



ENGINEERING DEPARTMENT DESIGN CRITERIA

January 24, 2020

The following is a list of minimum design criteria to guide the project designer on problems/omissions that frequently show-up during the review process by the City. It is the intent of the Engineering Department to eliminate speculation by the engineer on the City's minimum standards and what the minimum expectations are for a set of design drawings. In no way is this intended to encompass every aspect of every design, it has merely been compiled to assist the design professional.

GENERAL

- Design engineer shall apply for any applicable permits for example:
 - MDOT – any work within the limits of Hwy 67, Hwy 90, I-10 or I-110
 - MDEQ – stormwater, sanitary sewer, surface water discharge, etc.
 - USACOE – wetlands not adjacent to water body, impacts to seawall or any area south of the seawall, beach outfalls
 - Coast Guard – impacts to bridge openings
 - DMR – wetlands adjacent to water body, work over or adjacent to a water body
 - CSX – any work within the limits of CSX right of way
 - KAFB – any work crossing any Keesler gas line easement or impacts to ingress/egress to Keesler
 - MS SOS – tidelands lease or seawall encroachment
 - Harrison County – seawall encroachment or impacts to sand beach
 - MS Department of Health – sanitary sewer installation, water line installation
 - HCUA – OPC form for sanitary sewer installation, tie in to HCUA water or sewer system, grease trap permit
 - COB Tree permit – for any affected trees
- Design engineer shall prepare any required easements or notify the city of the need for easements if design contract does not include preparation of easements.
- Design engineer shall be responsible for any geotechnical investigation required to determine field conditions.
- Drawings shall be stamped by a professional engineer registered in the State of Mississippi.
- Final plans and specifications shall be submitted to the City in hard copy and digital format. Digital submission shall include pdf and .dgn/.dwg drawing type. PDF files shall be created from the original digital files and not scanning of hard copy plans and specs and shall be combined as one file for plans and one file for specs and not individual pdfs per sheet.

PAY ITEMS

- Pay item number, description, and unit shall match exactly the description in specifications under “Basis of Payment”.

- ❑ A 907 shall be added to all pay items located within a section for which a special provision is associated with even if the pay item itself is not changed by the special provision.
- ❑ Pay items and quantities shall be the same on Quantity Sheet, Proposal, and Engineer's Estimate.

DESIGN REVIEWS

- ❑ For each review session, redlines of drawings and specifications for previous review session shall be returned with each subsequent review session to insure the comments were incorporated. An explanation shall be indicated on the red lines for any COB comments not incorporated
- ❑ 30% Design Review Requirements – Within two months of the start of design, 30% design plans should be submitted and shall include the following:
 - Field survey is complete and shown on the drawings
 - Preliminary pipe calculations are complete
 - Plans show recommended sizes, slopes, and layout of proposed utilities (profiles not yet required)
 - Existing affected trees and structures are shown
 - Existing water/sewer/drainage are shown on the plan/profile sheets
 - Preliminary cost estimate
 - A preliminary list of necessary permits and easements
 - Specifications and details are not required at this stage
 - At 30% DE should begin coordinating with private utility companies
 - At 30% DE shall meet with the City Arborist to discuss impacts to trees in the project area.
 - After 30% review, DE should schedule the project to be on the Development Review Committee to begin the DRC approval process.
 - After 30% review and prior to 60% review meeting, the DE shall meet with the Public Works Lift Station Manager.
- ❑ 60% Design Review should include the following for review:
 - 30% set of plans that were marked up by the City. Any comments not addressed should have an explanation of why noted by the DE on the 30% marked up plans.
 - Revised 60% plans that include the comments from the 30% markups
 - Preliminary plan/profile for proposed water/sewer/drainage
 - Preliminary paving showing curb, driveways, sidewalks and proposed & existing elevations
 - Preliminary road cross-sections
 - Existing easements and right of way shown
 - Drainage calculations and drainage area maps
 - Stormwater pollution prevention plan
 - Standard Details are to be included
 - Specifications shall be submitted
 - Geotechnical report submitted (if necessary)
 - Update on the permits and/or easements
 - Update on the private utility company coordination

- Updated cost estimate
 - At 60% DE shall continue to meet with the City Arborist to discuss impacts to trees in the project area.
 - 60% plans will not be approved to move forward until the DE has either DRC approval or a letter from the DRC committee that states the project is exempt from DRC approval.
- 90% Design Review – In the opinion of the design engineer the drawing and specifications are complete and ready for advertisement and bid with only minor red lines needed by the City Engineer. The following should be submitted for review:
 - 60% set of plans that were marked up by the City. Any comments not addressed should have an explanation of why noted by the DE on the 60% marked up plans.
 - Final plans and specifications should include
 - Quantity Sheet
 - Removal Sheets
 - Plan/Profile sheets for water/sewer/drainage
 - Final layout showing curbs, driveways, sidewalks, elevations, pavement markings, etc.
 - Final cross sections
 - Private utility adjustments or associated comments
 - Detail sheets
 - Final specifications
 - All permits/approval received
 - All easements acquired
 - Final cost estimate
 - At 90% Design Review period, engineer shall meet with the City Arborist for final *written* approval of tree impacts.
 - After review by the City Engineer, the drawings and specifications should be complete and ready for advertisement within two weeks from receiving any final comments.
- 100% Plans – Project is ready to bid. The DE will submit to the City the following:
 - Bid plans/specifications in hard copy and digital format
 - Digital copy of the plans in .dgn/.dwg drawing type, with all reference files
 - Digital copy of the plans in a PDF file that is created from the original CAD digital files and not a scan of hard copy plans. PDF shall be combined as one file
 - Digital copy of the specifications in a PDF file that is created from the original .docx file and not a scan of the hard copy specifications. PDF shall be combined as one file.
 - The Advertisement document in .docx format (Advertisement dates to be determined by City)
 - The Contract & Bond in .docx format
- The DE may hold a meeting(s) between the 30% / 60% / 90% reviews if problems arise or the design professional has questions for the City Engineer that need to be resolved before the next submittal.

- ❑ The City will schedule progress meetings periodically during the design process other than the 30/60/90 review meetings for an update on how the project is progressing.

DRAWING COMPONENTS

- ❑ Title sheet
- ❑ Key plans
- ❑ Layout sheet(s)
- ❑ Control Sheets
- ❑ Utility company listings and phone numbers
- ❑ One call phone number
- ❑ Drawing index, index sheets shall be listed in a table format with borders. This is important for the City's Plangrid software.
- ❑ Legend shall indicate all symbols, abbreviations, line types and weights used throughout the drawings.
- ❑ Summary of quantities
- ❑ General notes. All applicable City of Biloxi's standard notes shall be included along with any specific notes generated by the design engineer for the particular project.
- ❑ Removal sheets are required and shall be separate from the plan/profile sheets.
- ❑ Plan/profile sheets.
 - Plan sheets shall show all existing items within the construction limits.
 - Profile sheets shall show as a minimum all existing/proposed sanitary sewer, drainage and water lines in addition to utility crossings.
 - Stationing shall be at a minimum 25' intervals.
 - Plan view and profile view station numbers shall line up.
 - Scale shall be indicated on each plan/profile sheet.
 - Construction limits shall be indicated.
- ❑ New alignment sheets (if necessary)
- ❑ Road cross sections.
 - Road cross sections shall be no more than 50 feet apart.
 - Road cross sections at each driveway
 - Transition between existing and new roadway shall be shown.
 - R.O.W. shall be shown.
 - Slopes shall be labeled.
- ❑ Detail sheets. City of Biloxi's Standard Details shall be used unless unique situations are to be addressed dictated by the design. The design engineer shall be responsible for any additional details to be developed. Any details developed for a City of Biloxi project shall become the property of the City of Biloxi.
- ❑ Right of way cross section detail shall include all existing and proposed public and private utilities, including location and depth. Potholing may be necessary to determine depth.
- ❑ City of Biloxi standard title block shall be shown on all sheets. Title block shall be the same on all sheets.
- ❑ Sheet numbers shall be simple and numerical (ex. 1 of 12) and in addition to the sheet numbers, pages shall be labeled with sheet type abbreviation followed by numerical order (PD_01, PD_02, etc.) as shown below.

TL – Title Sheet
IN – Index
GN – General Notes and Legend
QT – Quantity Sheets
LY – Layout Sheets
TS – Typical Sections
SB – Soil Boring Logs
SC – Sequence of Construction
TC – Traffic Control Plans
RM – Removal Plan/Profiles
WS – Water and Sanitary Sewer

PD – Paving and Storm Drainage
PM – Pavement Marking
CS – Horizontal and Vertical Control
PV – Paving Details (include ADA
Ramps & Sidewalks)
DD – Storm Drainage Details
XS – Cross Sections
SW – SWPPP
WD – Water Details
SD – Sewer Details

- ❑ Detail sheets may be combined if number of details do not dictate the need for individual utility detail sheets.
- ❑ Drawing alignment shall have North at the top of the page.
- ❑ Drawings shall be ANSI D (22” x 34”) for full size drawings or ANSI B (11” x 17”) for half-sizes.
- ❑ Drawings shall be scaled so that half size drawings translate to a common half scale.

SPECIFICATIONS

- ❑ Specification shall be Mississippi Standard Specifications for Road and Bridge Construction, 2017 edition (Red Book).
- ❑ Include all City of Biloxi and MDOT special provisions. Include sections that are not applicable at this time, if they may be needed during construction for a change order. Special provisions shall be edited to be in accordance with the specific design. Any additional special provisions to be generated to modify the “Red Book” shall be the responsibility of the design engineer. Any special provisions developed for a City of Biloxi project shall become the property of the City of Biloxi.
- ❑ As a minimum all items highlighted in yellow shall be edited for each project.
- ❑ The latest special provisions shall be used and can be found on the City of Biloxi Engineering Department Website. Any updates to the special provisions shall be included up until the time the project bids.
- ❑ Spec. sections shall be in the order as shown in the Table of Contents (Contract documents go in back).
- ❑ Non-collusion, Debarment/Ineligible Certification shall be in the spec. twice as shown in the Table of Contents.
- ❑ Liquidated damages shall be determined by the City Engineer.

ROADWAY

- ❑ Roadway width shall not be less than is shown in the City standard detail, unless existing width is inconsistent with detail. In that case, City Engineer shall determine final width.
- ❑ Boring logs (if taken) shall be included in the construction plans and report shall be attached to the specifications as an appendix.
- ❑ Minimum of 2% cross slope.

- ❑ Roadway/Right-of-Way design shall be in accordance with the latest editions of AASHTO's *A Policy on Geometric Design of Highways and Street* (Green Book), and the *MDOT Roadway Design Manual*.

TRAFFIC CONTROL

- ❑ All temporary and permanent traffic control measure shall be in accordance with the MUTCD.

SURVEY

- ❑ A minimum of 2 TBM's for horizontal alignment shall be set along the project for use during construction. Additional T.B.M.'s shall be set if visibility is limited.
- ❑ A minimum of 1 TBM. for vertical alignment shall be set along the project for use during construction. Additional T.B.M.'s shall be set if visibility is limited.
- ❑ All plans shall include a minimum of 1 control sheet.
- ❑ Care shall be taken to locate the T.B.M.'s in locations that will not be effected by construction.
- ❑ TBM information shall be provided to the City on the control sheets in the plans. TBM's will not be assigned a City Benchmark number nor will they be required to be a brass monument.
- ❑ The number and location of control points shall be proposed by the design engineer and approved by the City Engineer.
- ❑ All control points shall be shown on the drawings with a detailed description for location purposes.
- ❑ Boundary, topographic surveys and/or wetland delineations completed for the project shall be included in the construction plans.

DRAINAGE

- ❑ Minimum of Class III RCP or Class III RCAP shall be used
- ❑ Design for 100 year storm frequency per City ordinance
- ❑ Drainage structures shall be spaced no more than 350' apart.
- ❑ Profile sheets shall show outside diameter of pipe, but invert shall be indicated where necessary.
- ❑ Individual conflicts with sanitary sewer shall be addressed with further details.
- ❑ PVC shall only be used outside of the roadway and shall be behind the curb and shall be no smaller than 15" diameter and no larger than 30" in diameter.
- ❑ No HDPE drainage pipe allowed on City projects.
- ❑ Where different types, sizes, or materials of drainage pipe are indicated on the recapitulation sheet, plan/profile sheets shall indicate where each type, size, or material is used.
- ❑ Plans shall be clear as to what existing pipes are to remain active, be abandoned in place, be abandoned and filled with flowable fill, or are to be removed.
- ❑ If private development, rear lot drainage must be adequately addressed so that there is no ponding of water on adjacent properties after development.

EROSION CONTROL PLANS

- ❑ The erosion and sediment controls must be in accordance with the standards set forth in MDEQ's "Planning and Design Manual for the Control of Erosion, Sediment & Stormwater" and the MDEQ Large/Small Construction General Permit.
- ❑ Engineers are responsible for filling out applicable information on the Notice of Intent and if necessary submitting it to MDEQ for permitting prior to bidding.
- ❑ The Notice of Intent, permit and inspection form shall be included with the project specifications.
- ❑ Written Section of SWPPP (if disturbing more than one (1) acre shall include the following information at a minimum: Owner name and contact information, disturbed area, nearest water body, description of temporary and permanent controls; implementation schedule, inspection and maintenance plan, and housekeeping measures.
- ❑ Scaled Site Plan (Erosion Control Plan) shall include the following at a minimum:
 - Total area to be disturbed by construction or filling activities
 - Original and Proposed contours
 - Direction of flow of stormwater runoff
 - Adjacent receiving water bodies
 - The locations of all temporary and permanent erosion and sediment controls
 - Details of all temporary and permanent erosion and sediment controls
 - Notes pertaining to the implementation, inspection and reporting of the selected erosion controls

SANITARY SEWER

- ❑ Design shall be in accordance with MDEQ's *Guidance for Design of Publically Owned Wastewater Facilities*
- ❑ Minimum pipe size: 8"
- ❑ Gravity pipe type: PVC SDR26 with a minimum depth of 30"
- ❑ Force main pipe type: PVC SDR21 or DI Class 50
- ❑ Minimum manhole size is 4' diameter
- ❑ Sewer manholes shall be spaced no more than 350' apart.
- ❑ Drop connections installed inside the manhole when inverts are greater than 24 inches apart, and drop manholes shall be a minimum of 5' diameter.
- ❑ Drop manholes shall be designated as such on the plans.
- ❑ Watertight manhole covers are required in the 100-year flood plain; watertight bolt down manhole covers are required in the velocity zones. Manhole cover type shall be clearly designated on the plans.
- ❑ Profile sheets shall show outside diameter of pipe, but invert shall be indicated where necessary.
- ❑ Where different types, sizes, or materials of sewer main are indicated on the recapitulation sheet, plan/profile sheets shall indicate where each type, size, or material is used.
- ❑ Plans shall be clear as to what existing pipes are to remain active, or to be abandoned in place. Any pipe that is not able to be removed shall be filled with flowable fill.
- ❑ Individual drainage conflicts shall be addressed by separate detail

LIFT STATIONS

- ❑ Minimum lid size shall be 3'x5'
- ❑ Minimum wet well size shall be 6' diameter but 8' max if precast
- ❑ All lift stations shall include a rail system
- ❑ Minimum 1 hour fill time
- ❑ Pump: Increase margin minimum 50%
- ❑ Inflow: minimum 3' above pump
- ❑ Motor: minimum 5 hp
- ❑ SCADA system shall be installed on every lift station.
- ❑ Bypass connection required on all stations and shall be nor more than 4' above ground
- ❑ Standard motor frame, base plate, lengths, shaft sizes shall all be standard products, no proprietary products
- ❑ If 3 phase power is required, designer should coordinate with power company during design.
- ❑ Electrical panels shall be elevated to the minimum base flood elevation plus 1'.
- ❑ Provide a paved access drive to each lift station.
- ❑ Type of fencing surrounding lift station shall be determined depending on location but at a minimum wooden on three sides with chain link gate.
- ❑ Standard detail for lift stations shall be used as a starting point for design but engineer shall coordinate final design with Public Works Lift Station Manager.

WATER

- ❑ Design shall be in accordance with the *MSDH Water System Design Guidelines* and AWWA standards
- ❑ Minimum pipe size: 8" main
- ❑ Pipe type: C-900 PVC with minimum 30" coverage
- ❑ Valves on main line shall be spaced no more than 500' apart.
- ❑ Fire hydrants shall be spaced no more than 500' apart and be placed as close to street intersections as possible.
- ❑ Fire hydrants shall be served by a minimum of an 6" water line.
- ❑ Dead end lines shall have a fire hydrant with an automatic flusher.
- ❑ Separation of water & sewer crossings/parallels shall be in accordance with MSDH and AWWA standards. Distance shall be indicated on the plans.
- ❑ If more than one material is used for water (i.e. PVC and ductile iron), plans shall indicate which material is used where and type of joint material to be used.
- ❑ If casing is to be used, size, location and type are to be shown.
- ❑ Plans shall be clear as to what existing pipes are to remain active, be abandoned in place, be abandoned and filled with flowable fill, or are to be removed.

PROJECT CLOSEOUT – Designers shall ensure the following requirements related to project closeout are included in the specifications:

- ❑ Warranty period is for two years from the date of final payment.
- ❑ 2 hard copies and 1 digital pdf copy of closeout documents shall be submitted prior to final payment including any warranty documents and O&M manuals.

- ❑ Final payment will not be issued until after the final as-built drawings have been submitted, reviewed for accuracy and accepted. Final as-built drawings must be provided in both digital and hard copies. Digital files shall consist of a complete .pdf of the as-builts as well as the CADD files (.dgn, .dwg or .dxf format). One full size hard copy shall also be provided.
- ❑ As-builts in digital format shall have all field changes incorporated into the original contract drawings. Hard copies of as-builts shall show the redlined field changes on the original contract drawings. Redlines shall stand out by color.
- ❑ All benchmarks shall be reset and benchmarks forms submitted to the City.

EVALUATION

To help the City of Biloxi contract future design projects to consultants, the city shall evaluate this project's progress and final design. The City will use the following factors to evaluate the design engineer's performance: thoroughness and accuracy of plans, delivery time of final set of plans, receptiveness to City staff comments on plan reviews, and number of design errors discovered during the construction phase.