatus and equipment needed for the test shall be supplied by the Developer or Contractor.

The Developer or Contractor shall permanently stop all leaks. After repairing all defective items, the line shall be tested again to determine final acceptability of the installation.

3. DISINFECTING WATER MAINS

Water mains shall be disinfected in conformance with the procedure specified in the current standards for AWWA C651 or other procedure satisfactory to the City Engineer. Calcium hypochlorite disinfecting compound in granular, pellet or tablet form, conforming to the current standards for AWWA B300, may be introduced into the pipe while laying. A sufficient amount shall be placed so as to obtain approximately 50 parts per million of chlorine in all parts of the line when line is filled with water.

Valves and hydrants shall not be opened and closed while the system is being disinfected. Treated water shall be retained at least 24 hours after which time it shall be tested for residual chlorine. If less than five (5) parts per million is indicated, additional chlorine in solution shall be added until disinfection satisfactory to the City Engineer is obtained. When disinfection has been completed and approved by the City Engineer, the system shall be flushed and filled with clear water. The clear water shall then be flushed into a sewer manhole until all foreign material has been removed from the lines.

A testing laboratory, approved by the Director, shall test the water after the line is refilled and if the water is not found to be of safe bacteriological quality, the Contractor shall re-chlorinate the line until the quality of the water is proven to be satisfactory. All tests shall be drawn in the presence of the Director during normal working hours. All tests shall be at the Contractor's expense.

The number of bacteriological tests on new water lines will be determined by the Director. Location of tests will also be determined by the Director.

New water mains must pass two (2) consecutive negative bacteriological tests, when the first test fails, before lines can be accepted.

New lines shall not be opened into existing water mains until the Director has copies of the passing bacteriological tests taken.

4.18 BEDDING AND BACKFILL OF TRENCHES

Bedding and backfill shall be as shown on Drawing No. 4-J.

4.19 RESTORING SURFACE

The surface of all trenches shall be filled and compacted so that the surface will conform to the condition of the surrounding ground. The repaving requirements of the plans shall be met regardless of type of existing surfacing.

Existing pavement shall be cut in neat parallel lines as shown on Drawing No. 4-J.

Aggregate base shall be Class II compacted to 95% relative compaction. Aggregate base shall have 3/4-inch maximum combined grading.

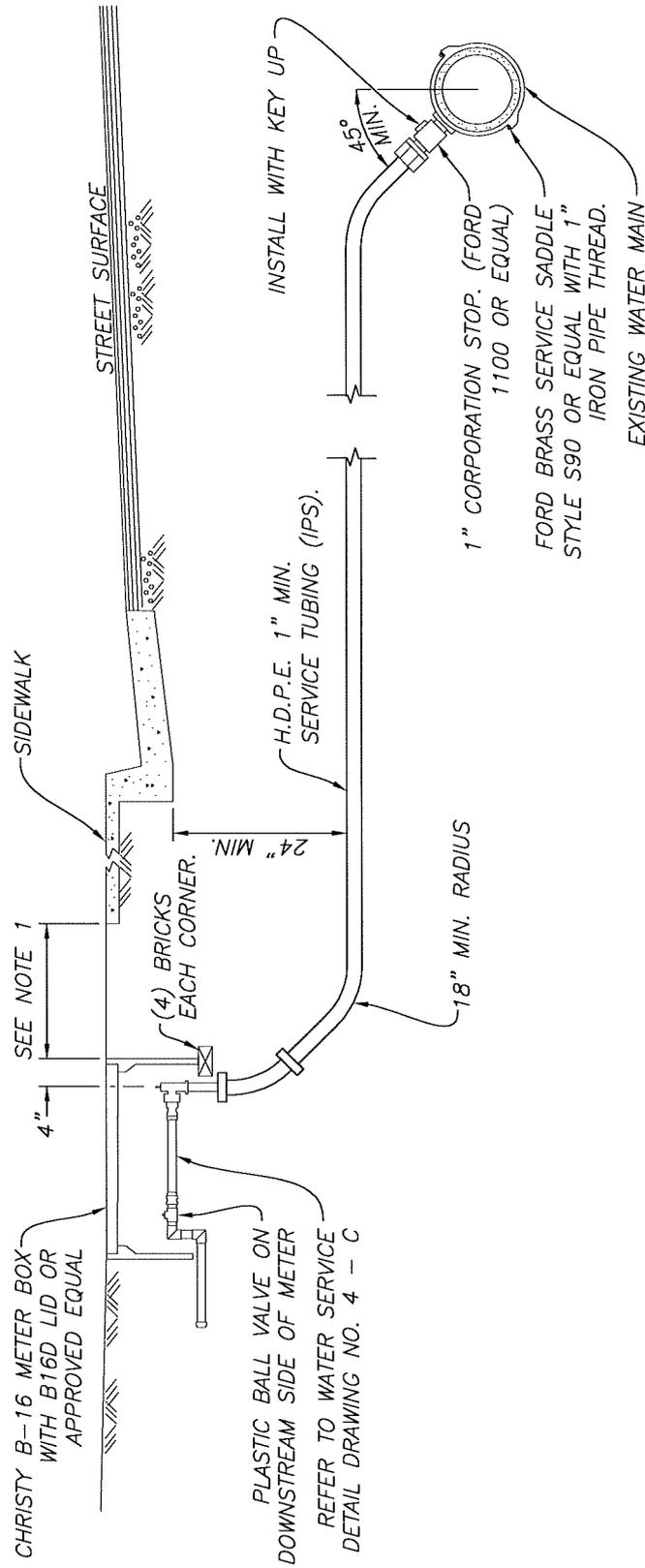
Asphalt concrete shall be Type B, AR 4000 with 1/2-inch maximum aggregate, medium grading.

A paint binder of asphaltic emulsion shall be applied to all surfaces in conformance with Section 39-4.02 of the State Standards.



CITY OF GUSTINE IMPROVEMENT STANDARDS

1" DIAMETER WATER SERVICE



NOTES:

1. 1' FROM BACK OF SIDEWALK FOR ATTACHED CURB AND SIDEWALK. FOR AREAS WITH SEPARATED CURB AND SIDEWALK 1' FROM BACK OF CURB.
2. SERVICE LATERALS SHALL BE POLYETHYLENE PLASTIC PIPE (PE3408, SDR7, PR160 P.S.I.) IN IRON PIPE SIZES AND SHALL BE SUITABLE FOR TRANSPORTING POTABLE WATER. POLYETHYLENE PIPE SHALL COMPLY WITH A.S.T.M. STANDARD D2239.
3. TRAFFIC LID REQUIRED IF LOCATED IN TRAVELED AREA AT CUSTOMER'S EXPENSE.
4. STAINLESS STEEL INSERT STIFFENERS SHALL BE USED INSIDE P.E. TUBING AT ALL PACK JOINT CONNECTIONS.
5. CURB STOPS SHALL BE DIRECTLY OPPOSITE SERVICE SADDLES UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

APPROVED BY:

DATE:

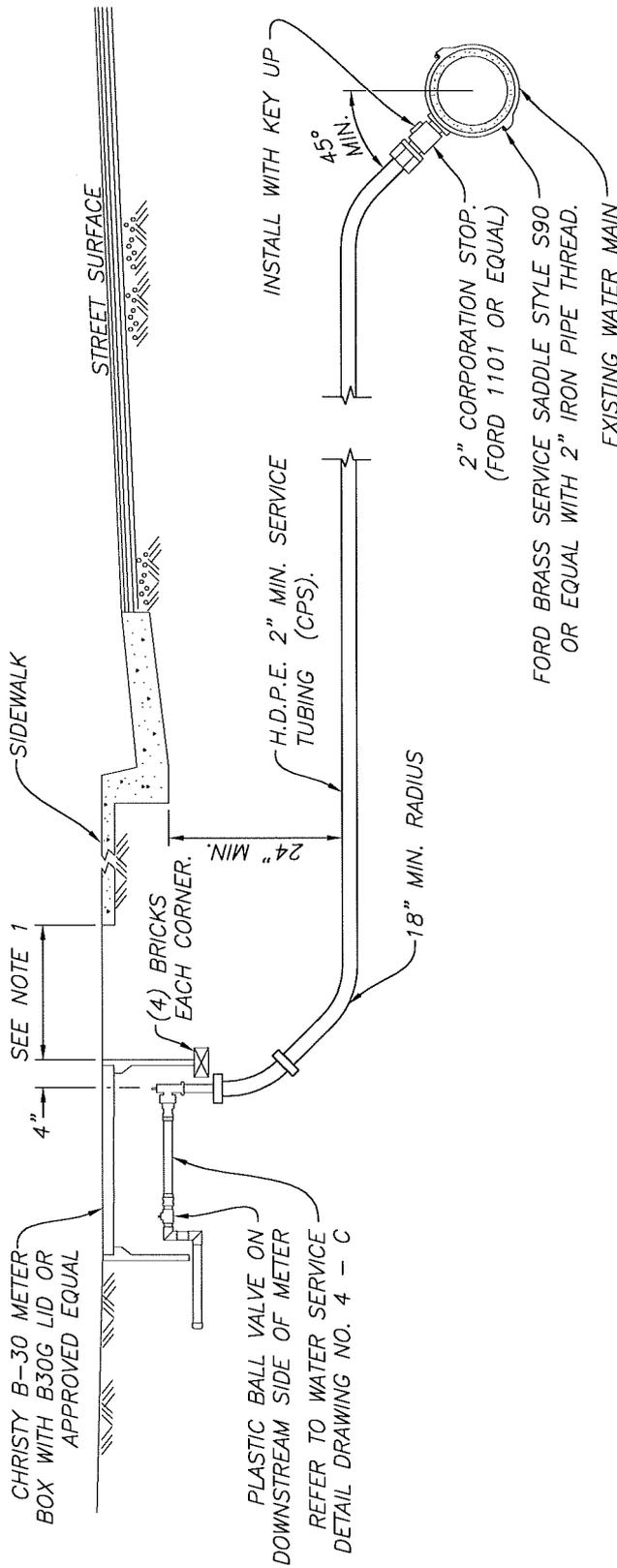
DRAWING NO.

4 - A



CITY OF GUSTINE IMPROVEMENT STANDARDS

2" DIAMETER WATER SERVICE



NOTES:

1. ONE FOOT FROM BACK OF SIDEWALK FOR ATTACHED CURB AND SIDEWALK. FOR AREAS WITH SEPARATED CURB AND SIDEWALK ONE FOOT FROM BACK OF CURB.
2. SERVICE LATERALS SHALL BE POLYETHYLENE PLASTIC PIPE (PE3408, SDR7, PR160 P.S.I.) IN COPPER TUBING SIZES AND SHALL BE SUITABLE FOR TRANSPORTING POTABLE WATER. POLYETHYLENE PIPE SHALL COMPLY WITH A.S.T.M. STANDARD D2239.
3. TRAFFIC LID REQUIRED IF LOCATED IN TRAVELED AREA AT CUSTOMER'S EXPENSE.
4. STAINLESS STEEL INSERT STIFFENERS SHALL BE USED INSIDE P.E. TUBING AT ALL PACK JOINT CONNECTIONS.
5. CURB STOPS SHALL BE DIRECTLY OPPOSITE SERVICE SADDLES UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

APPROVED BY:

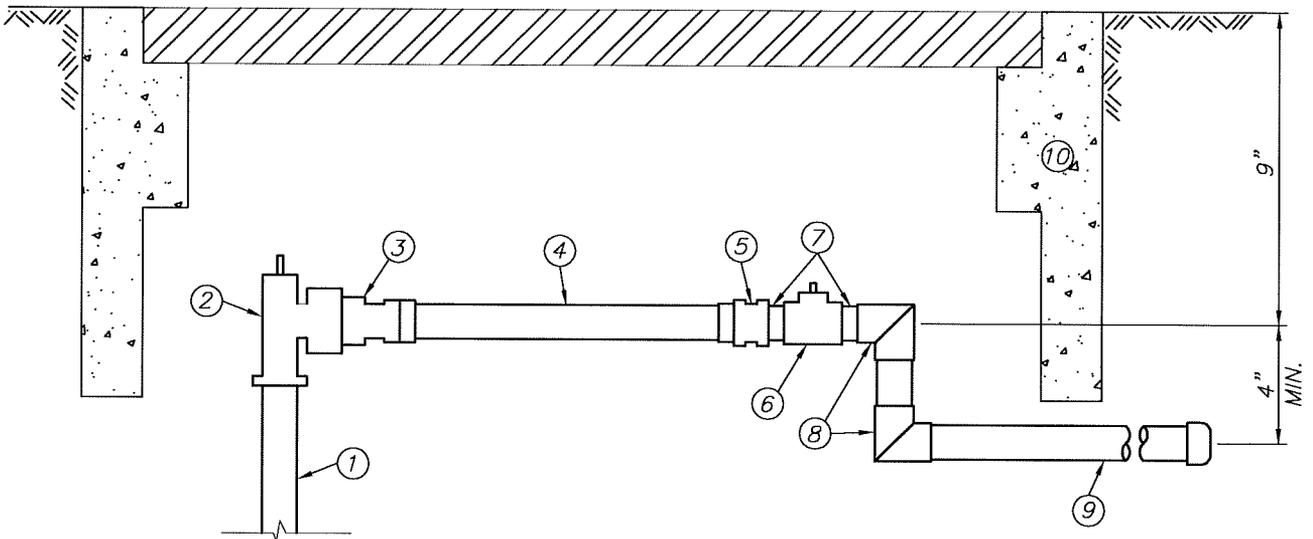
DATE:

DRAWING NO.

4 - B

NOTES:

- ① 1" SERVICE FROM MAIN
- ② 1" ANGLE METER VALVE (FORD BA63 - 444W OR EQUAL)
- ③ 1" x 3/4" METER ADAPTER (FORD A34 OR EQUAL)
- ④ SENSUS TRACE DIRECT READ METER
- ⑤ 3/4" x 1" METER COUPLING (FORD C31-24 OR EQUAL)
- ⑥ 1" PLASTIC BALL VALVE
- ⑦ 1" SCHEDULE 80 PVC NIPPLE
- ⑧ SCHEDULE 40 PVC ELBOWS
- ⑨ 1" SCHEDULE 40 PVC WITH CAP
- ⑩ METER BOX



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CITY OF GUSTINE IMPROVEMENT STANDARDS

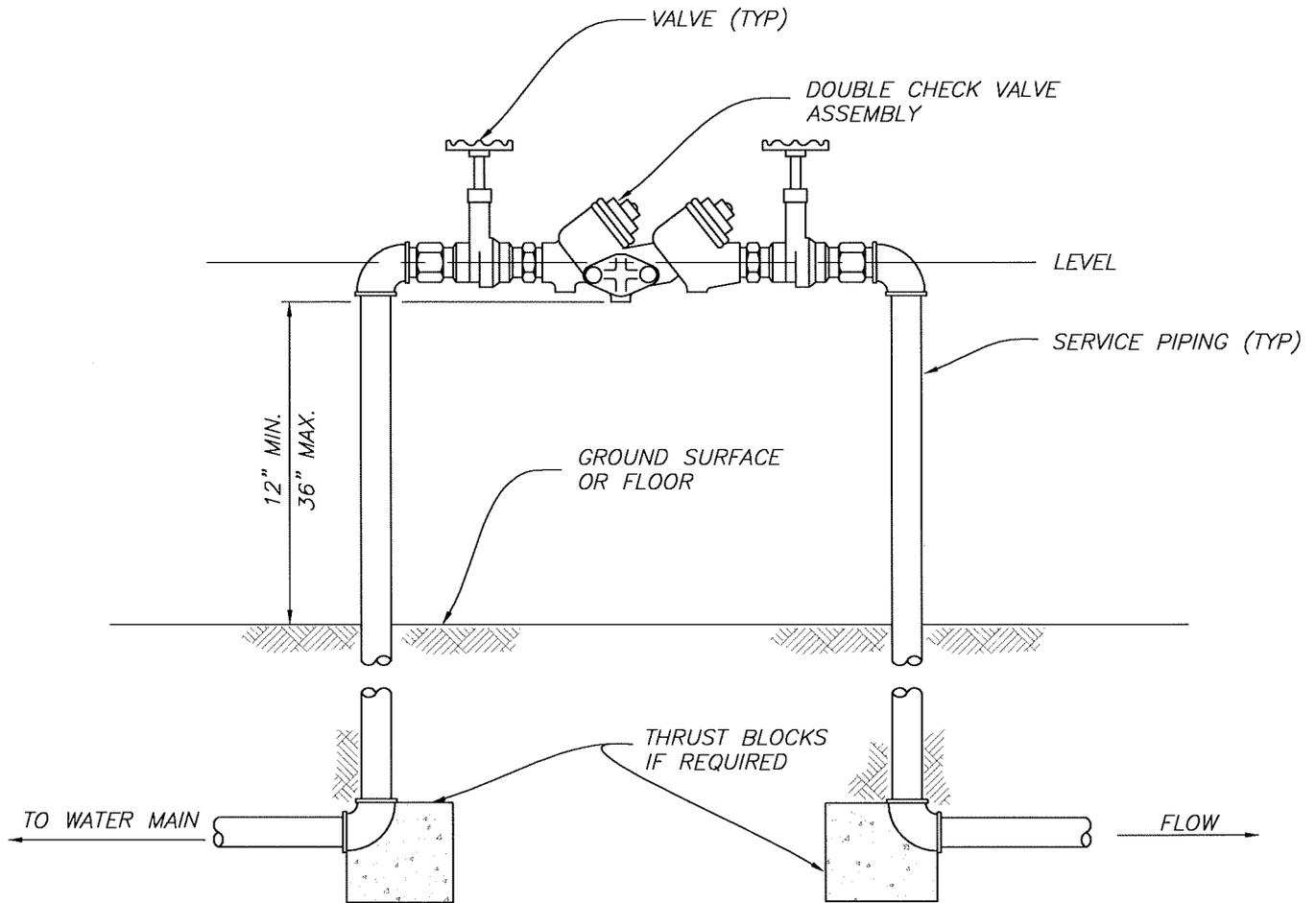
WATER METER SERVICE DETAIL

APPROVED BY:

DATE:

DRAWING NO.

4 - C



NOTES:

1. MANUFACTURING AND MODEL NUMBER OF BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE DIRECTOR PRIOR TO INSTALLATION.
2. ABOVE GROUND SERVICE PIPING FOR BACKFLOW PREVENTION DEVICES 2" IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER OR BRASS. SERVICE LINES 4" DIAMETER AND SMALLER BUT LARGER THAN 2" IN DIAMETER SHALL BE GALVANIZED STEEL.
3. SUPPORTS WHERE PROVIDED SHALL NOT INTERFERE WITH TESTING AND MAINTENANCE.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

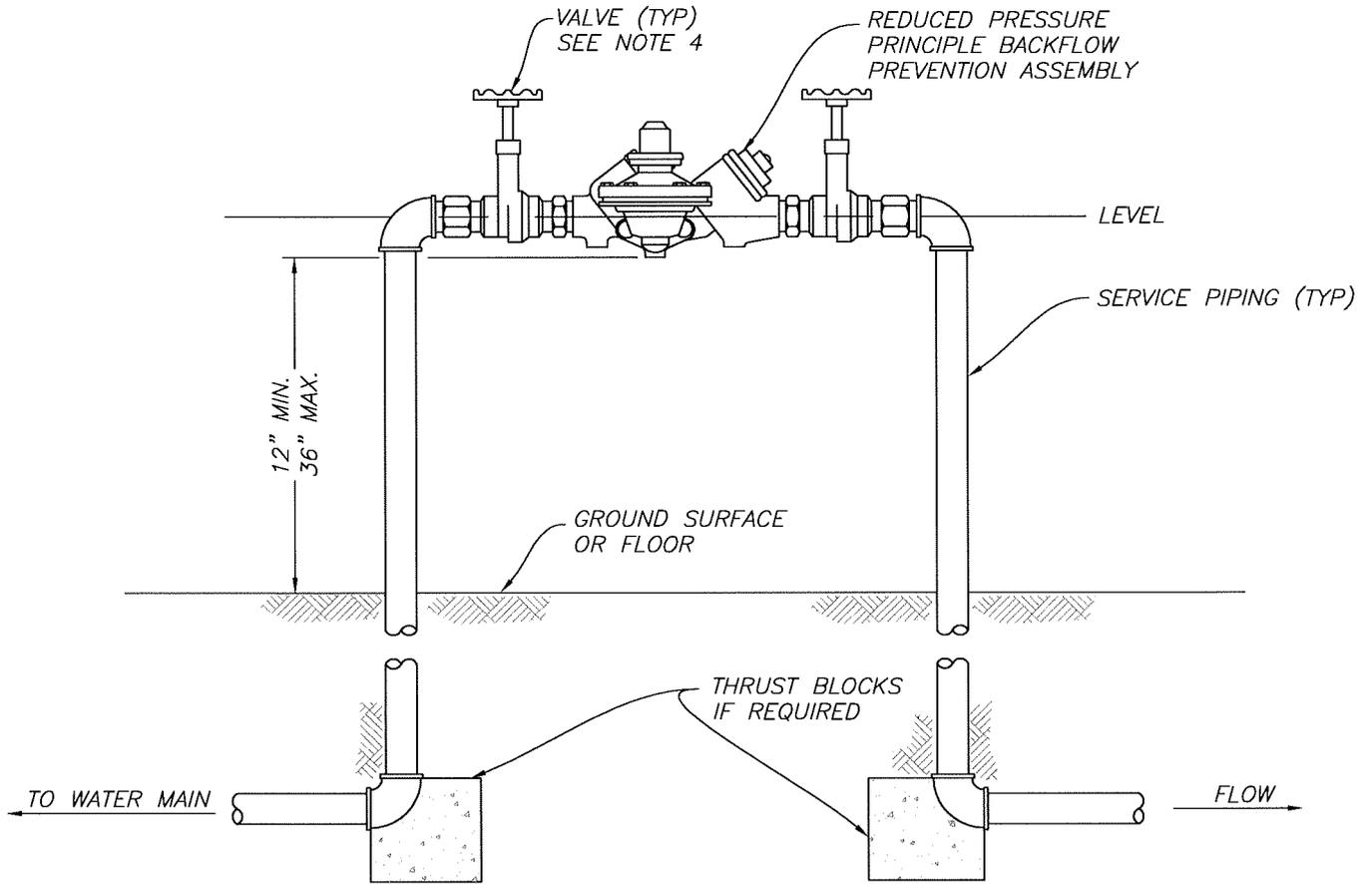
DOUBLE CHECK VALVE BACKFLOW PREVENTER

APPROVED BY:

DATE:

DRAWING NO.

4 - D



NOTES:

1. MANUFACTURING AND MODEL NUMBER OF BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE DIRECTOR PRIOR TO INSTALLATION.
2. ABOVE GROUND SERVICE PIPING FOR BACKFLOW PREVENTION DEVICES 2" IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER OR BRASS. SERVICE LINES 4" DIAMETER AND SMALLER BUT LARGER THAN 2" IN DIAMETER SHALL BE GALVANIZED STEEL.
3. SUPPORTS WHERE PROVIDED SHALL NOT INTERFERE WITH TESTING AND MAINTENANCE.
4. BALL VALVES SHALL BE INSTALLED ON 2-INCH AND SMALLER BACKFLOW PREVENTION ASSEMBLIES. GATE VALVES SHALL BE UTILIZED ON BACKFLOW PREVENTION ASSEMBLIES LARGER THAN 2-INCH.
5. INSTALL AN INSULATING BAG AS APPROVED BY DIRECTOR AROUND ASSEMBLY.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

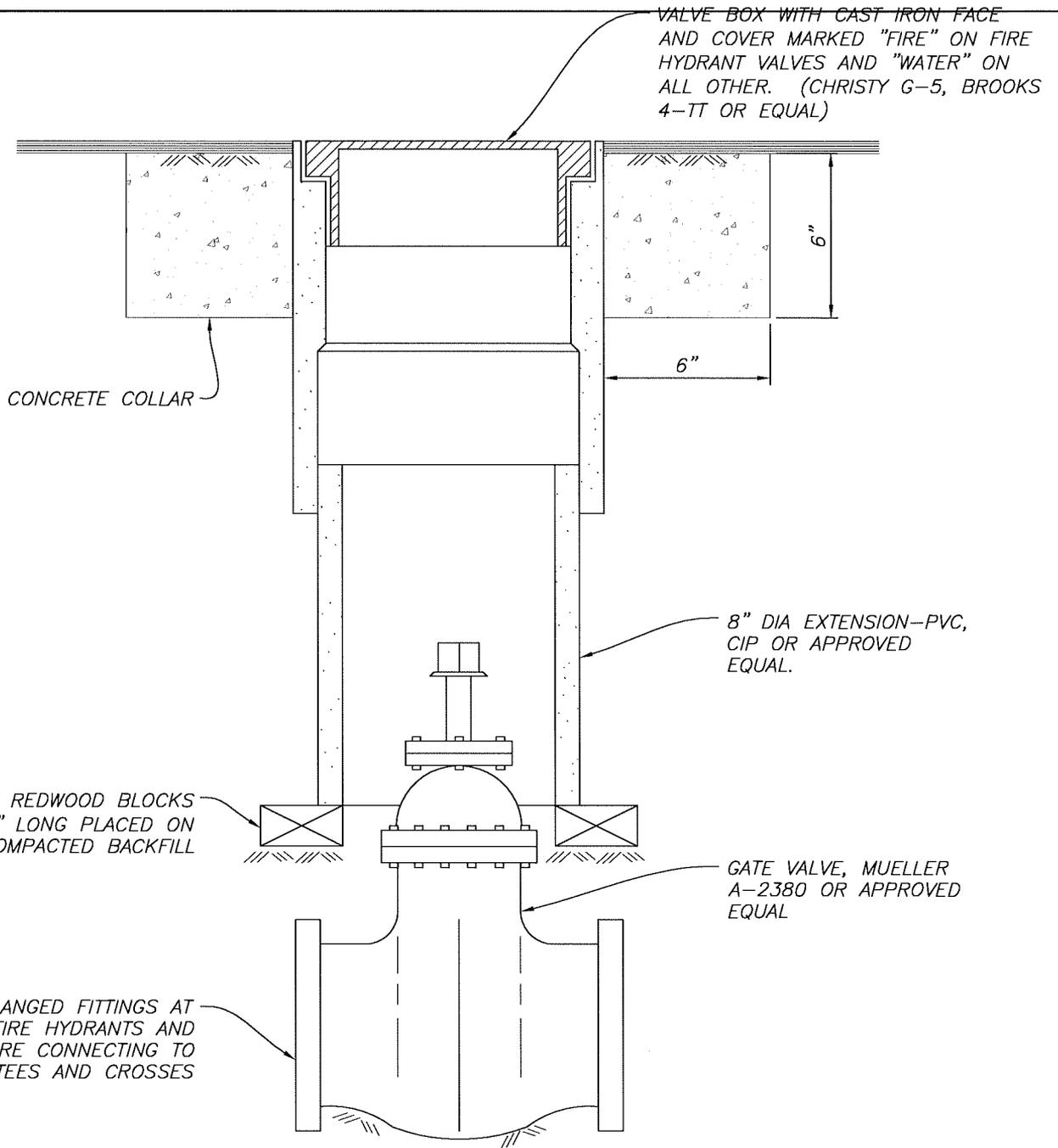
REDUCED PRESSURE BACKFLOW PREVENTER

APPROVED BY:

DATE:

DRAWING NO.

4 - E



NOTES:

1. SAME INSTALLATION APPLIES TO BUTTERFLY VALVES.
2. IF VALVE OPERATING NUT IS INSTALLED DEEPER THAN 3 FEET BELOW FINISHED GROUND ELEVATION, INSTALL VALVE NUT EXTENSION TO RAISE OPERATING NUT TO WITHIN 2 FEET FROM FINISHED GROUND ELEVATION. NUT EXTENSION SHALL BE APPROVED BY THE DIRECTOR.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

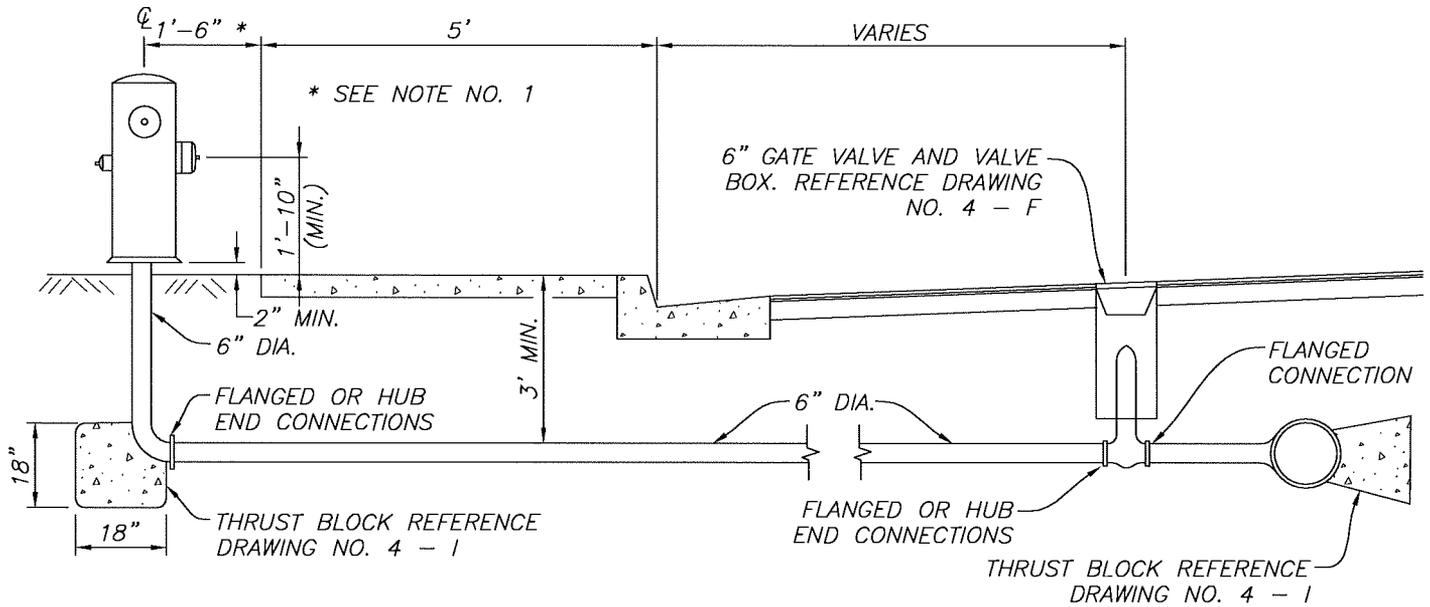
WATER LINE GATE VALVE ASSEMBLY

APPROVED BY:

DATE:

DRAWING NO.

4 - F



NOTES:

1. FIRE HYDRANT LOCATION SHOWN IS FOR 5' ATTACHED CURB AND SIDEWALK. FOR ATTACHED CURB AND SIDEWALK 7' IN WIDTH OR WIDER AND FOR SEPARATED CURB AND SIDEWALK CENTER FIRE HYDRANT 2'-6" BEHIND FACE OF CURB.
2. FACE 4 1/2" OUTLET PERPENDICULAR TO GUTTER LINE.
3. HYDRANTS SHALL BE CLOW MODEL 960 OR APPROVED EQUAL.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

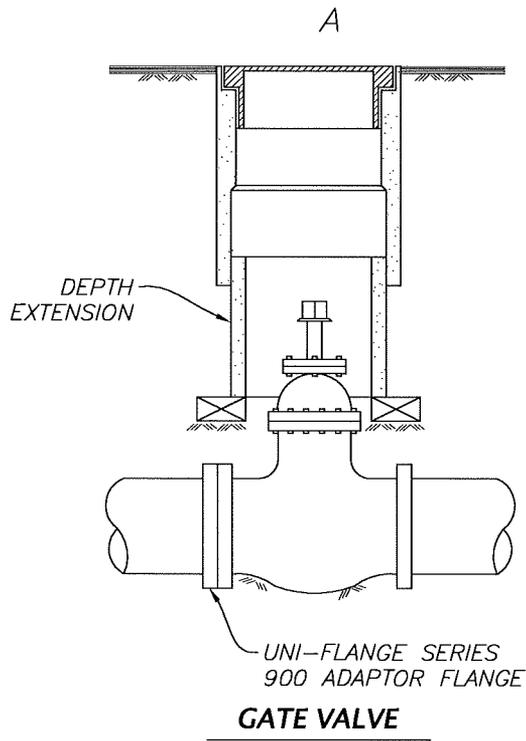
FIRE HYDRANT ASSEMBLY

APPROVED BY:

DATE:

DRAWING NO.

4 - G



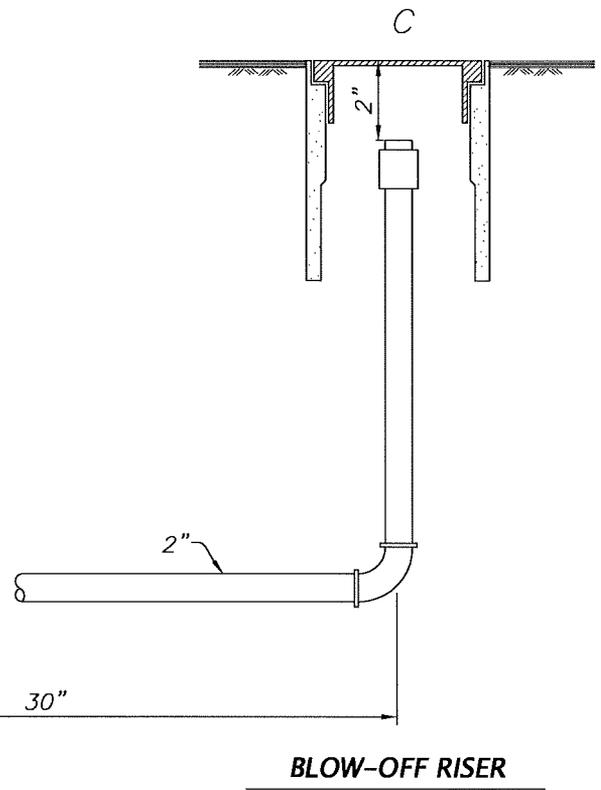
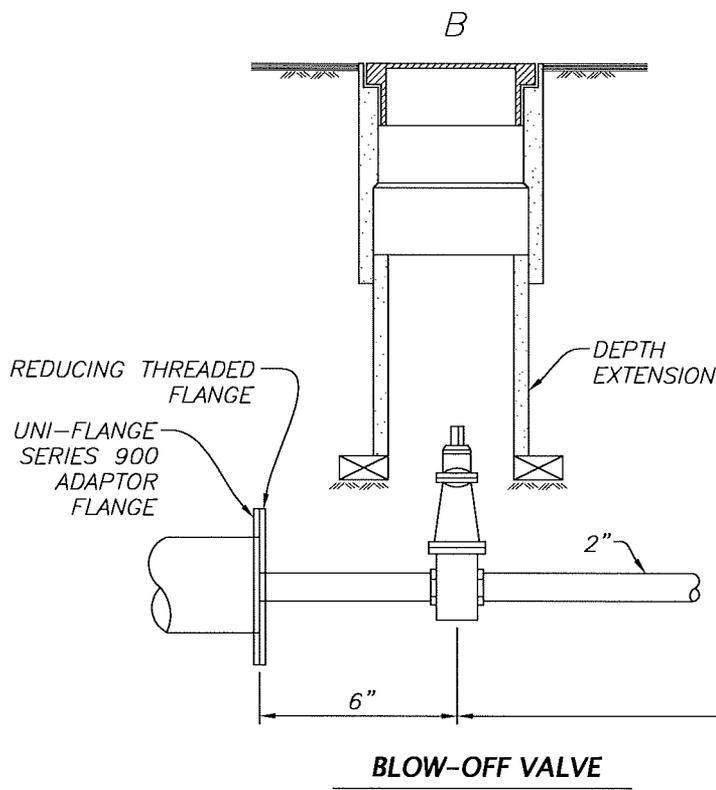
NOTES:

MATERIALS

1. 2" GATE VALVE MUELLER A2380 WITH 2" HUB NUT
2. ALL FITTINGS SHALL BE BRASS
3. OLYMPIC 66 C.I. TAPPED PLUG 2"

INSTALLATION REQUIREMENTS

4. CUL-DE-SAC INSTALL
 - A. STANDARD BLOW-OFF ASSEMBLY (B & C).
 - B. FIRE HYDRANT END OF LINE, NO BLOW-OFF REQUIRED.
5. END OF WATER MAINS
 - A. TO BE EXTENDED LATER - INSTALL GATE VALVE AND BLOW-OFF RISER (A & C).
 - B. NOT TO BE EXTENDED - INSTALL BLOW-OFF ASSEMBLY (B & C)
6. INSTALL SERIES 1350 JOINT RESTRAINTS AS RECOMMENDED BY UNI-FLANGE OR DESIGN ENGINEER.
7. IF VALVE OPERATING NUT IS INSTALLED DEEPER THAN 3 FEET BELOW FINISHED GROUND ELEVATION, INSTALL VALVE NUT EXTENSION TO RAISE OPERATING NUT TO WITHIN 2 FEET FROM FINISHED GROUND ELEVATION. NUT EXTENSION SHALL BE APPROVED BY THE DIRECTOR.



BLOW OFF VALVE ASSEMBLY

CITY OF GUSTINE IMPROVEMENT STANDARDS

WATER LINE BLOW-OFF ASSEMBLY

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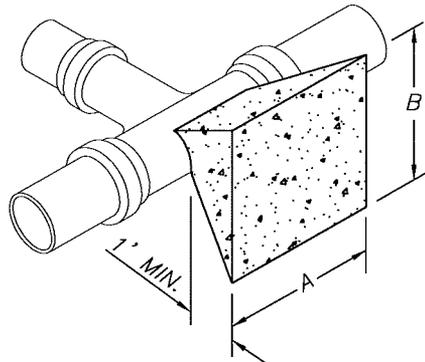
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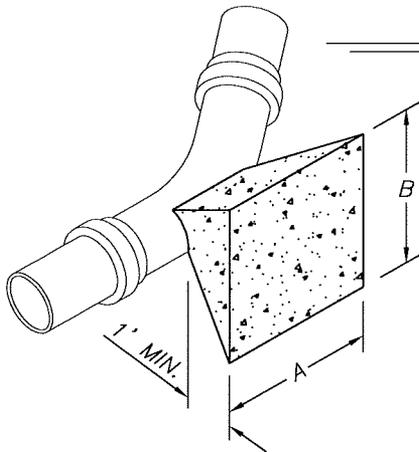
4 - H



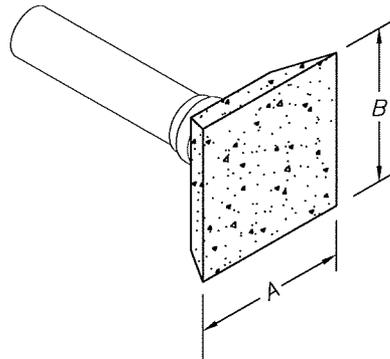
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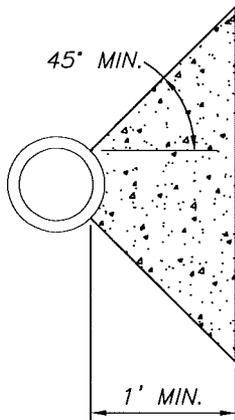
**TYPICAL THRUST BLOCK
TEE OUTLET**



**TYPICAL THRUST BLOCK
CAST IRON BEND**



**TYPICAL THRUST BLOCK
DEAD END**



**TYPICAL SECTION THROUGH
THRUST BLOCK**

THRUST BLOCK AREA REQUIRED		
FITTINGS	ALLOWABLE SOIL BEARING VALUE	
	1,500 LBS. PER SQ. FT.	
6" LINE	"A"	"B"
22 1/2°	1'-6"	1'-0"
45°	2'-0"	1'-3"
90°	3'-0"	1'-6"
TEE OUTLET	2'-0"	1'-6"
DEAD END	2'-0"	1'-6"
8" LINE	"A"	"B"
22 1/2°	1'-6"	1'-6"
45°	2'-6"	1'-6"
90°	4'-0"	2'-0"
TEE OUTLET	2'-9"	2'-0"
DEAD END	2'-9"	2'-0"
10" LINE	"A"	"B"
22 1/2°	2'-3"	1'-6"
45°	3'-0"	2'-0"
90°	5'-0"	2'-6"
TEE OUTLET	3'-3"	2'-6"
DEAD END	3'-3"	2'-6"
12" LINE	"A"	"B"
22 1/2°	2'-6"	2'-0"
45°	4'-0"	2'-6"
90°	6'-0"	3'-0"
TEE OUTLET	4'-0"	3'-0"
DEAD END	4'-0"	3'-0"

NOTE:

1. ALL VALUES SHOWN ARE MINIMUM FOR A HYDROSTATIC PRESSURE OF 150 P.S.I. AND A SOIL RESISTANCE OF 1,500 LBS./SQ. FT. WITH A MINIMUM PIPELINE COVER OF 2'-6".
2. REDUCTION OF THE THRUST BLOCK SURFACE AREA WILL BE CONSIDERED UPON SUBMITTAL OF APPROVED SOIL BEARING TEST RESULTS GREATER THAN 1,500 LBS./SQ. FT.
3. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED SOIL.
4. THRUST BLOCKS SHOWN ARE FOR HORIZONTAL THRUST RESTRAINT. FOR VERTICAL THRUST RESTRAINT, DETAILS SHALL BE PROVIDED BY DESIGN ENGINEER.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

THRUST BLOCK DETAILS

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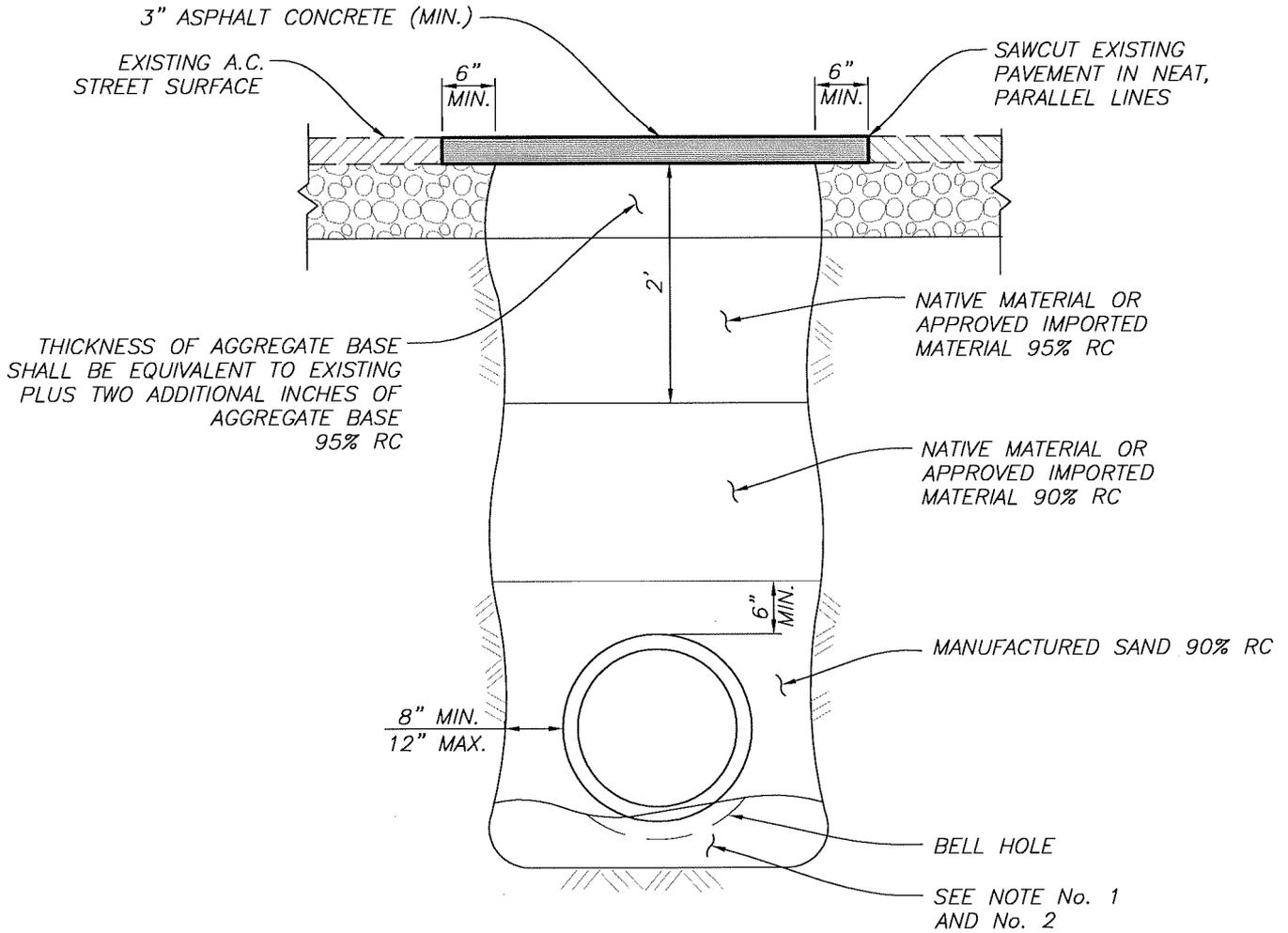
DATE:

DRAWING NO.

4 - 1

NOTE

TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.



NOTES:

1. IF BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVEREXCAVATED A MINIMUM OF 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
2. FOR PVC PRESSURE PIPE PROVIDE 4" OF MANUFACTURED SAND BEDDING.
3. NATURAL SAND MAY BE SUBSTITUTED FOR MANUFACTURED SAND AS APPROVED BY THE DIRECTOR OF PUBLIC WORKS. SUBSTITUTIONS SHALL BE REVIEWED ON A CASE BY CASE BASIS. REQUESTS FOR USAGE OF WHAT IS COMMONLY REFERRED TO AS "BLOW SAND" OR "HILMAR SAND" WILL NOT BE APPROVED.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

WATER LINE TRENCH DETAIL

APPROVED BY: _____ DATE: _____

DRAWING NO. **4 - J**

SECTION 5 – STORM DRAINAGE

SPECIFICATIONS:

5.1	GENERAL	5-1
5.2	SUBMITTALS	5-1
5.3	STORM RUNOFF	5-1
5.4	PIPE DESIGN	5-2
5.5	DRAIN INLETS	5-4
5.6	MANHOLES	5-4
5.7	TRENCH EXCAVATION	5-4
5.8	WATER IN TRENCH	5-5
5.9	LAYING AND JOINTING OF PIPE	5-5
5.10	BACKFILL	5-6
5.11	DEFLECTION TESTING	5-6
5.12	CLOSED CIRCUIT TV INSPECTION	5-7
5.13	DETENTION BASINS.....	5-7
5.14	PUMP STATIONS	5-8
5.15	TRASHRACKS	5-10
5.16	ACCESS	5-10

DRAWINGS:

5A	STORM DESIGN SHEET
5B	RAIN INTENSITY FREQUENCY CURVES
5C	FLEXIBLE WALL PIPE BACKFILL
5D	RIGID WALL PIPE BACKFILL
5E	C.I.P.P. STORM DRAIN AND TRENCH
5F	STORM DRAIN MANHOLE FOR 30” – 48” C.I.P.P.
5G	STORM DRAIN MANHOLE FOR 54” – 96’ C.I.P.P.
5H	STORM DRAIN MANHOLE PLAN VIEW (C.I.P.P.)
5I	STORM DRAIN MANHOLE
5J	CAST IRON MANHOLE FRAME AND COVER
5K	DRAIN INLETS

SECTION 5

STORM DRAINAGE

5.1 GENERAL

All drainage design shall be in accordance with the following requirements and shall provide a positive means of drainage to the discharge point designated by the City. . All drainage calculations shall be submitted to the City Engineer for review. Drainage calculations shall cover all drainage facilities required to deliver run-off to a certain location and hydraulic grade line elevation as approved by the City Engineer. Drainage flow calculations shall be submitted on Drawing No. 5-A. Output of computerized calculations will not be accepted unless all of the data required on Drawing No. 5-A is provided in the same format as Drawing No. 5-A.

5.2 SUBMITTALS

Prior to submittal of Improvement Plans for the first phase of construction, a storm drainage master plan for the entire development shall be submitted to the City Engineer for review and approval. The plan shall include the following:

- A plan with a scale of 1" to 100' showing the proposed system, preliminary pipe sizes, tributary sub-areas and existing and future tributary areas outside the project area.
- Hydraulic calculations.
- Detention basin design calculations and conceptual drawings of the basin and access road. The drawings shall include approximate groundwater elevation, basin inverts, maximum water surface elevations and hydraulic grade line control elevations.
- A description and preliminary sketch of any pump stations or gravity outlet facilities. This information shall include number and size of pumps, sump volumes and pump operating levels.

5.3 STORM RUNOFF

Flow rates may be determined by using the Rational Formula, $Q=CIA$, where Q represents the quantity of run-off in cubic feet per second; A , the total run-off area in acres; I , the intensity of the rainfall in inches per hour as determined from the intensity duration curves shown on Drawing No. 5-B; and C , the coefficient of run-off also shown on Drawing No. 5-B.

Alternatively, the Urban Hydrology for Small Watersheds, TR-55 method may be used, and in some cases required depending upon the size of the watershed.

Roof to gutter time shall be assumed to be 20 minutes.

5.4 PIPE DESIGN

1. GENERAL

Storm drainage piping shall be designed to handle a storm with a minimum return period of five years. The minimum size of any storm drainage pipe shall be 15 inches in diameter except for pipes terminated in cul-de-sacs and catch basin laterals which shall be a minimum of 12 inches in diameter.

Manning's formula shall be used to calculate design flow, velocity, slope and pipe diameter. Manning's roughness coefficient "n" varies with the type of pipe used according to the following table:

<u>Pipe Material</u>	<u>n</u>
Plastic	0.012
Reinforced Concrete	0.013
Cast-In-Place Concrete	0.015

Plastic pipe up to and including 15-inch diameter shall conform to ASTM Designation D3034. Pipe dimension ratio shall be SDR35. Plastic pipe 18-inch to 27-inch in diameter shall conform to ASTM Designation F679. Rubber gasket joints shall be factory installed and conform to ASTM F477.

Reinforced concrete pipe shall be the minimum class required to serve the purpose intended but in no case shall be less than Class III conforming to the specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, ASTM Designation C76. The pipe shall be manufactured using the packer head method or shall be centrifugally spun. The pipe shall utilize a Bureau of Reclamation Type R-4 bell and spigot. Use of elliptical reinforcement is not allowed.

Cast-in-place concrete pipe shall only be used if approved by the City Engineer. Cast-in-place concrete pipe shall conform to Section 63 of the State Standards and these Improvement Standards.

2. SLOPE

Minimum slopes are as follows:

Diameter (inches)	Minimum Slope (ft/ft)
12	0.0019
15	0.0014
18	0.0011
21	0.0009
24	0.0008
30	0.0006
36	0.0006
42	0.0005
48	0.0004

The above slopes are intended to provide velocities of not less than 2.0 feet per second when flowing half full regardless of the slope of the hydraulic grade line. (Where the City's system is surcharged, velocities based on the design hydraulic grade line are well below 2 feet per second except in trunk lines.)

If it is impractical to meet these velocity standards, the minimum slopes can be waived by the City Engineer.

The slope of storm drains between manholes shall be constant.

Catch basin laterals shall have a minimum fall of 0.10 feet between the catch basin and the manhole. Desired fall is 0.30 feet or more.

Siphons are not permitted.

3. VERTICAL ALIGNMENT

The minimum cover for storm drains shall be 2 feet 6-inches. When crossing a water main, the storm drain line should be installed below the water main with a minimum clearance of 12-inches. At points of convergence of pipes, the invert of the inflowing pipe shall be a minimum of 0.1 foot higher than the invert of the outflowing pipe. (This 0.1 foot of elevation difference does not apply for laying of pipe through a manhole.)

4. HORIZONTAL ALIGNMENT

Drainage pipes shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline whenever possible.

Permanent easements shall be provided for all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. Wider easements may be required by the Director for any lines over 18-inches in width or with an invert elevation 5 feet or greater below ground line. The line shall be located in the center of the easement unless otherwise required by the Director.

A minimum horizontal clearance of 10 feet shall be maintained between drain lines and water mains, unless otherwise approved by the City Engineer. If the 10-foot separation is waived, the requirements of the California State Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

5.5 DRAIN INLETS

Drain inlets shall be as shown on Standard Drawing 5-K. The structural channel iron shall be galvanized to conform to the requirements Section 75-1.05 of the State Standards.

Spacing of drain inlets shall be such that the surface flow to the drain inlet does not encroach into vehicular travel ways.

5.6 MANHOLES

Manholes shall be located on storm trunk and lateral pipelines. Manholes shall be placed at all storm drain intersections, at sections where changes in slope, pipe size and alignment occur, and at the upstream ends of all storm drains.

Manholes shall have a maximum spacing of 500 feet.

Invert elevation drop across each manhole shall equal the difference in pipe diameter where there is a change in pipe size and a minimum of 0.1 foot at all bends.

5.7 TRENCH EXCAVATION

The Contractor shall, prior to beginning construction, obtain from the Division of Industrial Safety the permit required by California Labor Code, Section 6500, and pay any fee charged for such permit. In addition thereto, whenever the work under the Contract involves trench excavation 5-feet or more in depth, the Contractor shall submit for approval to a registered civil or structural engineer representing the City, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of

Industrial Safety, the plan shall be prepared by a registered civil or structural engineer. Nothing in this section shall be deemed to allow the use of shoring, sloping or other protective system less effective than that required by the Construction Safety Orders. Nothing in this section shall be construed to impose tort liability on the City, City Engineer, or any of their officers, agents or employees.

The pipe trench shall be dug with side walls sloped or otherwise supported in a safe manner in accordance with the Department of Industrial Relations, Division of Occupational Safety and Health Administration regulations pertaining to trenching.

Excavated material shall be placed on only one side of the trench unless otherwise directed. Separation distance between piles of excavated material and trench shall be consistent with the Construction Safety Orders.

The alignment and grade for the bottom of the trench shall be properly established before the trench is excavated and shall be approved by the City before the pipe is laid. Trenches shall be true to line and grade, and the bottom shall be even and free from all objectionable material.

5.8 WATER IN TRENCH

When water is encountered in the trench, it shall be removed by draining or by pumping. Should water get into the trench before the pipe is laid, the laying of pipe shall be postponed until the trench has dried sufficiently to provide a firm foundation for the pipe or else, the mud or softer material shall be removed and grade re-established by backfilling and compacting with suitable material as determined by the City.

5.9 LAYING AND JOINTING OF PIPE

Laying and jointing of pipe shall be in accordance with the manufacturer's recommendations and as approved by the City. Joint deflections shall not exceed 80% of the maximum recommendations of the manufacturer.

Where rubber gaskets are used for jointing pipe, a feeler gauge shall be used to check the position of the rubber gasket upon each closure. The interior of the pipe shall be cleared of all debris, and exposed pipe ends shall be closed by a suitable pipe plug when pipe laying is not in progress.

The pipe shall be laid on a trench bottom shaped to provide adequate support of the pipe except at coupling or bell holes. The use of prepared mounds to facilitate laying of the pipe is not approved.

Where pipe is to be encased or have concrete bedding, suitable concrete blocks shall be used to support the pipe in the proper location while placing concrete.

5.10 BACKFILL

After the storm drains have been properly constructed and inspected, the trench shall be backfilled and compacted as shown on Drawing No. 5-C for flexible walled pipe, Drawing No. 5-D for rigid walled pipe and Drawing No. 5-E for cast-in-place pipe.

Compaction tests shall be performed by a testing laboratory approved by the City. The laboratory shall be retained by the Developer and all testing expenses shall be paid by the Developer.

Jetting of backfill will not be allowed except in special cases as approved by the City Engineer.

During the compaction operation, the contractor must exercise extreme caution so as not to damage or disturb the pipe.

5.11 DEFLECTION TESTING

PVC storm drain pipe shall be tested using a mandrel or other approved testing device. Maximum deflection shall not exceed 5% of the average inside diameter of the pipe.

For all pipes less than 24-inch (I.D.), a mandrel shall be pulled through the pipe by hand. Prior to use, the mandrel shall be approved by the Director. If the mandrel fails to pass, the pipe will be deemed to be over-deflected.

Mandrels shall be rigid, nonadjustable, odd-numbering-leg (9 legs minimum), having an effective length not less than its nominal diameter. The minimum diameter of the mandrel at any point along its full length shall be as follows:

<u>Pipe Material</u>	<u>Nominal Size (Inches)</u>	<u>Minimum Mandrel Diameter (Inches)</u>
PVC-ASTM D3034 (SDR35)	12	10.793
	15	13.203
PVC-ASTM F679 (T-1 Wall)	18	16.748
	21	19.744
	24	22.212
	27	25.033

Mandrels shall be fabricated from steel, fitted with pulling rings at each end, and stamped or engraved on some segment, other than the runner, with the pipe material, specifications, nominal size and mandrel O.D.

For pipes with a nominal diameter of 24-inches or larger, deflections shall be determined by a method submitted to and approved by the Director. If a mandrel is selected, the minimum diameter, length and other requirements shall conform to the dimensions and requirements previously stated.

5.12 CLOSED CIRCUIT TV INSPECTION

Prior to placing the final street surfacing, the Contractor will inspect all new storm drain piping with a closed circuit television system. This will be done after the pipe has been installed true to the prescribed lines and grades, the trench backfilled and compacted, the manhole and cleanout covers set to proper grade, the roadway subgrade compacted, aggregate subbases and bases placed and compacted, and the sewer system cleaned of all debris.

At the start of each storm drain section, the Contractor shall record the manhole location by street intersections the inspection is beginning and ending at. This information shall appear in typewritten letters on the videotape. A gauge shall be attached to and dragged behind the camera to indicate the depth of any standing water within the line. The gauge shall have a diameter of 10% of the pipe diameter being televised.

Pulling of the camera shall be stopped and locations recorded in typewritten letters on the videotape at the following locations:

- The beginning and ending locations of all areas where the depth of standing water exceeds 10% of the pipe diameter.
- Any problem areas.

Camera pulling speed shall not exceed 100 ft. per minute.

Videotapes shall be delivered to the Director for his review. The Contractor shall make all necessary repairs and corrections to the pipeline as required by the Director prior to paving.

5.13 DETENTION BASINS

1. GENERAL

Detention basins shall be designed with a capacity to hold the total run-off from a 10-year frequency, 24-hour event with the maximum water level no higher than six inches below the lowest tributary gutter elevation. Additionally, storm basins shall hold the total run-off from a 50-year frequency, 24-hour event with a water surface elevation below the lowest top of curb.

Hydraulic grade line control elevation, if not established, shall be the elevation at which 50 percent of the design containment occurs.

Basin bottoms shall be provided with a minimum slope of 0.008 toward approved drainage facilities. The minimum separation between the basin bottom and any groundwater shall be 2 feet at all times.

Maximum sideslopes of detention basins shall be 8 horiz.:1 vert. unless otherwise approved by the City.

Basin inlet/outlet piping shall enter the basin through a reinforced concrete inlet/outlet structure installed in the sideslope of the basin.

Storm drainage piping shall be designed such that nuisance water flows less than the discharge capacity of the basin shall be evacuated without first entering the basin. Detention basins shall be provided with outlet facilities capable of draining a full basin within 48 hours.

2. MISCELLANEOUS IMPROVEMENTS

Detention basins shall include a landscape irrigation system and shall be planted with a grass mixture as approved by the City.

Fencing/gates will be required around the entire basin perimeter. Fencing shall be a minimum of 42 inches high. Materials and styling shall be as required by the City.

5.14 PUMP STATIONS

1. GENERAL

Pumping stations shall be designed to pump 100% of the calculated runoff from a storm with a ten-year return period unless utilized in conjunction with a detention basin. Pumps designed in conjunction with basins shall be capable of draining 100 percent of the basins storage capacity within 48 hours.

Pump stations shall be designed with a separator to remove settling and floating debris from the water entering the pump sump. They will also be designed with the following criteria:

- Pump stations shall have a minimum of two low RPM (1,170 RPM maximum) non-clog vertical turbine or mixed flow pumps. Capacities shall be selected so that with the

largest pump out of service, the others can handle the design flow.

If the design flow of the station exceeds 1,000 gpm, a 500 gpm nuisance flow pump shall also be installed. The nuisance flow pump shall be a non-clog submersible FLYGT sewer pump with a slide rail system. (Slide rails shall be 2-inch schedule 40 steel pipe with stainless steel hardware.)

- Reinforced concrete pump sump of a hydraulic design that meets the recommendations of the pump manufacturer and the City.
- Adequate storage in the pump sump, to provide a minimum pump cycle time of 15 minutes for the nuisance pump or lead pump, whichever is less.

2. CONTROLS

Controls shall be mounted in a deadfront free standing self-contained NEMA 3R metal enclosure with a padlockable door. The control center and all electrical components shall bear the Underwriters Laboratory (UL) label.

For each pump, there shall be included, a NEMA combination circuit breaker/overload protector with adjustable protection, short circuit protection, reset and disconnect for all phases; across the line magnetic contactor; hand/off/automatic pump operation selector switch; overload relay to be pre-calibrated to match motor characteristics and factory sealed to ensure trip setting is tamper proof and 120 volt control circuitry.

The control center shall also have a pump alternator, pump run lights, condensation heater with thermostat and a 120 volt, 15 amp, GFI duplex receptacle mounted on the inner door.

A manual power transfer switch and a receptacle with closing plug, as specified by the Director, shall be provided to allow connection of an emergency power generator.

The water level sensor for pump control shall be as specified by the Director.

3. DISCHARGE PIPING

Discharge piping shall be ductile iron or steel. Plastic piping may be allowed below ground where approved by the City Engineer.

The design velocity in the discharge piping shall not exceed 8 foot per second. All internal piping in the pumping station shall be properly anchored and restrained. Expansion joints and flanged connections shall be provided to facilitate dismantling and maintenance of the equipment.

Valves, couplings and additional flanges as required for proper maintenance of the pumping facilities shall be readily accessible.

5.15 TRASHRACKS

Trashracks shall be installed on all basin pump stations utilizing vertical turbine or mixed flow pumps.

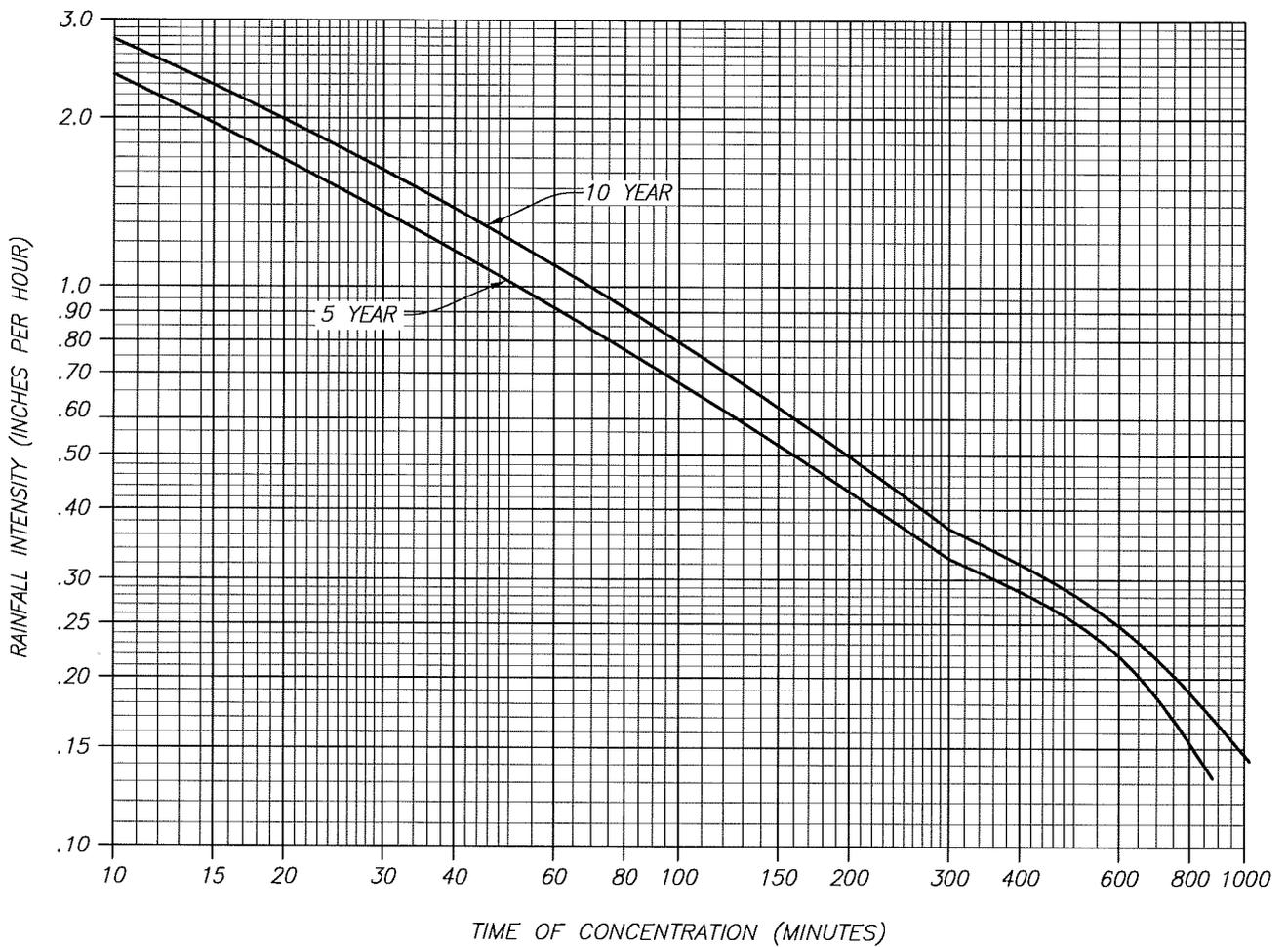
Trashracks shall be constructed of flat steel bars a minimum of 2 inches deep and 0.25 inches wide. Centerline to centerline spacing of bars shall be 2 inches maximum.

Bars shall be held in a parallel, equally spaced position by a flat toe plate welded across their lower ends and by horizontal spacing bars welded to the rack's downstream side. These horizontal bars shall not interface with raking the racks.

Trashracks shall be inclined 30 to 45 degrees from the horizontal and shall extend from the floor to the top of the structure. A walkway, platform or other suitable level surface shall be provided at the top of all structures to allow for proper maintenance operations. Guardrails meeting the Industrial Safety Orders shall be provided. Sufficient clearance shall be provided between trashracks and surrounding fences or other obstacles to permit handling of cleaning rakes.

5.16 ACCESS

Pump station layout shall allow for proper access of maintenance vehicles. Vehicular access route from the adjacent public travelway, throughout the site, and back onto the public travelway shall be shown on the site plan. Access roads to pump stations shall be asphalt concrete paved as required by the Director. Minimum outer and maximum inner turning radii of 42 feet and 24 feet, respectively, are required. Minimum access road pavement width shall be 12 feet.



NOTES:

1. ALL STORM DRAINAGE PIPING SHALL BE DESIGNED TO HANDLE A STORM WITH A MINIMUM RETURN INTERVAL OF 5 YEARS.
2. ROOF TO GUTTER TIME SHALL BE ASSUMED TO BE 20 MINUTES.
3. THE 10 YEAR-24 HOUR RAINFALL IS 1.99 INCHES.
4. THE 50 YEAR-24 HOUR RAINFALL IS 2.64 INCHES.

RUNOFF COEFFICIENTS	
ZONING	"C"
R1, R2	0.50
R3	0.60
COMMERCIAL	0.80
INDUSTRIAL	0.70

Apr 16, 2012 - 11:11am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

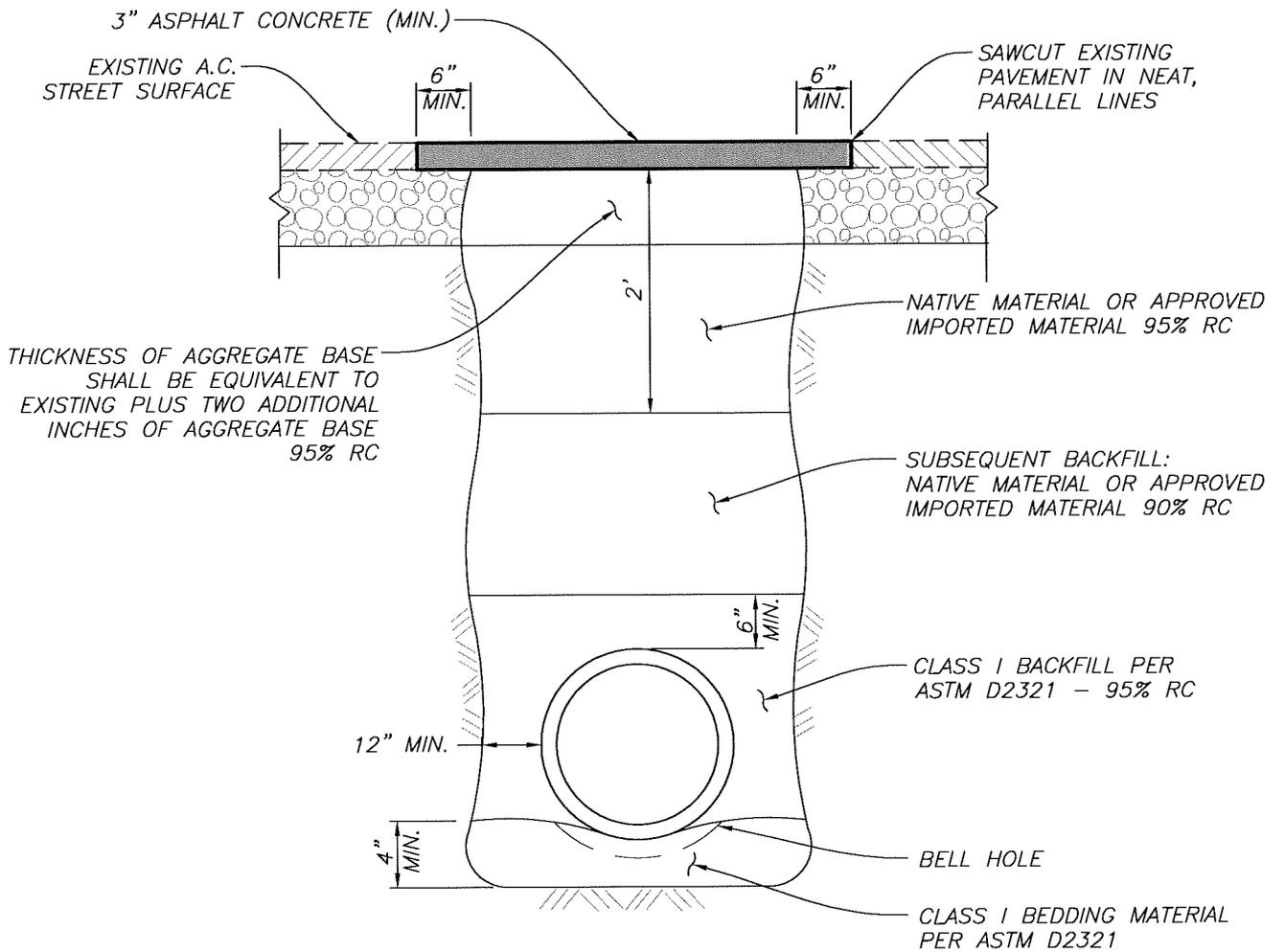
RAIN INTENSITY FREQUENCY CURVES

APPROVED BY:

DATE:

DRAWING NO.

5 - B



NOTES

1. IF THE BOTTOM OF TRENCH IS SOFT AND UNSTABLE, IT SHALL BE OVER EXCAVATED 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
2. TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

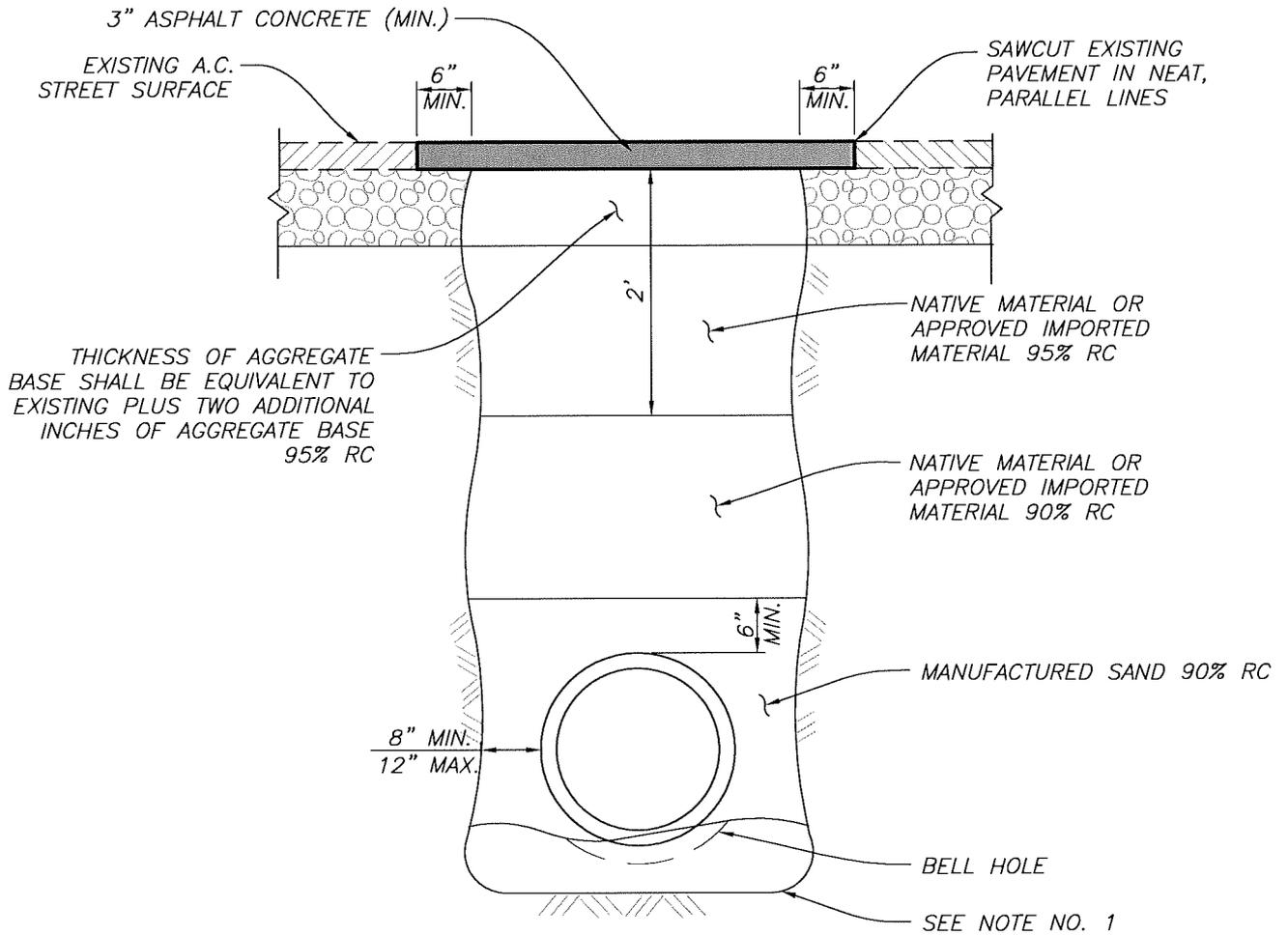
FLEXIBLE WALL PIPE BACKFILL

APPROVED BY:

DATE:

DRAWING NO.

5 - C



NOTES:

1. IF THE BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVER-EXCAVATED A MINIMUM OF 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
2. NATURAL SAND MAY BE SUBSTITUTED FOR MANUFACTURED SAND AS APPROVED BY THE DIRECTOR. SUBSTITUTIONS SHALL BE REVIEWED ON A CASE BY CASE BASIS. REQUESTS FOR USAGE OF WHAT IS COMMONLY REFERRED TO AS "BLOW SAND" OR "HILMAR SAND" WILL NOT BE APPROVED.
3. TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.

Apr 16, 2012 - 3:57pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

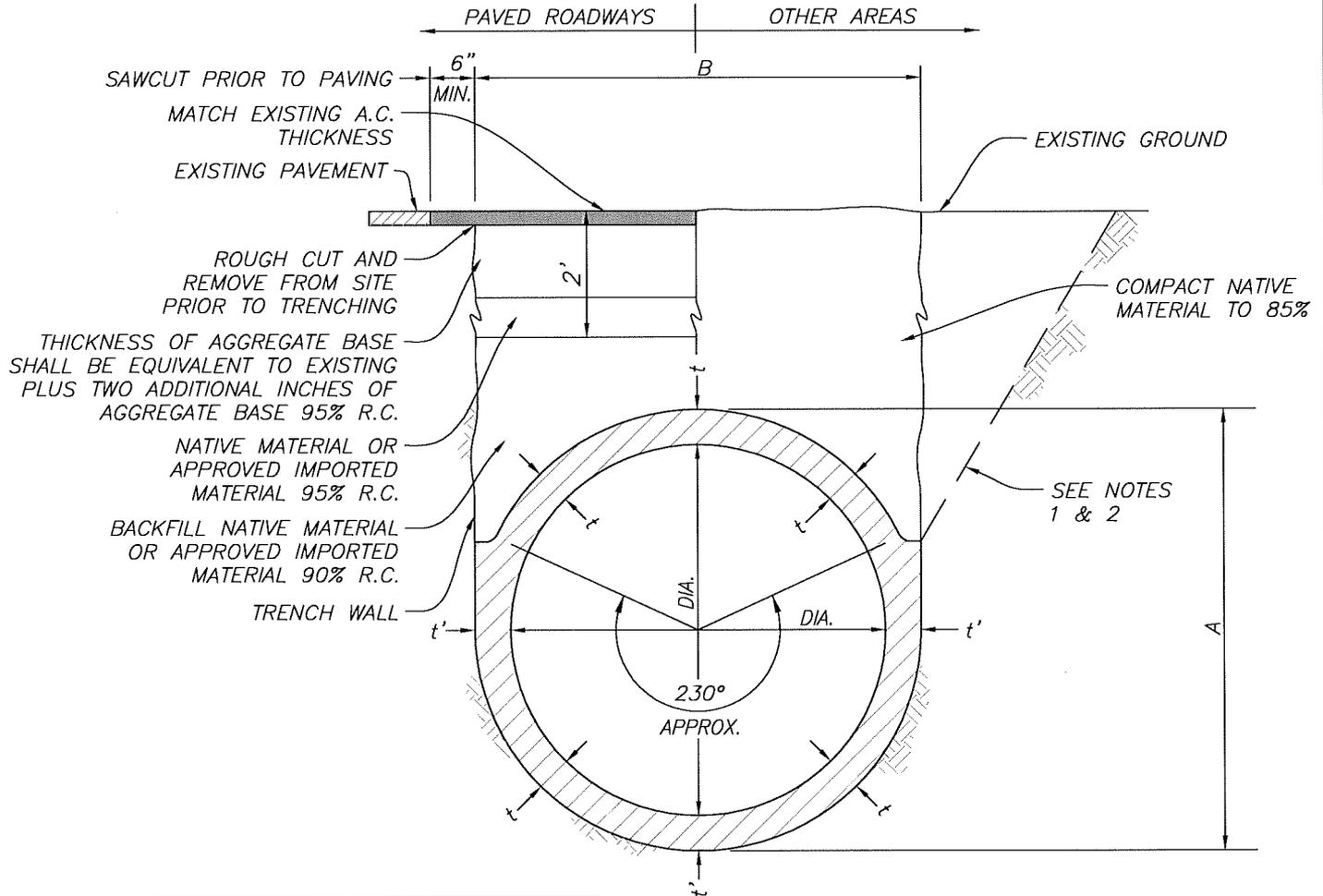
RIGID WALL PIPE BACKFILL

APPROVED BY:

DATE:

DRAWING NO.

5 - D



DIA.	A	MIN. B	t	t'
30"	36"	37"	3"	3"
36"	43"	44"	3 1/2"	3 1/2"
42"	50"	51"	4"	4"
48"	58"	59"	5"	5"
54"	65"	66"	5 1/2"	5 1/2"
60"	72"	73"	6"	6"
66"	79"	80"	6 1/2"	6 1/2"
72"	86"	87"	7"	7"
84"	100"	101"	8"	8"
96"	114"	115"	9"	9"

**TYPICAL PIPE SECTION
30" THRU 96"**

NOTES:

1. THE CONTRACTOR SHALL SUBMIT A DETAILED PLAN TO THE CITY ENGINEER PRIOR TO EXCAVATION, SHOWING DESIGN OF SHORING, BRACING, SLOPING OR OTHER PROVISIONS TO BE MADE FOR WORKER PROTECTION, IN ACCORDANCE WITH SECTION 6422 OF THE LABOR CODE OF CALIFORNIA.
2. THE MINIMUM REQUIRED WORKER PROTECTION SHALL BE AS DESCRIBED IN THE CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY. VARIANCES THEREFROM SHALL BE PREPARED AND SIGNED BY A REGISTERED CIVIL ENGINEER OF THE STATE OF CALIFORNIA.
3. TRENCHES IN EXISTING PAVED AREAS SHALL BE EXCAVATED VERTICALLY, OR TO THE MOST NARROW PRACTICAL WIDTH AS SOIL CONDITIONS WILL PERMIT.

Apr 16, 2012 - 4:01pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

C.I.P.P. STORM DRAIN AND TRENCH

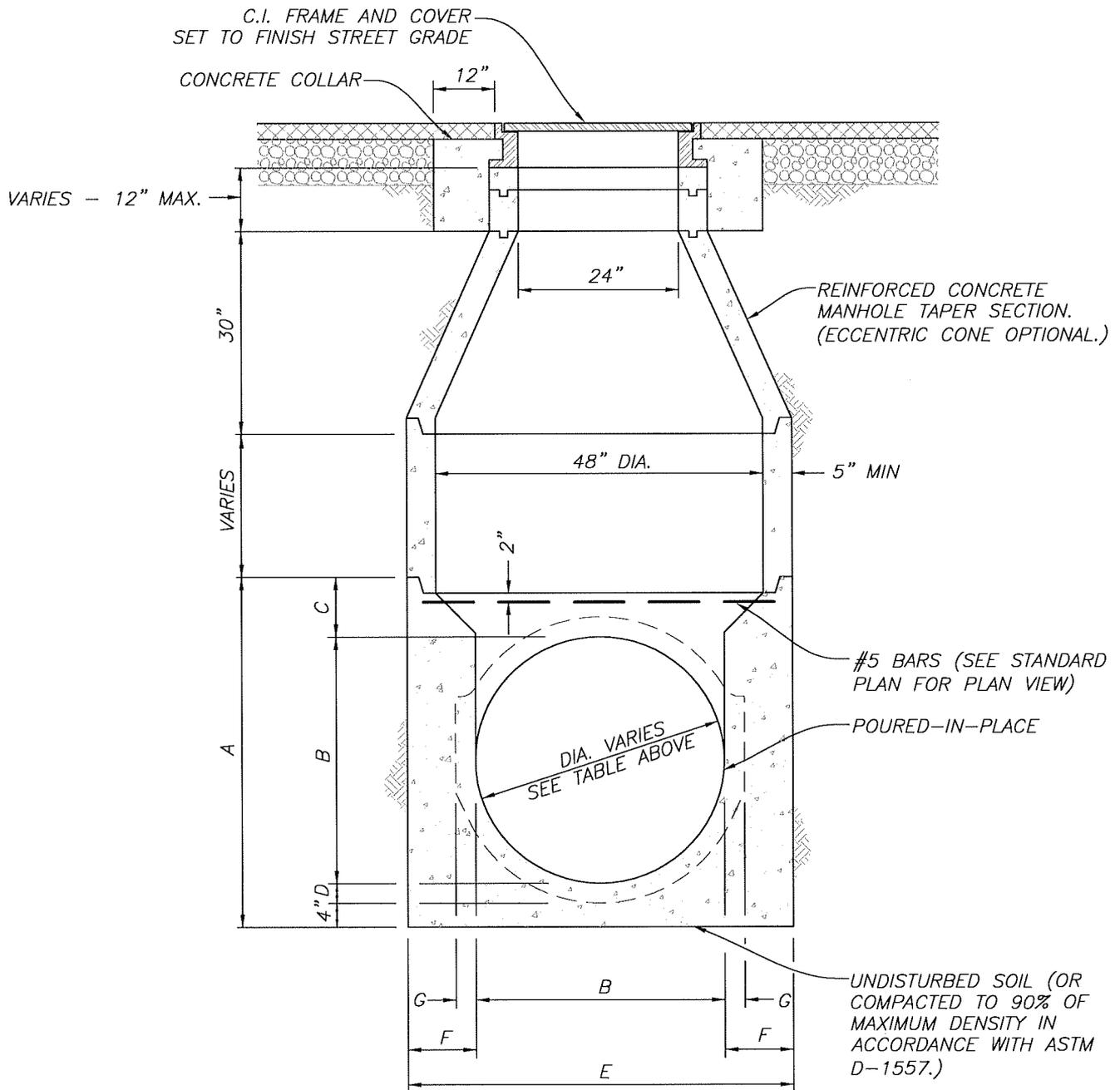
APPROVED BY:

DATE:

DRAWING NO.

5 - E

DIA.	A	B	C	D	E	F	MIN. G
30"	46"	30"	9"	3"	56"	13"	3"
36"	53"	36"	9 1/2"	3 1/2"	56"	10"	3 1/2"
42"	60"	42"	10"	4"	60"	9"	4"
48"	68"	48"	11"	5"	66"	9"	5"



Apr 16, 2012 - 4:07pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

STORM DRAIN MANHOLE FOR 30" - 48" C.I.P.P.

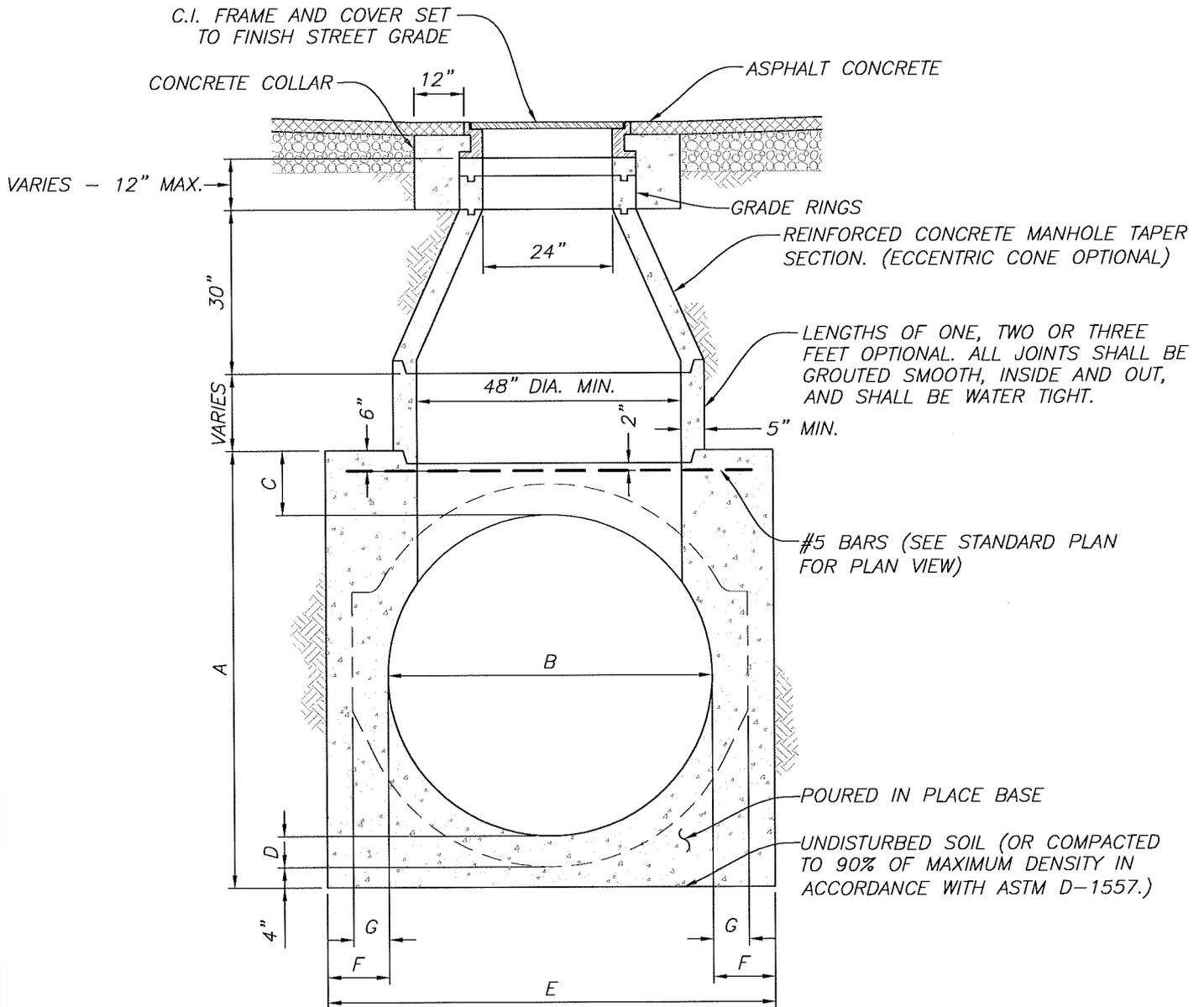
APPROVED BY:

DATE:

DRAWING NO.

5 - F

DIA.	A	B	C	D	E	F	MIN. G
54"	75"	54"	11	5 1/2"	75"	10	5 1/2"
60"	82"	60"	12	6"	82"	11	6"
66"	89"	66"	12	6 1/2"	89"	11	6 1/2"
72"	96"	72"	13	7"	96"	12	7"
84"	110"	84"	14"	8"	110"	13"	8"
96"	124"	96"	15"	9"	124"	14"	9"



Apr 16, 2012 - 4:11pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

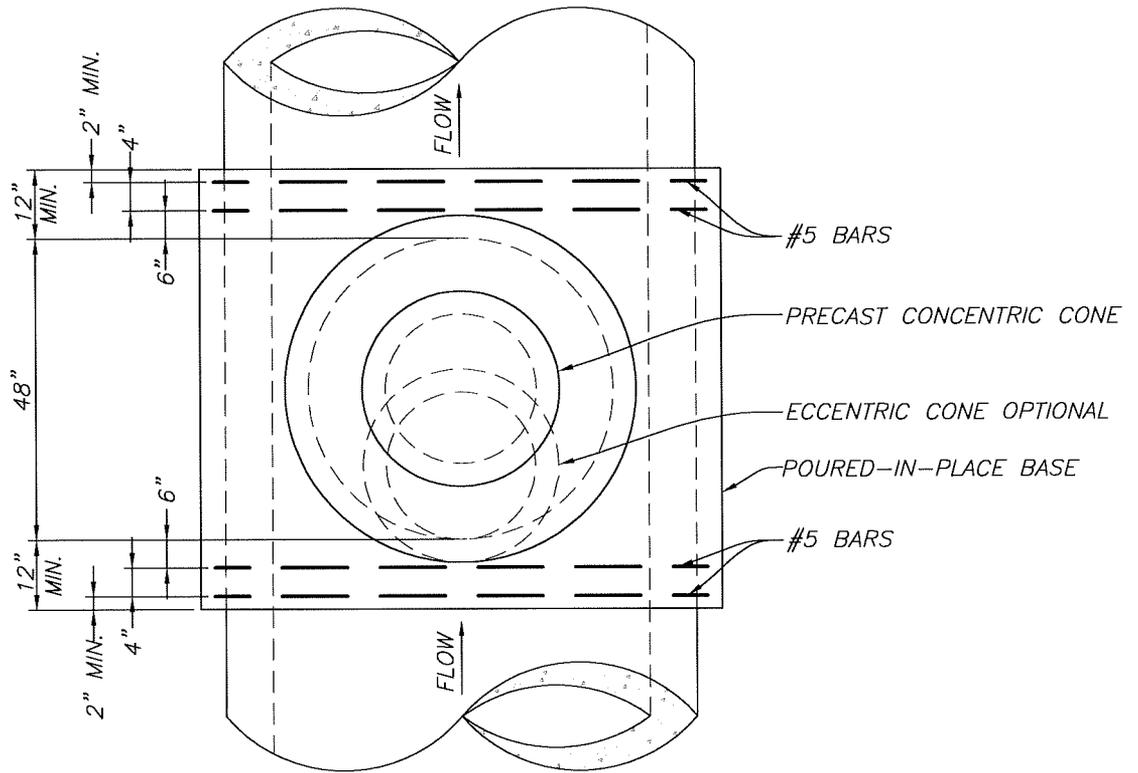
STORM DRAIN MANHOLE FOR 54" - 96" C.I.P.P.

APPROVED BY:

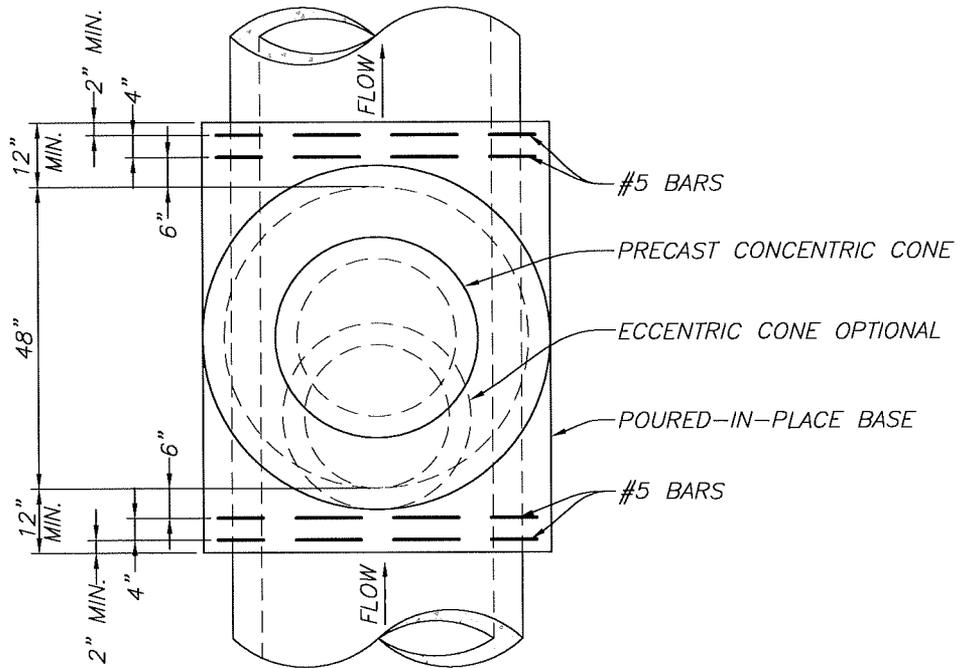
DATE:

DRAWING NO.

5 - G



MANHOLE FOR 54" - 96" C.I.P.P.



MANHOLE FOR 30" - 48" C.I.P.P.

Apr 16, 2012 - 4:15pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

STORM DRAIN MANHOLE PLAN VIEW (C.I.P.P.)

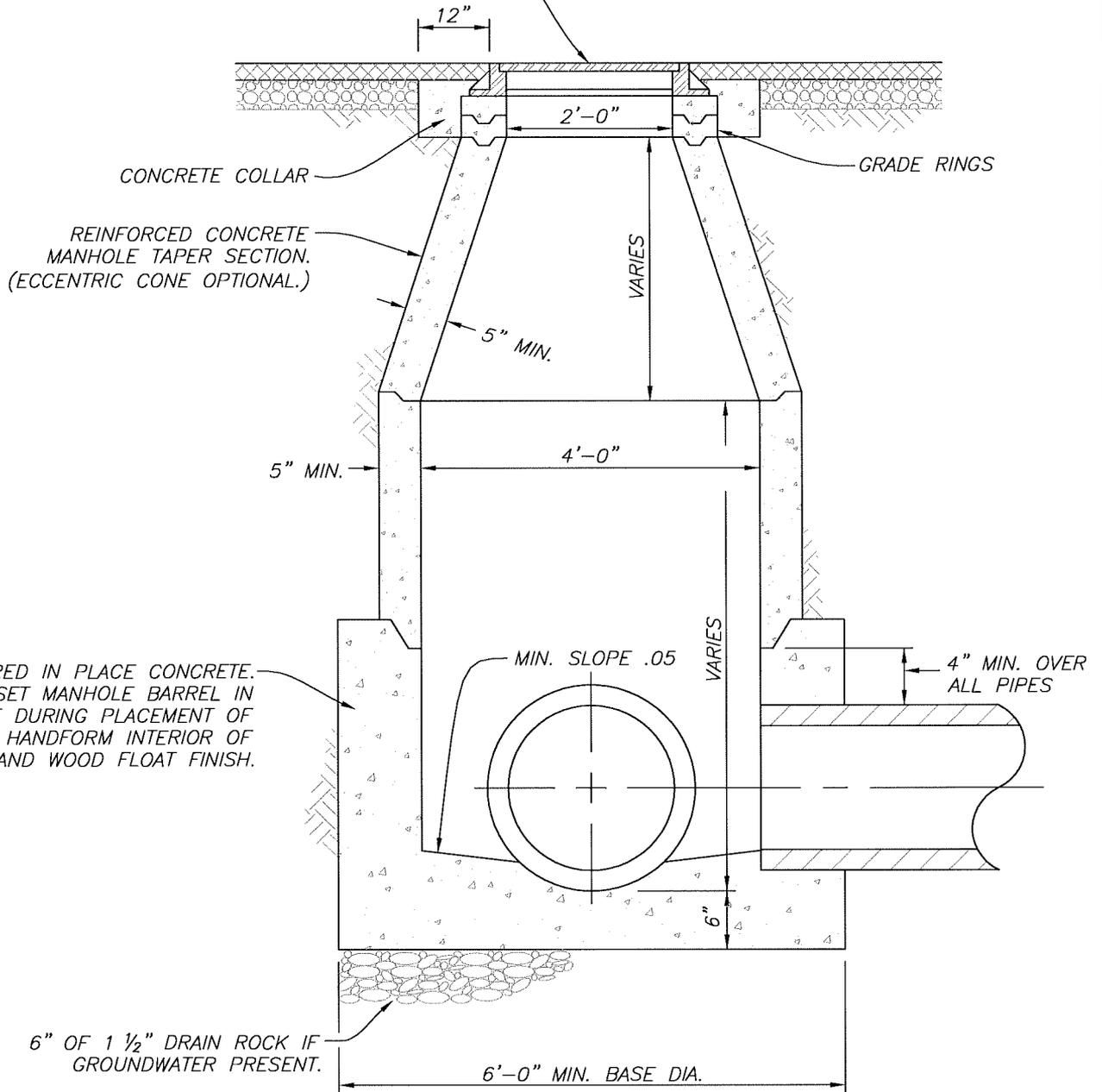
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5 - H

C.I. FRAME AND COVER.
SET TO FINISH STREET GRADE.



Apr 16, 2012 - 4:19pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

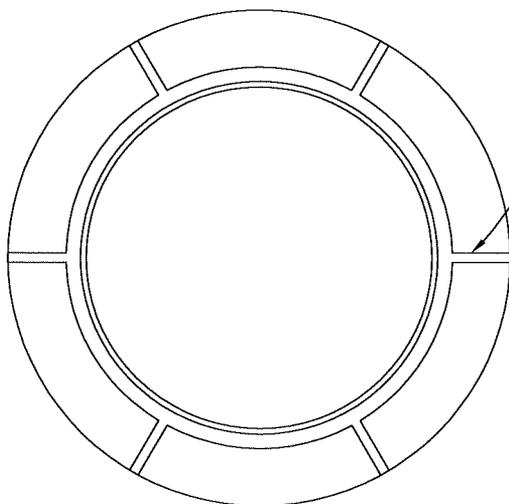
STORM DRAIN MANHOLE

APPROVED BY:

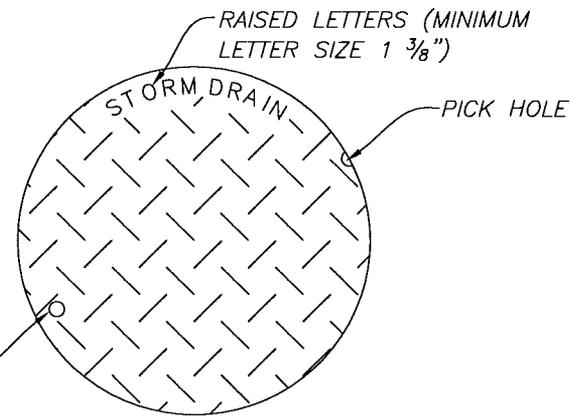
DATE:

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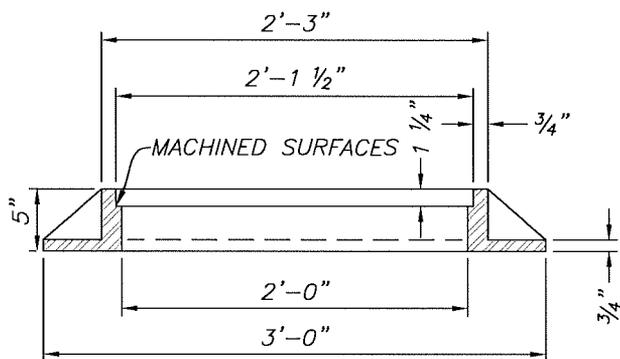
5 - 1



PLAN

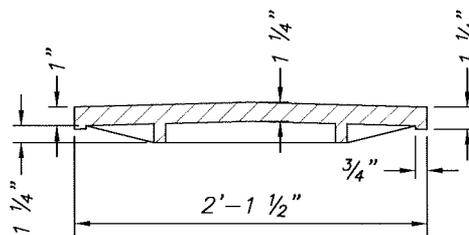


TOP

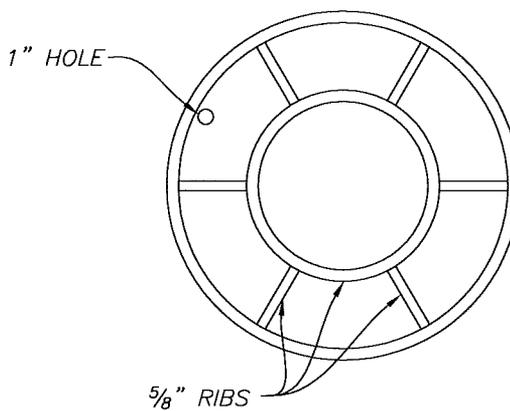


SECTION

MANHOLE FRAME DETAIL



SECTION



BOTTOM

MANHOLE COVER DETAIL

MINIMUM WEIGHT OF FRAME AND COVER: 280 lbs.

Apr 16, 2012 - 11:12am V:\COG\city_standards\cad\5 - J.dwg

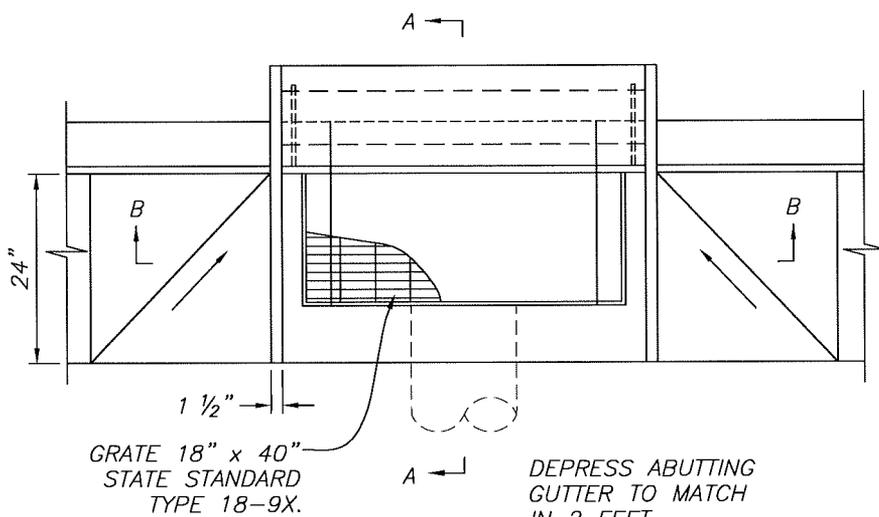


CITY OF GUSTINE IMPROVEMENT STANDARDS

CAST IRON MANHOLE FRAME AND COVER

APPROVED BY: _____ DATE: _____

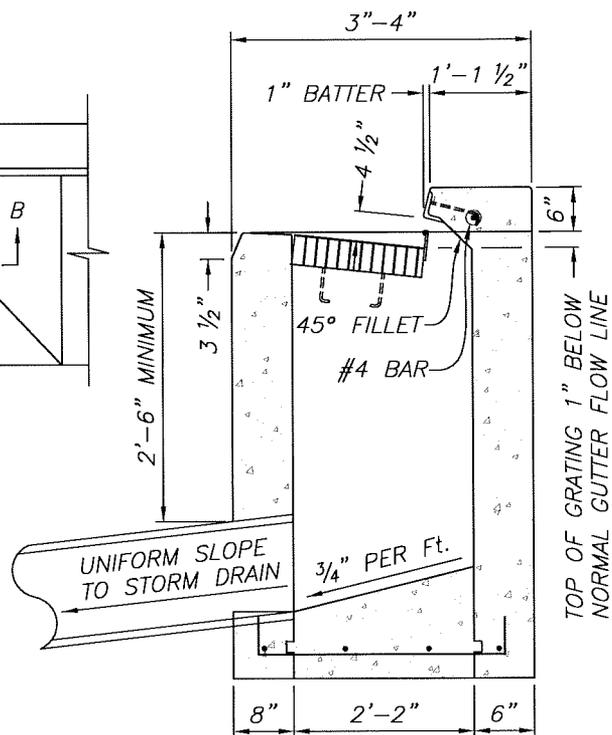
DRAWING NO. **5 - J**



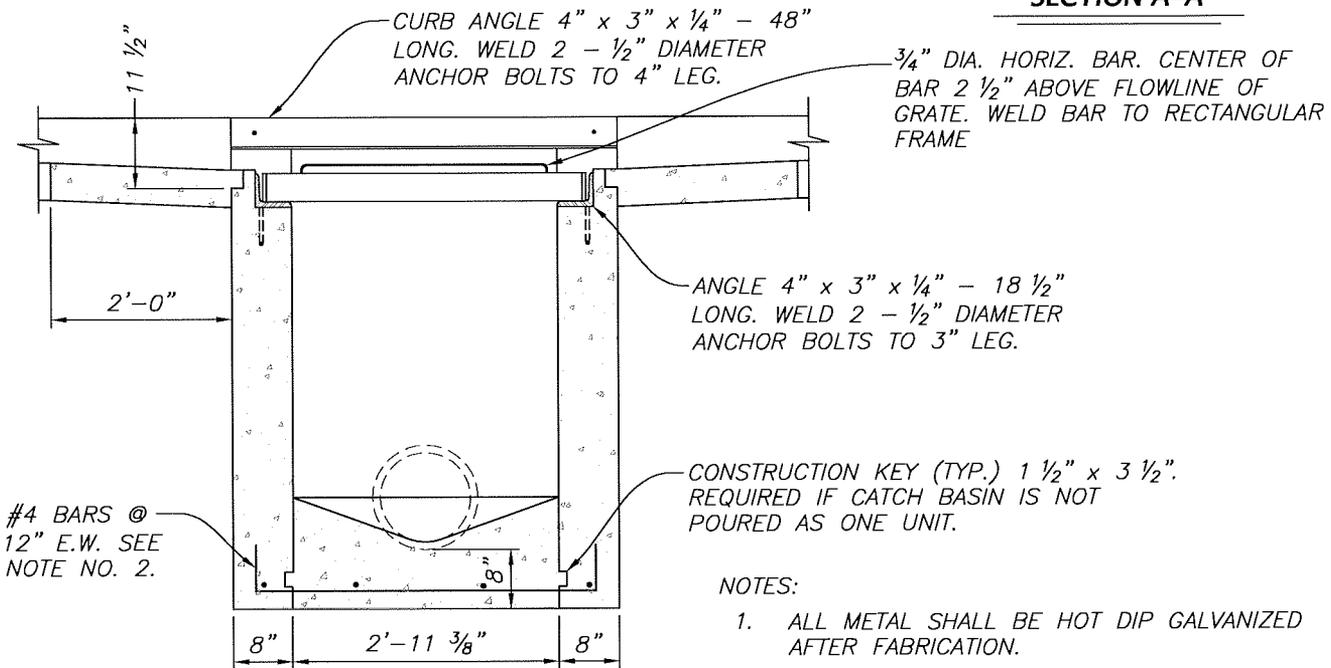
GRATE 18" x 40"
STATE STANDARD
TYPE 18-9X.

DEPRESS ABUTTING
GUTTER TO MATCH
IN 2 FEET.

PLAN



SECTION A-A



SECTION B-B

NOTES:

1. ALL METAL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
2. WALL AND FLOOR REINFORCING NOT REQUIRED IF INVERT LESS THAN 8' DEEP, OTHERWISE USE No. 4 BARS AT 12" EACH WAY, CENTER IN WALLS.

Apr 16, 2012 - 4:22pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

DRAIN INLET

APPROVED BY:

DATE:

DRAWING NO.

5 - K

SECTION 6 - SEWER

SPECIFICATIONS:

6.1	GENERAL	6-1
6.2	DESIGN SUBMITTALS	6-1
6.3	DESIGN	6-1
6.4	PIPE FOR SEWER MAINS	6-4
6.5	SERVICES	6-4
6.6	MANHOLES	6-4
6.7	LIFT STATIONS	6-5
6.8	FORCE MAINS	6-6
6.9	TRENCH EXCAVATION	6-6
6.10	WATER IN TRENCH	6-7
6.11	LAYING AND JOINTING OF PIPE	6-7
6.12	LATERAL CONNECTIONS	6-8
6.13	BACKFILL	6-8
6.14	CLEANING AND FLUSHING	6-8
6.15	INSPECTION	6-9
6.16	CLOSED CIRCUIT TV INSPECTION	6-10
6.17	GREASE TRAPS	6-11

DRAWINGS:

6A	SANITARY SEWER MANHOLE
6B	SANITARY SEWER DROP MANHOLE
6C	CAST IRON MANHOLE FRAME AND COVER
6D	SANITARY SEWER CLEANOUT
6E	4-INCH SEWER SERVICE
6F	4-INCH SEWER SERVICE CLEANOUT
6G	FLEXIBLE WALL PIPE BACKFILL
6H	RIGID WALL PIPE BACKFILL

SECTION 6

SEWER

6.1 GENERAL

Sewers shall be installed by a Developer or Contractor holding the appropriate license for such work under the provisions of the State of California Business and Professions Code.

6.2 DESIGN SUBMITTALS

Prior to submittal of Improvement Plans for the first stage of construction, a master sanitary sewer plan for the entire development shall be submitted to the City Engineer for review and approval. The plan shall include the following:

- A plan with a scale of 1" to 100' showing the proposed system, preliminary pipe sizes, tributary sub-areas and existing and future tributary areas outside the project area.
- Design flow at major junction points.
- A description and preliminary sketch of any pump stations. This information shall include number and size of pumps, wet well volumes and operating levels.

6.3 DESIGN

Unless specific sanitary sewer discharges are required or approved by the City, the following sewage discharges shall be used for design of residential developments:

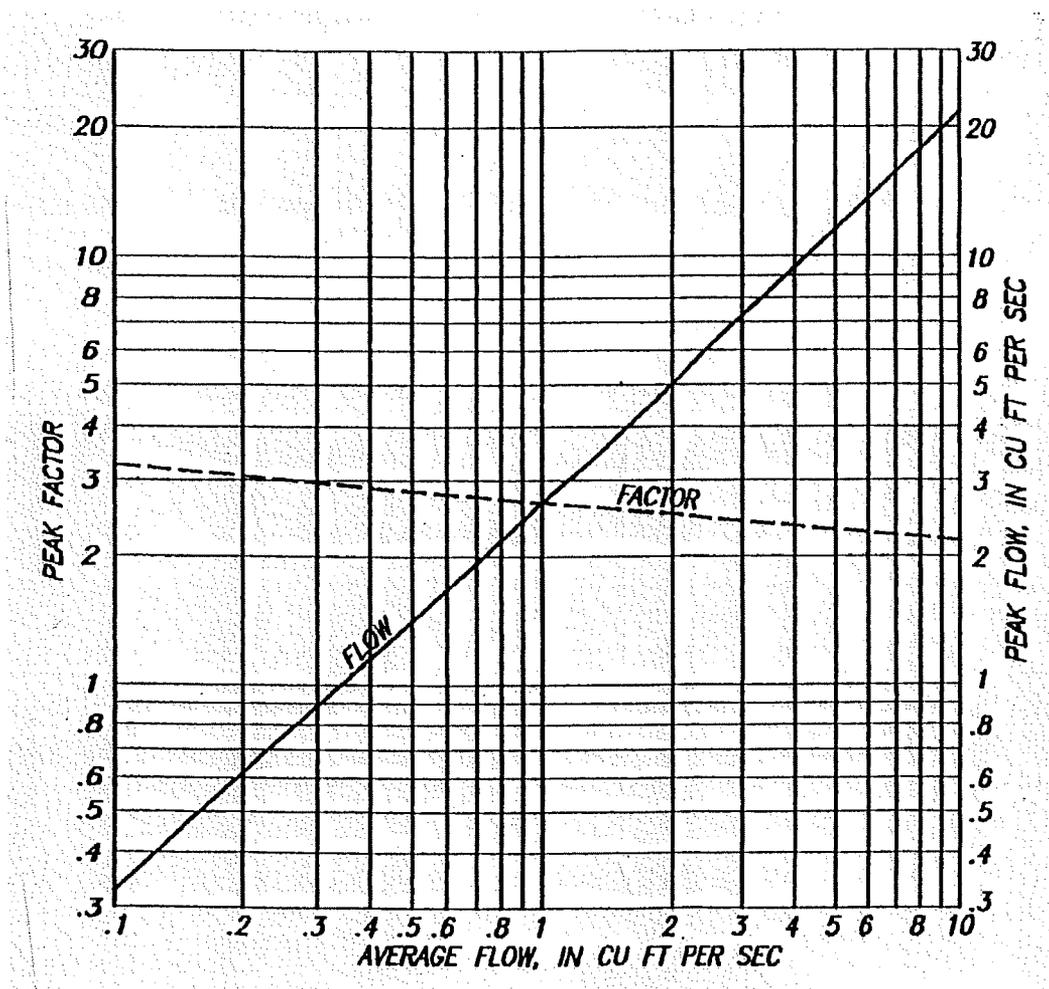
<u>Residential Development</u>	<u>Average Flow</u>
Single Family - Detached	300 gpud
Single Family - Attached	300 gpud
Multi Family - 2-4 Units	250 gpud
Multi Family - 5 Units or More	200 gpud

gpud = gallons per unit per day

For commercial, industrial and other types of development, anticipated sewage discharges shall be determined using typical discharge information from similar facilities.

Peak flow shall be obtained by multiplying the average flow by the peaking factor. The peaking factor is 3.0 for commercial flows and 2.0 for industrial flows.

Peaking factors for residential flow shall be selected from the following figure based upon total upstream average flow.



Sanitary sewer calculations shall be submitted to the City Engineer for review.

The minimum size pipe used for gravity sanitary sewer mains shall be 6 inches in diameter.

Minimum slopes for sewer lines are as follows:

Diameter (inches)	Minimum Slope (ft/ft)
6	.0049
8	.0034
10	.0025
12	.0019
15	.0014
18	.0011
21	.0009
24	.0008

The above slopes are intended to provide velocities of not less than 2.0 feet per second when flowing full based on Manning's equation utilizing an "n" value of 0.13.

If it is impractical to meet these velocity standards, the minimum slopes can be waived by the City Engineer.

Maximum velocity shall not exceed 10 feet per second. The slope of sewer lines between manholes shall be constant.

The minimum cover for sanitary sewer lines, unless otherwise approved by the City Engineer, shall be 3 feet 6 inches from the existing or planned final grade, whichever is lower, to the top of the sewer pipe. Where the preceding minimum cover cannot be provided, the City Engineer may require submittal of pipe load calculations and structural design.

When crossing a water main, it is desirable that the sewer line be installed below the water main with a minimum clearance of 12 inches. If the desired clearance cannot be maintained, the sewer line shall be designed in accordance with the requirements of the California Department of Health Services for separation between water mains and sanitary sewers. A minimum vertical clearance of at least 3 inches shall be maintained between a sewer line and a storm drain.

At points of convergence of sewer pipes of the same size, the invert of the incoming pipe shall be a minimum of 0.1 feet higher than the outflowing pipe. (This 0.1 foot of elevation difference does not apply for laying of pipe through a manhole.) Under no circumstances shall the crown of the incoming pipe be below the crown of the outflowing pipe.

Sanitary sewer pipes shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline whenever possible.

Permanent easements shall be provided for all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. Wider easements may be required by the Director for any lines over 12 inches in width or with an invert elevation 5 feet or greater below ground line. The line shall be located in the center of the easement unless otherwise required by the Director.

A minimum horizontal clearance of 10 feet shall be maintained between sewer lines and water mains, unless otherwise approved by the City Engineer. If the 10 foot separation is waived, the requirements of the California State Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

6.4 PIPE FOR SEWER MAINS

The following standard pipe materials shall be used for gravity sewer construction and shall conform to the latest edition of American Society of Testing Materials standards (ASTM Standards).

<u>Pipe Material</u>	<u>Standard</u>
PVC (Std. Wall)	ASTM D3034
PVC Large Diameter	ASTM F679
PVC Large Diameter Ribbed	ASTM F794
Vitrified Clay	ASTM C700

6.5 SERVICES

In general, only one sanitary service is allowed per parcel served. Additional services may be approved by the City Engineer in order to eliminate the need for on-site lift stations or monitoring requirements.

The minimum diameter for services (sewer laterals) shall be 4 inches.

A sewer lateral installed concurrently with a main sewer shall be of the same type and class of pipe material as the sewer main except where cover or water main separation require otherwise.

6.6 MANHOLES

Manholes shall be placed at the intersections of all sewer mains and/or laterals 6 inches in diameter or larger and at sections where changes in slope, pipe size, or pipe alignment occur. In addition, manholes shall be installed at the upstream ends of all mains. (Cleanouts may be substituted for manholes at the upstream ends of mains if approved by the City Engineer.)

Manholes shall have a maximum spacing of 350 feet on 6 inch and 8 inch mains and 450 feet on mains 10 inches and larger.

Manholes shall have an inside diameter of 4 feet when the largest pipe entering or exiting the manhole is less than 24 inches in diameter. Where the nominal pipe diameter is 24 inches or larger, the inside diameter of the manhole shall be 5 feet.

Drop manholes shall be provided wherever the invert of the incoming pipe is higher than 2 feet above the invert of the outflowing pipe.

6.7 LIFT STATIONS

Lift stations shall be specifically approved by the City Engineer. The lift station shall be of the wet well - dry well arrangement and shall be provided with fencing, paved access and potable water.

The following criteria shall be used for design:

- Wet well capacity shall be adequate to provide a minimum pump cycle time of 10 minutes.
- Wet wells shall be reinforced concrete with a polyurethane lining.
- A stainless steel debris basket with a stainless steel slide rail system shall be provided on the wet well influent pipe.
- Aluminum access frames and covers shall be provided for the wet well.
- Dry well shall be Smith and Loveless Custom Series or approved equal with a steel shell. Minimum diameter of the dry well shall be 9 feet.
- Dry wells shall be protected from corrosion through usage of anodes. Number, size and connection details for anodes to the wet well shall be as recommended by a corrosion specialist approved by the City.
- Two non-clog sewer pumps, each capable of pumping 100% of the design flowrate, shall be provided.
- A TESCO 24-200 LB service pedestal with a Liquitronics III-SL sump level control monitor shall be provided. Contactors for high level alarm and power failure shall be provided in the telemetry portion of the cabinet. Conduits for future telemetry shall be

provided from the pedestal to the nearest point of connection to telephone services.

- Manual power transfer switch and a receptacle with closing plug shall be provided to allow connection of an emergency power generator.
- Provide a pole mounted yard light and alarm light.

6.8 FORCE MAINS

Force main piping shall be sized to provide a minimum velocity of 2 feet per second at the design flowrate of the lift station.

The following standard pipe materials shall be used for force main construction and shall conform to the latest edition of applicable AWWA Standards:

<u>Pipe Materials</u>	<u>Standard</u>
Ductile Iron	AWWA C151
W/Cement Mortar Lining & Seal (std thickness)	AWWA C104
Polyethylene Encasement	AWWA C105
PVC (iron pipe O.D.)	AWWA C900, DR 18 (Class 150) minimum

There are no slope requirements for force mains. However, inverts and pipe slopes shall be shown on the profile sheet of the Improvement Plans.

Force mains shall enter the gravity sewer system through a manhole. The invert of the force main shall be 1 foot above the flow line of the outflow pipe. Cleanouts or automatic air release valves as required by the City Engineer shall be provided.

6.9 TRENCH EXCAVATION

The Contractor shall, prior to beginning construction, obtain from the Division of Industrial Safety the permit required by California Labor Code, Section 6500, and pay any fee charged for such permit. In addition thereto, whenever the work under the Contract involves trench excavation 5 feet or more in depth, the Contractor shall submit for approval to a registered civil or structural engineer representing the City, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer. Nothing in this section shall be deemed to allow the use of shoring,

sloping or other protective system less effective than that required by the Construction Safety Orders. Nothing in this section shall be construed to impose tort liability on the City, City Engineer, or any of their officers, agents or employees.

The pipe trench shall be dug with side walls sloped or otherwise supported in a safe manner in accordance with the Department of Industrial Relations, Division of Occupational Safety and Health Administration regulations pertaining to trenching.

Excavated material shall be placed on only one side of the trench unless otherwise directed. Separation distance between piles of excavated material and trench shall be consistent with the Construction Safety Orders.

The alignment and grade for the bottom of the trench shall be properly established before the trench is excavated and shall be approved by the City before the pipe is laid. Trenches shall be true to line and grade, and the bottom shall be even and free from all objectionable material.

6.10 WATER IN TRENCH

When water is encountered in the trench, it shall be removed by draining or by pumping. Should water get into the trench before the pipe is laid, the laying of pipe shall be postponed until the trench has dried sufficiently to provide a firm foundation for the pipe or else, the mud or softer material shall be removed and grade re-established by backfilling and compacting with suitable material as determined by the City.

6.11 LAYING AND JOINTING OF PIPE

Laying and jointing of pipe shall be in accordance with the manufacturer's recommendations and as approved by the City. Joint deflections shall not exceed 80% of the maximum recommendations of the manufacturer.

Where rubber gaskets are used for jointing pipe, a feeler gauge shall be used to check the position of the rubber gasket upon each closure. The interior of the pipe shall be cleared of all debris, and exposed pipe ends shall be closed by a suitable pipe plug when pipe laying is not in progress.

The pipe shall be laid on a trench bottom shaped to provide adequate support of the pipe except at coupling or bell holes. The use of prepared mounds to facilitate laying of the pipe is not approved.

Where pipe is to be encased or have concrete bedding, suitable concrete blocks shall be used to support the pipe in the proper location while placing concrete.

6.12 LATERAL CONNECTIONS

Where 4 inch laterals are constructed concurrently with main sewers 15 inches in diameter and less, connections shall be made with a regularly manufactured wye branch. Connection to mains, 18 inches in diameter or larger, shall be at manholes only, unless otherwise approved by the Director. If approval is granted, a City approved wye or tee saddle shall be used. Saddles shall have a skirt to prevent the saddle from entering the sewer main beyond the inside surface of the main, and shall be located so the invert of the saddle branch is at the same elevation as the crown of the main sewer. A neat opening shall then be cut in the main sewer which shall form a snug fit with the spigot of the saddle. The saddle shall then be installed and secured in accordance with the manufacturer's recommendations and, in addition, shall be attached to the main with a minimum of two stainless steel banding straps. The ends of the lateral shall be securely stopped with plugs or caps which can easily be removed without damage to the pipe end. The end of the lateral shall be marked by imprinting an "S" on the curb face over the sewer lateral. All laterals shall be installed prior to air testing.

Lateral connections to existing sewers shall be made at a manhole or wye branch. Where, in the opinion of the Director, it is impractical to connect or to install a manhole or wye branch, the connection shall be made by the use of a tee saddle as described above.

6.13 BACKFILL

After the sewers and appurtenances have been properly constructed and inspected, the trench shall be backfilled and compacted as shown on Drawing No. 6-G for flexible walled pipe and as shown on Drawing No. 6-H for rigid walled pipe.

Compaction tests shall be performed by a testing laboratory approved by the City. The laboratory shall be retained by the Developer and all testing expenses shall be paid by the Developer.

Jetting of backfill will not be allowed except in special cases as approved by the City Engineer.

During the compaction operation, the Contractor must exercise extreme caution so as not to damage or disturb the pipe.

6.14 CLEANING AND FLUSHING

After all backfilling is completed and manhole frames and covers set, but prior to placement of paving material, the Contractor shall clean and flush all sanitary sewer mains.

To clean and flush sewer pipes 12-inches or less in diameter, the Contractor shall furnish and use a heavy rubber ball manufactured for this purpose and approved by the Director. When inflated with air it should have an outside diameter equal to the interior diameter of the pipe to be cleaned. The ball shall be placed in the uppermost structure of the line to be cleaned and then water shall be introduced into the structure in back of the ball. The ball shall pass through the pipe with only the pressure of the water behind it. The rate at which the ball is allowed to pass through the pipe shall be controlled by a rope attached to the ball at all times. This procedure shall be utilized on each section of pipe installed. Care shall be exercised to feed the ball slow enough to allow debris to be removed in a manner acceptable to the Director. The work shall be done in such a manner as to prevent flooding of adjacent properties due to sewage back-up.

Sewer pipes over 12-inches in diameter may be cleaned by means other than the above described ball method, with the approval of the Director.

6.15 INSPECTION

PVC sewer pipe shall be tested after cleaning and flushing using a mandrel or other approved testing device. Maximum deflection shall not exceed 5% of the average inside diameter of the pipe.

For all pipes less than 24-inch (I.D.), a mandrel shall be pulled through the pipe by hand. Prior to use, the mandrel shall be approved by the Director. If the mandrel fails to pass, the pipe will be deemed to be over-deflected.

Any over-deflected pipe shall be re-laid.

Mandrels shall be rigid, nonadjustable, odd-numbering-leg (9 legs minimum), having an effective length not less than its nominal diameter. The minimum diameter of the mandrel at any point along its full length shall be as follows:

<u>Pipe Material</u>	<u>Nominal Size (Inches)</u>	<u>Minimum Mandrel Diameter (Inches)</u>
PVC – ASTM D3034 (SDR35)	6	5.455
	8	7.282
	10	9.085
	12	10.793
	15	13.203
PVC – ASTM F679 (T-1 Wall)	18	16.748
	21	19.744
	24	22.212
	27	25.033
PVC – ASTM F794	18	16.768
	21	19.713
	24	22.325
	27	25.175
	30	28.025

Mandrels shall be fabricated from steel, fitted with pulling rings at each end, and stamped or engraved on some segment, other than the runner, with the pipe material, specifications, nominal size and mandrel O.D.

For pipes with a nominal diameter of 24 inches or larger, deflections shall be determined by a method submitted to and approved by the Director. If a mandrel is selected, the minimum diameter, length and other requirements shall conform to the dimensions and requirements previously stated.

All sanitary sewer lines shall be pressure tested by a low-pressure air test. Each section of PVC pipe shall be tested in accordance with UNI-B-6. VCP shall be tested in accordance with ASTM C828. Any section of sewer pipe failing the air test shall be repaired and retested until leakage is reduced to acceptable leakage.

6.16 CLOSED CIRCUIT TV INSPECTION

Prior to placing the final street surfacing, the Contractor, will inspect all new sewer systems with a closed circuit television system. This will be done after the pipe has been installed true to the prescribed lines and grades, the trench backfilled and compacted, the manhole and cleanout covers set to proper grade, the roadway subgrade compacted, aggregate subbases and bases placed and compacted, and the sewer system cleaned of all debris.

At the start of each sanitary sewer section, the Contractor shall record the manhole location by street intersections the inspection is beginning and ending at. This

information shall appear in typewritten letters on the videotape. A gauge shall be attached to and dragged behind the camera to indicate the depth of any standing water within the line. The gauge shall have a diameter of 10% of the pipe diameter being televised.

Pulling of the camera shall be stopped and locations recorded in typewritten letters on the video tape at the following locations:

- The beginning and ending locations of all areas where the depth of standing water exceeds 10% of the pipe diameter.
- All wye locations.
- Any problem areas.

Camera pulling speed shall not exceed 60 ft. per minute.

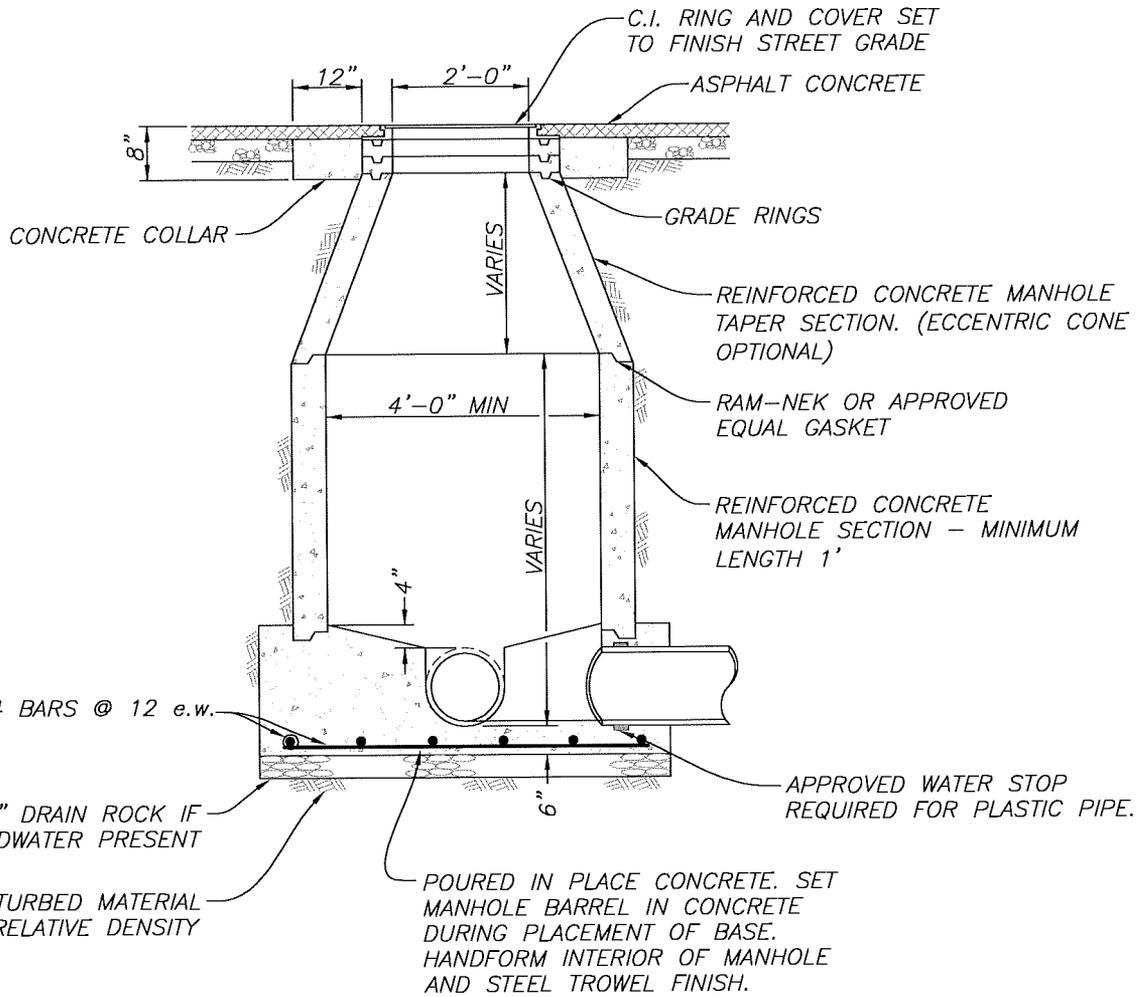
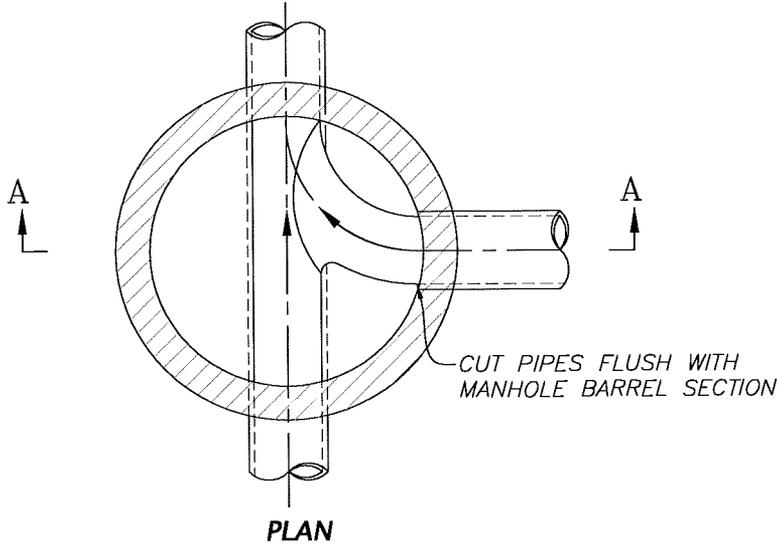
Videotapes shall be delivered to the Director for his review. The Contractor shall make all necessary repairs and corrections to the pipeline as required by the Director prior to paving.

6.17 GREASE TRAPS

Grease traps and interceptors shall be constructed by the Developer on private property on the sewer service lateral for any facility whose operation will result in oil, grease, sand or other solids being discharged into the City's sanitary sewer system.

The traps or interceptor shall conform to Section 708 and 711 of the Uniform Plumbing Code and it shall be constructed where it can be easily inspected for proper operation by the City.

For additional information regarding specific requirements of grease traps, contact the Building Official.



SECTION "A-A"

CITY OF GUSTINE IMPROVEMENT STANDARDS

SANITARY SEWER MANHOLE

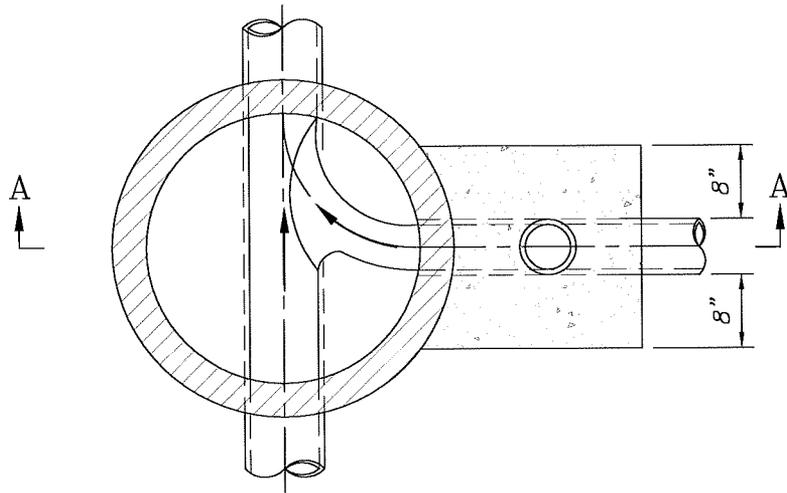
DRAWING NO. **6 - A**

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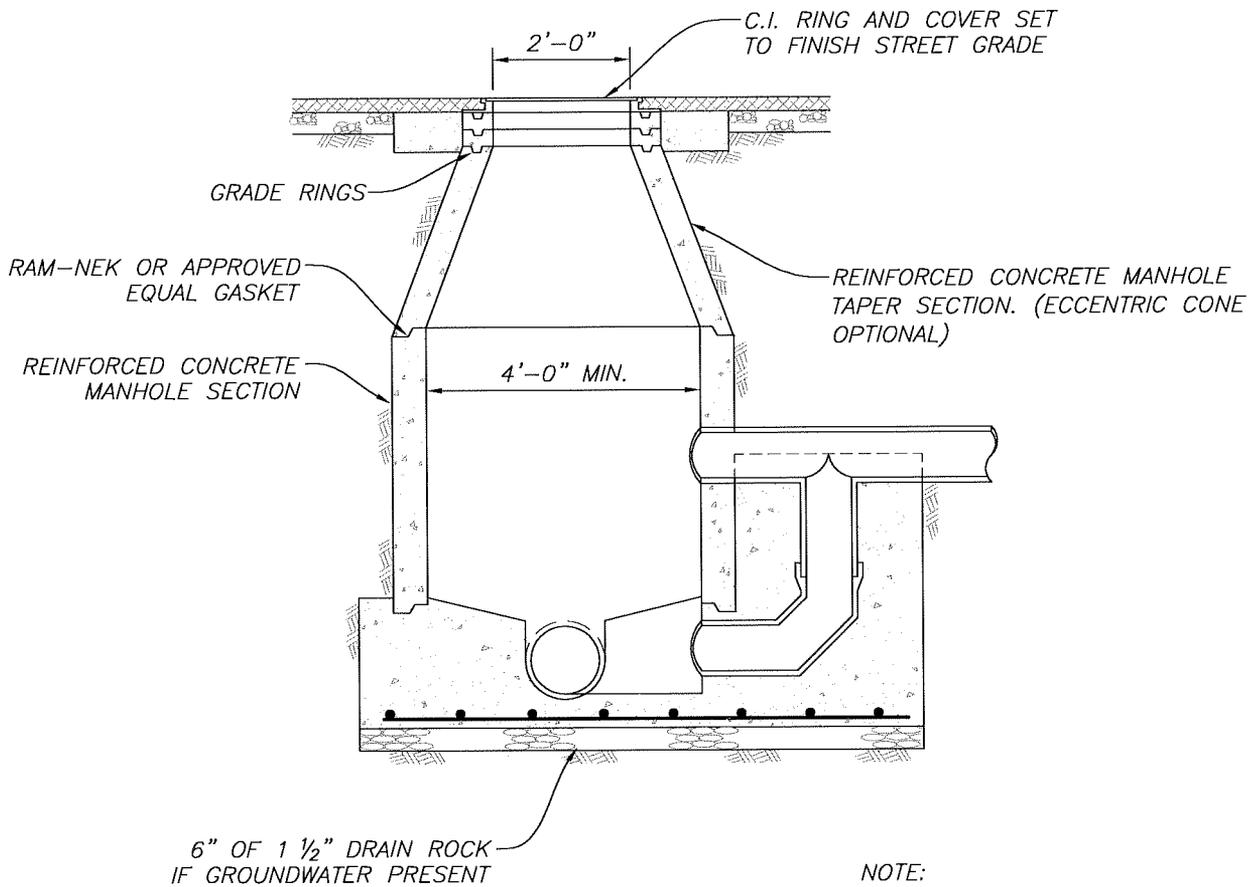
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PLAN



SECTION "A-A"

NOTE:
SEE STANDARD DRAWING 6-A
FOR ADDITIONAL INFORMATION

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CITY OF GUSTINE IMPROVEMENT STANDARDS

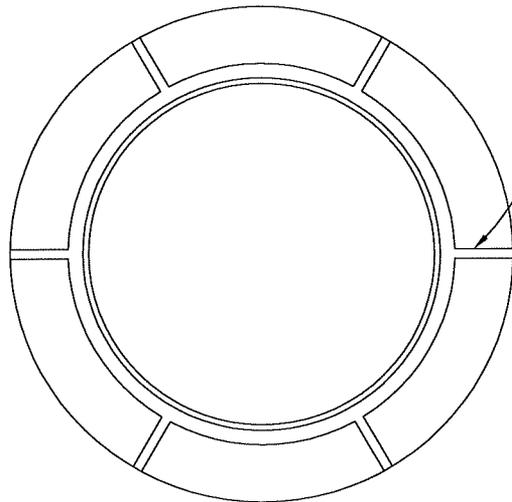
SANITARY SEWER DROP MANHOLE

APPROVED BY:

DATE:

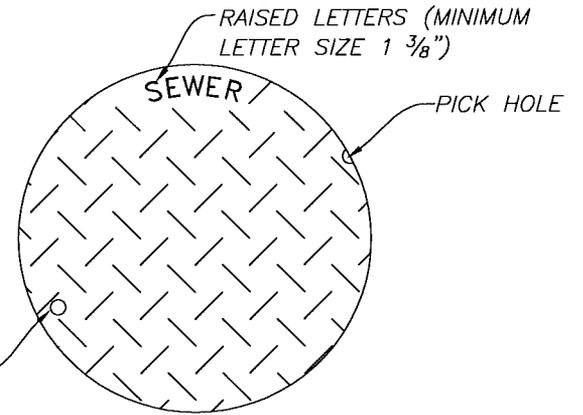
DRAWING NO.

6 - B

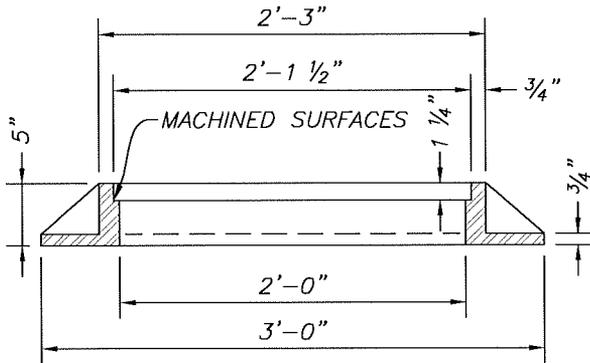


PLAN

6 $\frac{5}{8}$ " RIBS

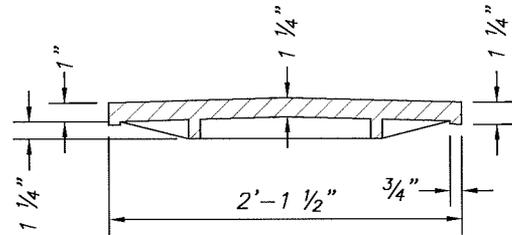


TOP

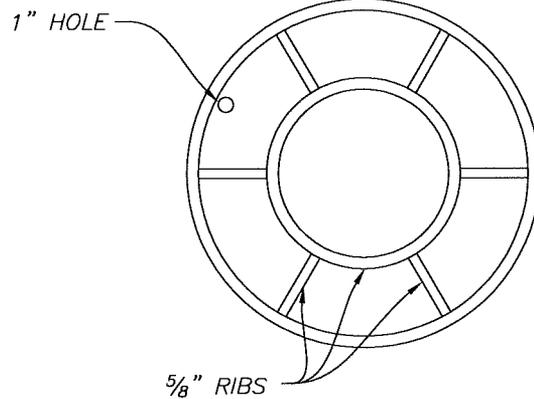


SECTION

MANHOLE FRAME DETAIL



SECTION



BOTTOM

MANHOLE COVER DETAIL

MINIMUM WEIGHT OF FRAME AND COVER: 280 lbs.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

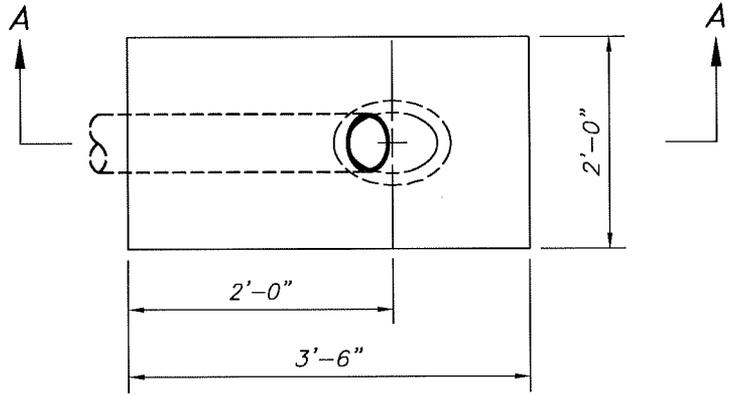
CAST IRON MANHOLE FRAME AND COVER

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DRAWING NO.

6 - C

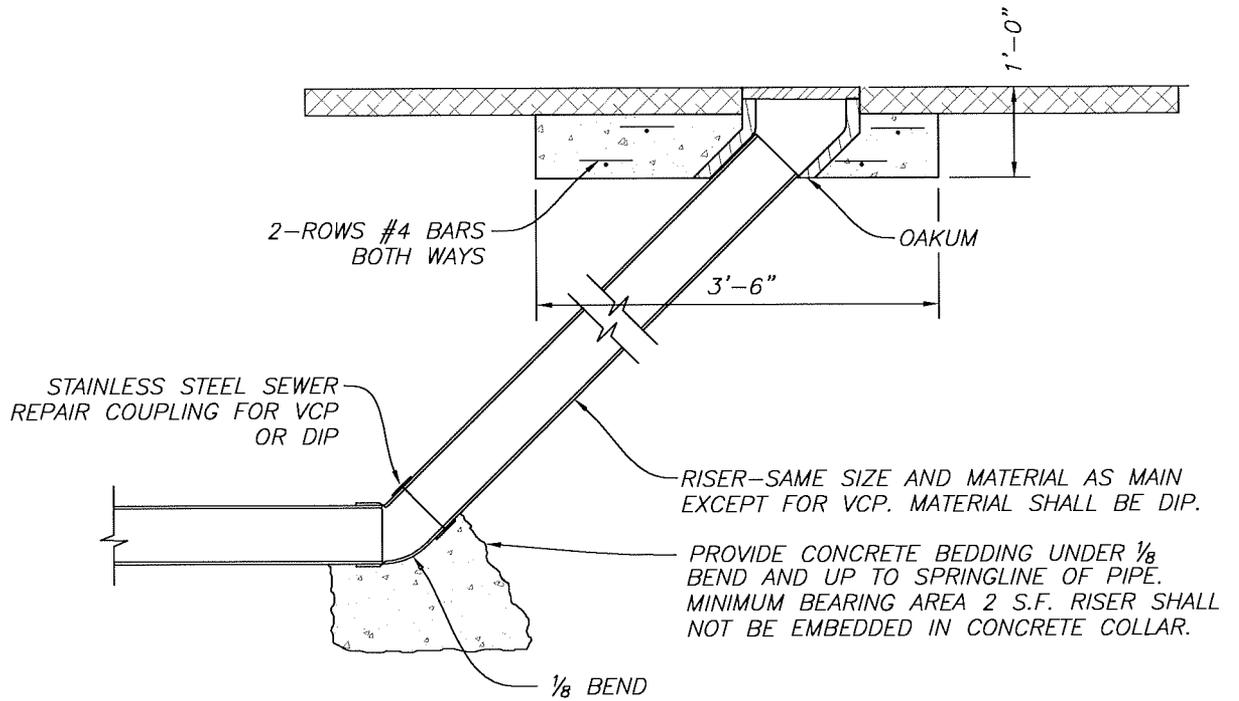


CASTING FRAME AND COVER

6" PINKERTON FOUNDRY
NO. A-490 OR EQUAL.

8" PINKERTON FOUNDRY
NO. A-211 OR EQUAL.

PLAN



SECTION A-A

Apr. 16, 2012 - 11:12am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

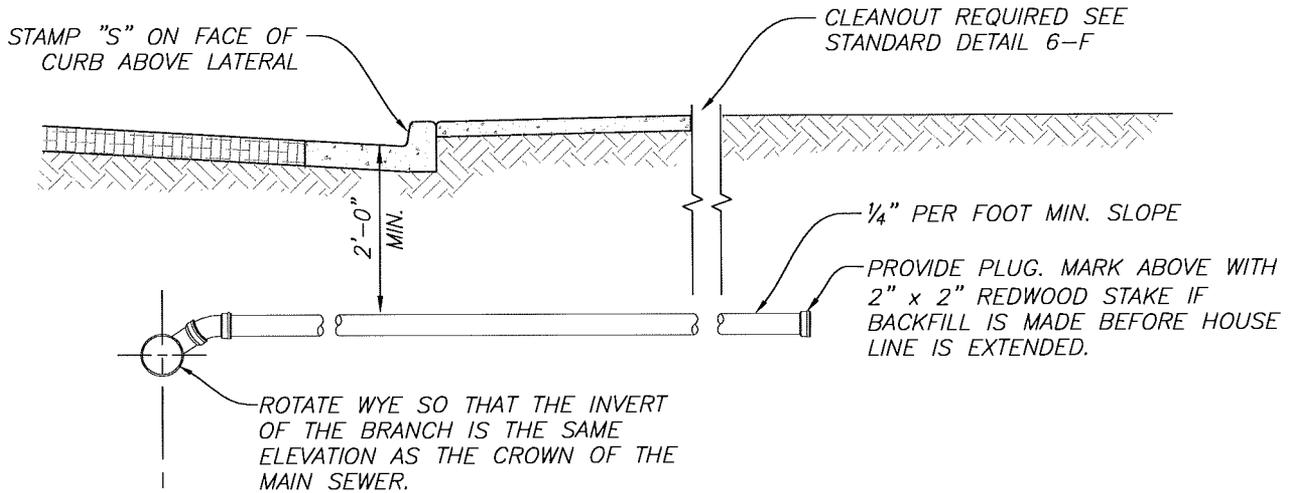
SANITARY SEWER CLEANOUT

APPROVED BY:

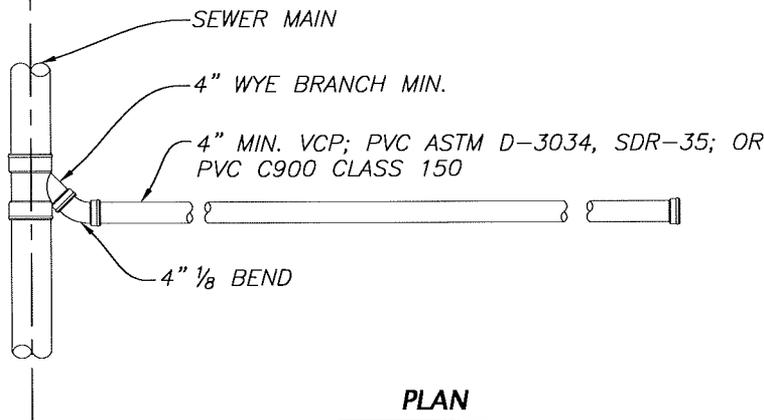
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DRAWING NO.

6 - D



PROFILE



PLAN

NOTES:

1. *LATERALS SHALL HAVE SAME BEDDING & BACKFILL AS SEWER MAIN. TRENCH WIDTH FOR 4" OR SMALLER LINES SHALL BE SUFFICIENT TO ALLOW MECHANICAL COMPACTION OF BACKFILL AROUND CONDUIT.*
2. *SEWER SERVICE SHALL HAVE A MINIMUM OF 2' COVER AT PROPERTY LINE WHENEVER LATERAL DEPTH AND SERVICE SLOPE OF 1/4" PER FOOT (MIN.) PERMIT. SERVICE SHALL BE DEEP ENOUGH TO SERVE ADJACENT PROPERTY.*
3. *WHEN THE LATERAL SEWER DEPTH IS SUCH THAT 2' COVER AT PROPERTY LINE CANNOT BE MET, THE LATERAL MUST BE ENCASED IN CONCRETE IN THE TRAVELED RIGHT OF WAY OR PVC PIPE MEETING THE REQUIREMENTS OF AWWA C900 CLASS 150 SHALL BE USED.*

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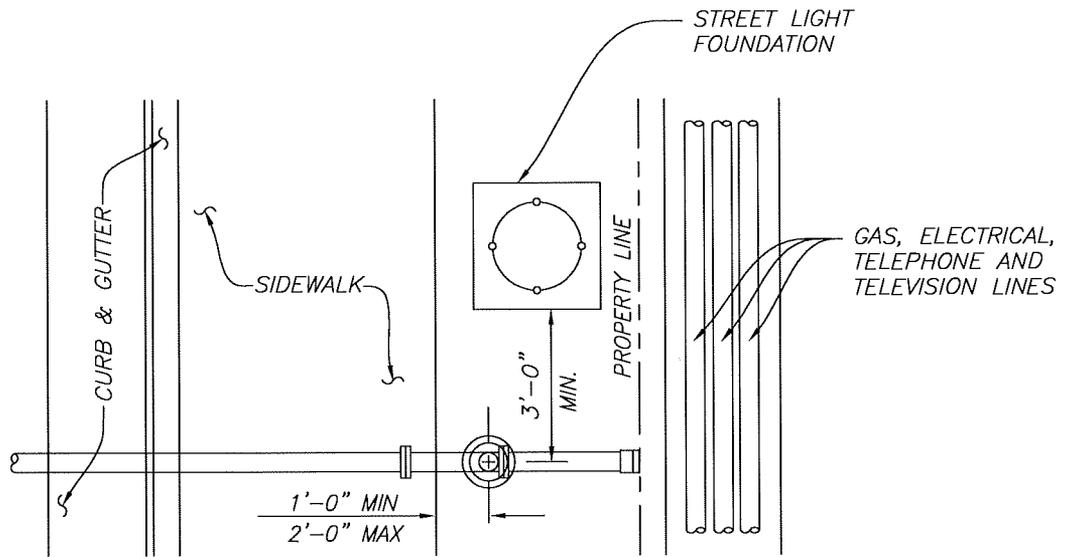


CITY OF GUSTINE IMPROVEMENT STANDARDS

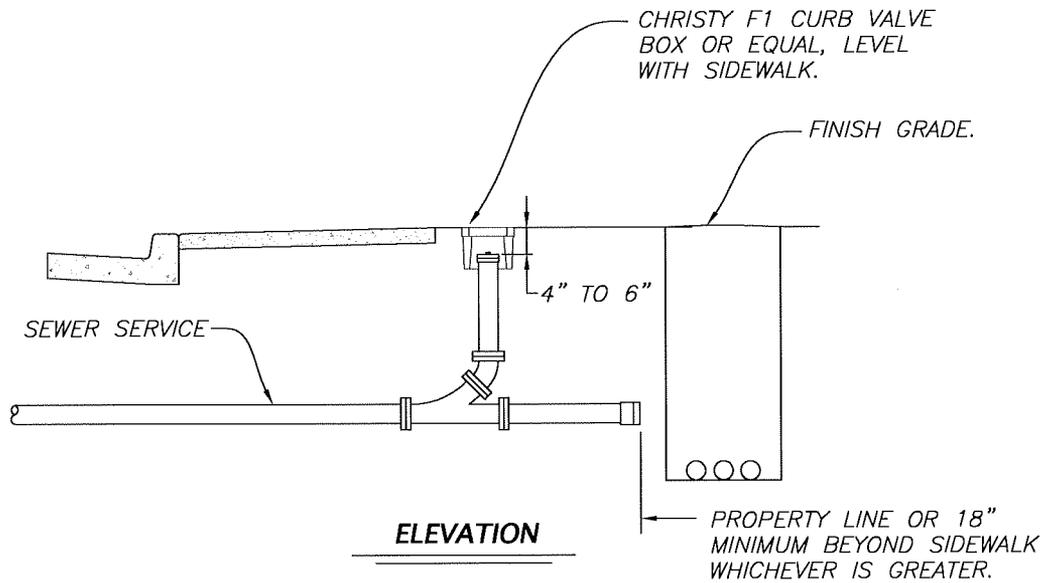
4-INCH SEWER SERVICE

APPROVED BY: _____ DATE: _____

DRAWING NO. **6 - E**



PLAN



ELEVATION

NOTES:

1. THE RISER SHALL BE TERMINATED APPROXIMATELY 6" BELOW GRADE WITH A SOLVENT WELD CAP. THE CLEANOUT CAP, PLUG AND CURB VALVE BOX SHALL BE INSTALLED WHEN CONNECTION TO THE SEWER SERVICE IS MADE.
2. CLEANOUT LOCATION IS SHOWN BASED ON ATTACHED CURB AND SIDEWALK. FOR SEPARATED CURB AND SIDEWALK, INSTALL CLEANOUT 2' BEHIND CURB.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

4-INCH SEWER SERVICE CLEANOUT

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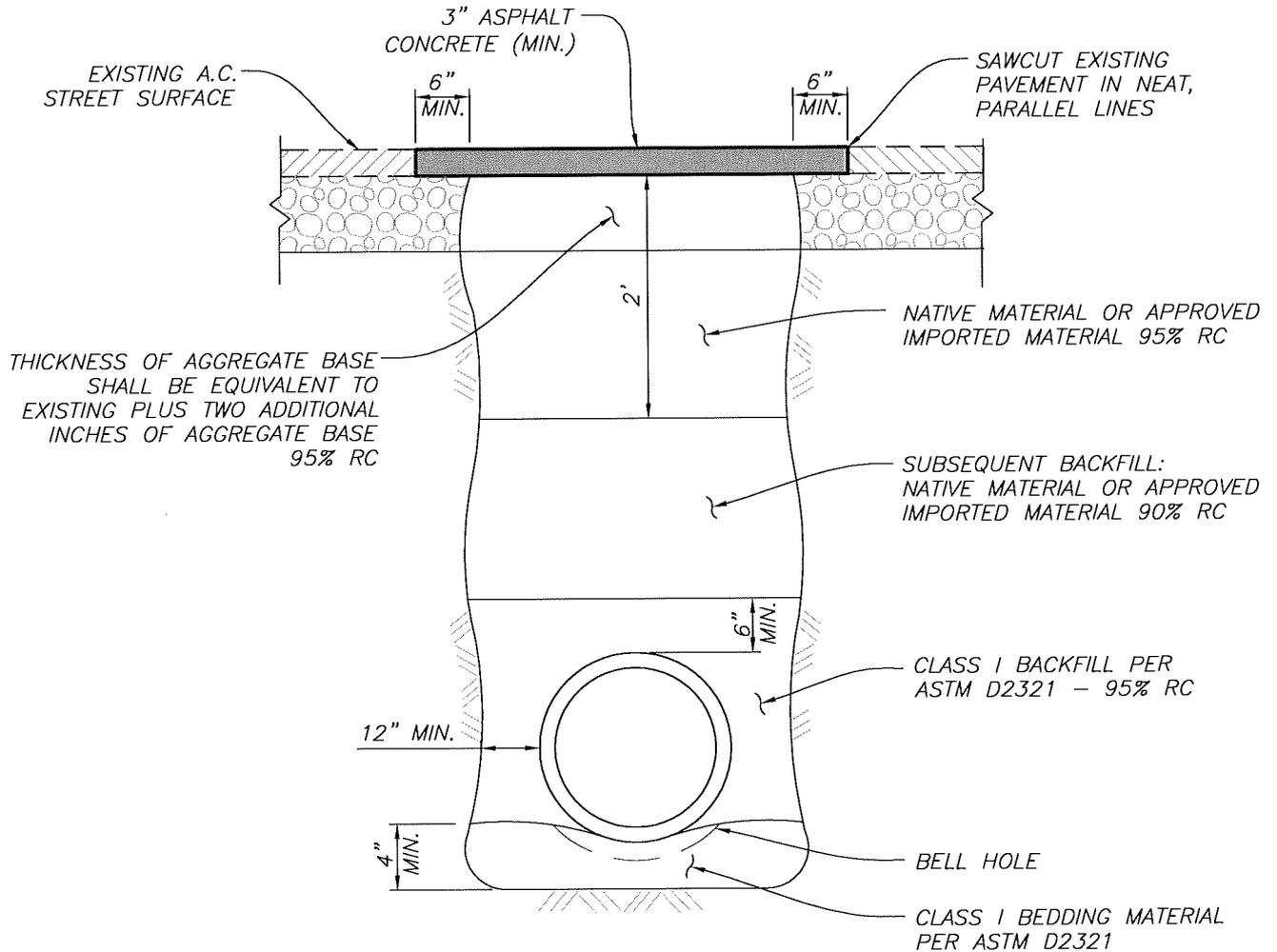
DATE:

DRAWING NO.

6 - F

NOTE

TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.



NOTES:

1. IF THE BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVER-EXCAVATED 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.

Apr 16, 2012 - 4:48pm
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CITY OF GUSTINE IMPROVEMENT STANDARDS

FLEXIBLE WALL PIPE BACKFILL

APPROVED BY:

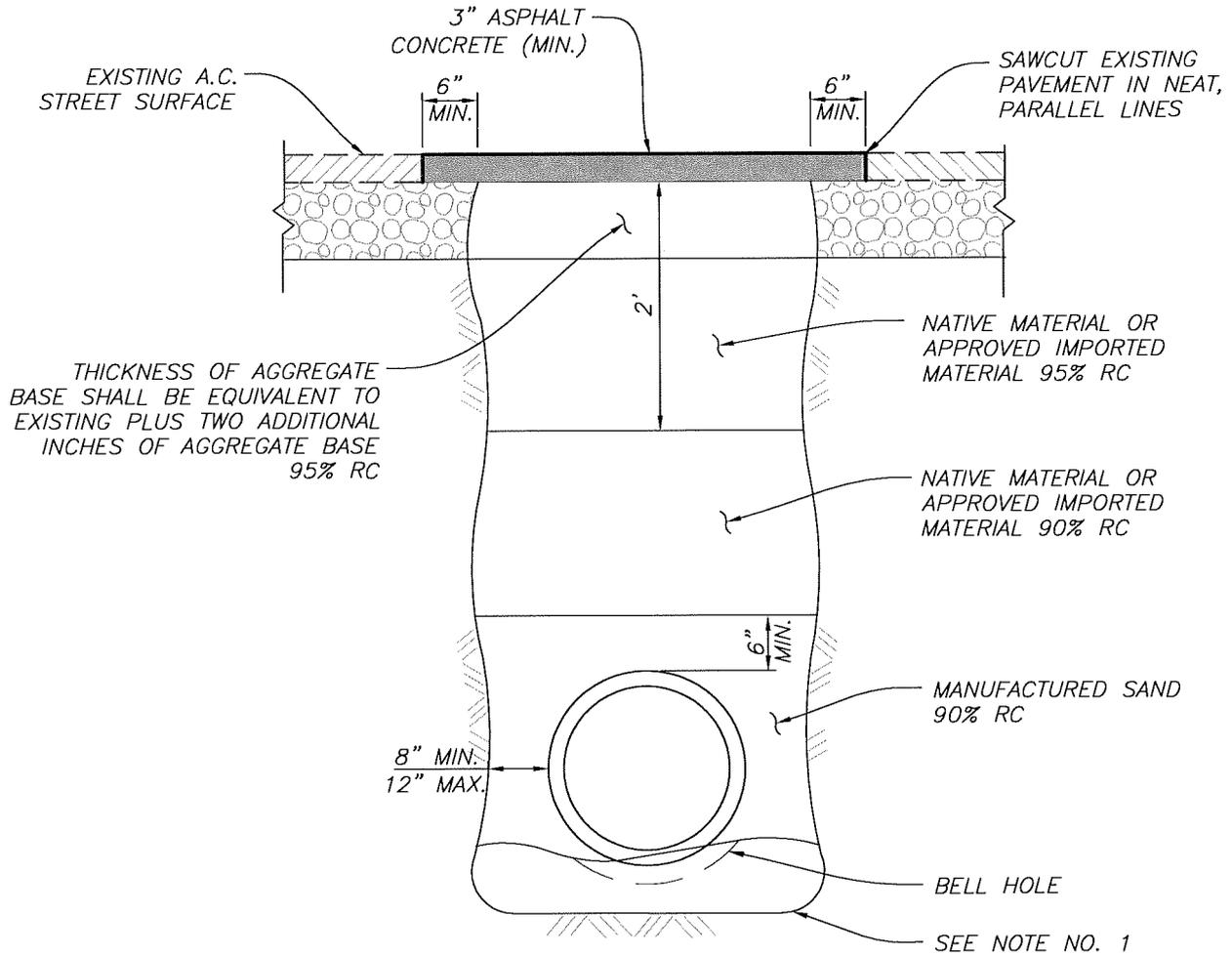
DATE:

DRAWING NO.

6 - G

NOTE

TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.



NOTES:

1. IF THE BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVER-EXCAVATED A MINIMUM OF 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
2. NATURAL SAND MAY BE SUBSTITUTED FOR MANUFACTURED SAND AS APPROVED BY THE DIRECTOR. SUBSTITUTIONS SHALL BE REVIEWED ON A CASE BY CASE BASIS. REQUESTS FOR USAGE OF WHAT IS COMMONLY REFERRED TO AS "BLOW SAND" OR "HILMAR SAND" WILL NOT BE APPROVED.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

RIGID WALL PIPE BACKFILL

APPROVED BY:

DATE:

DRAWING NO.

6 - H

SECTION 7 - PARKING

SPECIFICATIONS:

7.1	GENERAL	7-1
7.2	PARKING DESIGN GUIDE	7-1
7.3	HANDICAP PARKING REQUIREMENTS	7-2
7.4	PAVEMENT	7-3
7.5	STORM DRAINAGE	7-3

DRAWINGS:

7A	OFF STREET PARKING STANDARDS
7B	TYPICAL PARKING STALL STRIPING

SECTION 7

PARKING

7.1 GENERAL

Parking lots shall be provided for commercial, industrial facilities and multi-family dwelling units containing more than four dwelling units located within the City. The minimum number of parking spaces for each use shall conform to the standards set forth in the Gustine Municipal Code. All parking stalls shall be marked to clearly delineate the parking spaces.

End stalls shall be protected from the turning movements of other vehicles through the use of raised curbing and landscaping. Raised end islands or peninsulas shall extend a maximum of 13 feet past the parking base line to minimize pedestrian tripping.

All areas not utilized for parking and vehicular circulation shall be landscaped. Landscaped and paved areas shall be separated by 6-inch high concrete curbs.

7.2 PARKING DESIGN GUIDE

To aid in the design of parking layouts, the following information is offered as a guide to meet the minimum requirements for off-street parking and the layout design of driver-parking lots under normal use conditions.

The following factors should be considered:

- A. **Sizes and Access:** Each standard size off-street parking space shall have a minimum width of 9 feet and a minimum depth of 19 feet, exclusive of access drives or aisles, and shall be of useable shape, location, and condition. Compact spaces having a minimum width of 7-1/2 feet and a minimum depth of 15 feet, exclusive of access drives and aisles, shall be permitted, not to exceed 30% of the total required parking stalls. Small car spaces shall have "compact" or "small car" painted on the pavement at the entrance of each stall. End stalls and stalls adjacent to raised curbing shall be a minimum of 1 foot wider than the normal stall width. The length of parking spaces may be reduced by 2 feet if landscaped planters of sufficient width are used as curb stops.
- B. **Entrances, exits and location of nearest intersection, in each direction.**
- C. **The width of the parking area normally determines the parking angle to be used.**

- D. Right angle (90 degrees) parking is usually more efficient and provides two-way movement in the aisles and shorter cruise distance. However, it generally requires more turning effort.
- E. Angle parking (other than 90 degrees) affords greater ease in parking and allows for narrower aisles but it requires one-way circulation.
- F. Delineating Striping: All parking spaces shall be clearly delineated using single 4-inch wide striping. Length of stripes shall be 17 feet for standard parking spaces and 13 feet for compact parking spaces. Length of stripes may be reduced by 2 feet if landscaped planters of sufficient width are used as curb stops.

With these factors in mind, an accurate drawing of the proposed parking area should be prepared showing such details as sidewalks, curb cuts for driveways, use of abutting properties, immovable obstacles, flow of on-street traffic in the area, and other pertinent information. This drawing can be used to aid in the determination of a layout pattern based on selection of the best of all possible parking arrangements. The best arrangement should provide the maximum number of parking spaces with aisles and stalls designed for one-turn driver parking.

7.3 HANDICAP PARKING REQUIREMENTS

- A. Each parking area associated with any type of land use listed in the Patterson Zoning Code, except for single-family and two-family residential dwellings, shall include a number of parking spaces specifically reserved for vehicles licensed or authorized by the State of California for use by physically challenged/disabled drivers in accordance with the following:

Total Spaces in Parking Area	Minimum Number of Spaces Required for Physically Challenged/Disabled Drivers
1 - 25	1 Van Accessible Space
26 - 50	2 including 1 Van Accessible Space
51 - 75	3 including 1 Van Accessible Space
76 - 100	4 including 1 Van Accessible Space
101 - 150	5 including 1 Van Accessible Space
151 - 200	6 including 1 Van Accessible Space
201 - 300	7 including 1 Van Accessible Space
301 - 400	8 including 1 Van Accessible Space
401 - 500	9 including 1 Van Accessible Space
501 - 1000	2% including 3 Van Accessible Spaces

One space for each 200 spaces thereafter.

- B. Such parking spaces shall be located within a reasonable proximity of any conveniently accessible entrance to the building served by the parking area.

7.4 PAVEMENT

All parking stalls and drive aisles shall be paved with either asphalt concrete or Portland cement concrete.

A. Asphalt Concrete

Minimum slope for asphalt concrete shall be 1.5 percent. This slope requirement may be reduced to 1 percent by the City Engineer if it can be shown that meeting the 1.5 percent requirement is not practical.

B. Portland Cement Concrete

Unreinforced and reinforced Portland cement concrete pavement shall be designed and constructed in accordance with the recommendations of the American Concrete Institute set forth in ACI 330R-87, "Guide For Design And Construction Of Concrete Parking Lots." Design calculations meeting the criteria set forth in the above ACI guide shall be submitted to the City Engineer for review and approval.

Minimum finished grade slope shall be 1.0 percent. If it can be shown that meeting the 1.0 percent requirement is not practical, the slope may be reduced to 0.75 percent with the approval of the City Engineer.

7.5 STORM DRAINAGE

Design of storm drainage piping for parking lots shall be based on predicted run-off from a 5-year storm using the Rational Formula $Q = CIA$. Where Q equals the predicted run-off in cubic feet per second; C the coefficient of run-off; I the intensity of the rainfall in inches per hour; and A the drainage area tributary to the parking lot in acres. Run-off coefficients and intensity of rainfall shall be determined from Drawing No. 5-B.

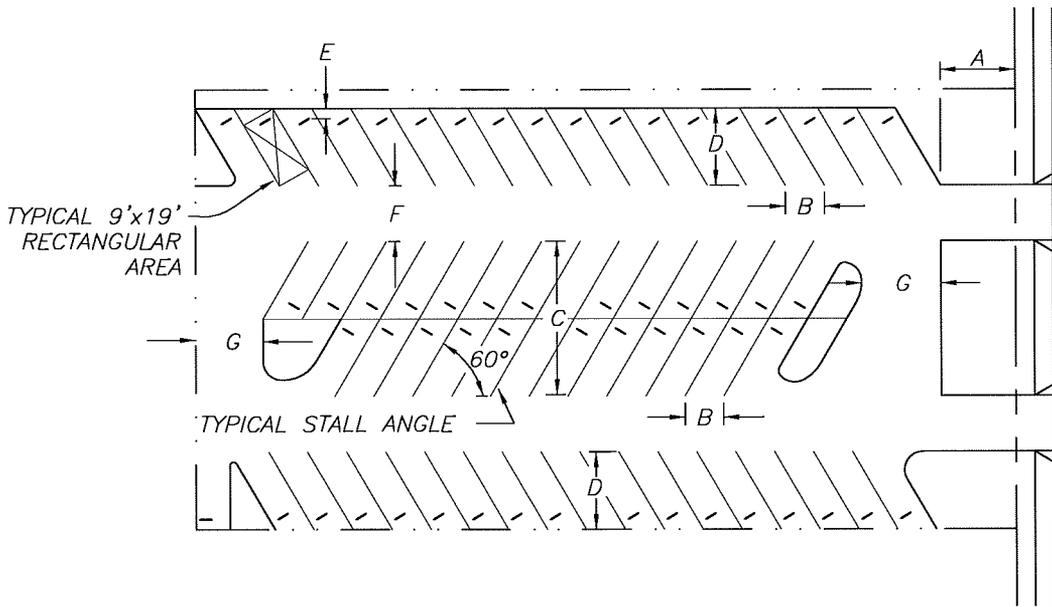
Roof to parking lot time shall be assumed to be 10 minutes. Manning's equation shall be used for pipe flow design. When using smooth walled plastic pipe, the roughness coefficient, "n" value, shall be 0.010. Local entrance and exit losses shall be included in the calculation of head loss. Local loss coefficients (K) shall be as follows:

LOCAL LOSS COEFFICIENTS

<u>Local Loss</u>	<u>K</u>
Re-entrant Inlets	1.0
Square Edge and Beveled Inlets	0.5
All Exits	1.0
90° Elbow	0.3
45° Elbow	0.2
Line Flow Tee	0.2
Branch Flow Tee	1.0

If curb drains are used, all grate elevations shall be a minimum of 0.6 feet above the invert of the discharge pipe at the curb (exit).

If drain basin lines discharge into the City's storm drain system at the back of a City catch basin, the grate elevations in the parking lot shall be a minimum of 0.3 feet above the City's catch basin grate.



THE REQUIRED FRONT SETBACK DIMENSION (A) IS AS SPECIFIED IN THE CITY OF GUSTINE ORDINANCE(S) FOR THE ZONING DISTRICT IN WHICH THE PARKING LOT IS TO BE LOCATED AND NO LESS THAN 20' IN RESIDENTIAL ZONES AND 10' IN COMMERCIAL AND INDUSTRIAL ZONES.

PARKING ANGLE TO DRIVEWAY		45°	50°	55°	60°	70°	80°	90°
STALL WIDTH	B	12.7'	11.8'	11.0'	10.4'	9.6'	9.1'	9.0'
STALL DEPTH	C	33.2'	34.8'	36.3'	37.5'	38.7'	39.0'	38.0'
STALL DEPTH	D	19.8'	20.7'	20.7'	21.0'	20.9'	20.3'	19.0'
DRIVEWAY WIDTH	F	8.8'	11.6'	11.6'	15.0'	18.2'	22.4'	27.0'

NOTES:

1. ANY DRIVEWAY USED FOR BOTH INGRESS AND EGRESS TO AND FROM A PARKING LOT AND NOT DIRECTLY SERVING PARKING STALLS SHALL HAVE A MINIMUM WIDTH OF TWENTY FOUR (24) FEET. ANY DRIVEWAY USED ONLY FOR EITHER INGRESS OR EGRESS TO OR FROM A PARKING LOT AND NOT DIRECTLY SERVING PARKING STALLS SHALL BE A MINIMUM OF TWELVE (12) FEET IN WIDTH.
2. THE ABOVE TYPICAL PARKING LOT DIAGRAM, PARKING STALL AND DRIVEWAY DIMENSION TABLE SHALL DETERMINE THE MINIMUM REQUIREMENTS FOR A PARKING LOT PLAN.
3. THE MINIMUM DRIVEWAY WIDTH (F) AT ANY PARKING STALL ANGLE LESS THAN 45°, INCLUDING PARALLEL STALLS, IS 8.8 FEET.
4. THE TURNAROUND OR END DRIVEWAY WIDTH (G) SHALL BE A MINIMUM OF 18 FEET.
5. THE WHEELSTOP SET BACK DIMENSION (E) SHALL BE A MINIMUM OF 2 FEET FOR ANY PARKING PLAN.

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CITY OF GUSTINE IMPROVEMENT STANDARDS

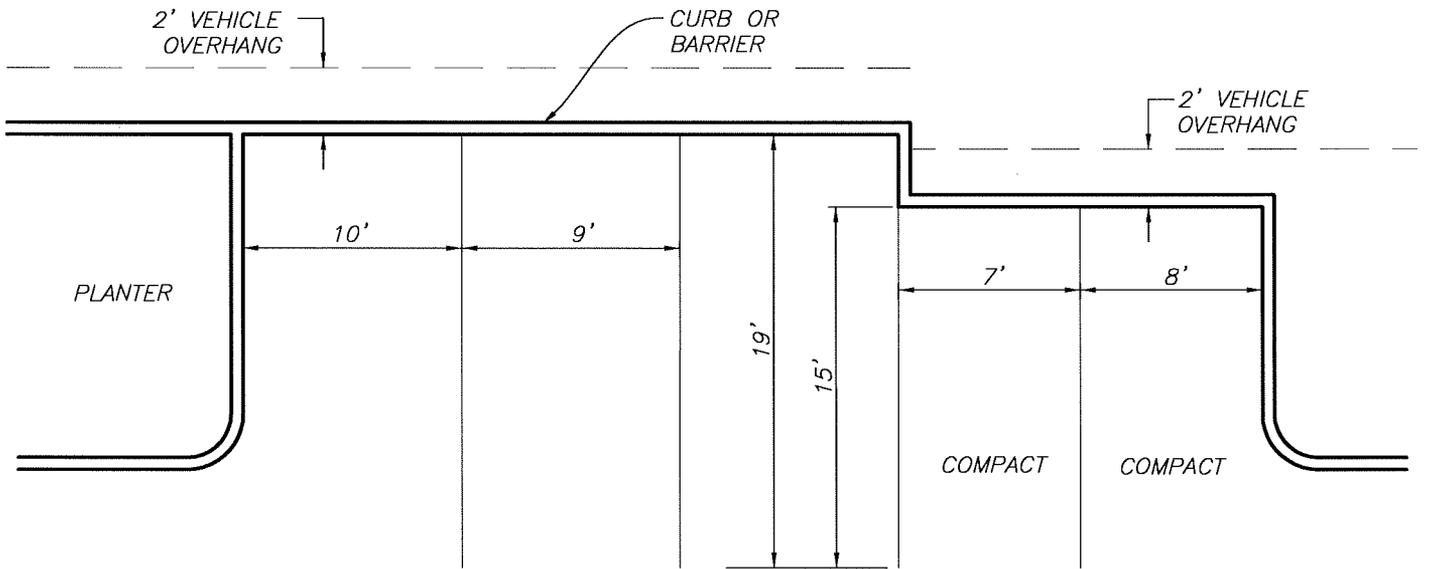
OFF-STREET PARKING STANDARDS

APPROVED BY:

DATE:

DRAWING NO.

7 - A



Apr 17, 2012 - 8:51am
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CITY OF GUSTINE IMPROVEMENT STANDARDS

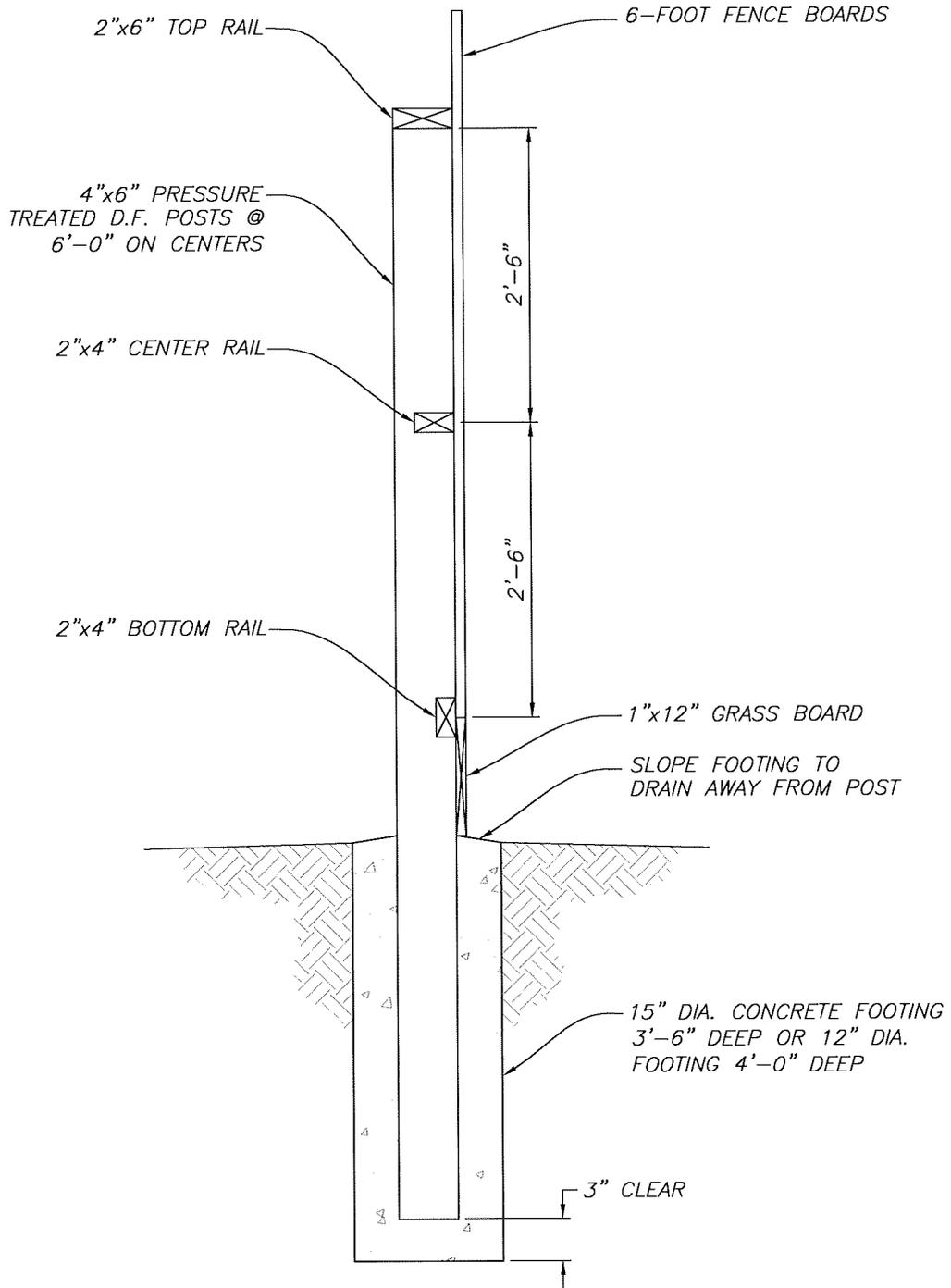
TYPICAL PARKING STALL STRIPING

APPROVED BY:

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7 - B



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CITY OF GUSTINE IMPROVEMENT STANDARDS

7-FOOT WOODEN FENCE

APPROVED BY:

DATE:

DRAWING NO.

MISC-1