



CITY OF MESA ENGINEERING DEPARTMENT

MECHANICAL PROCESS SUBMITTAL GUIDELINES *Treatment Plants, Pump and Lift Stations, etc.*

January 2013



BASIS OF DESIGN REPORT (15% Submittal)

The Basis of Design Report documents the initial analysis of the major components of the project in order to establish design criteria and project requirements. Among the topics included are: a summary of project purpose, goals, requirements, and constraints; a summary of permit and regulatory requirements including type, permitting agency, submittal schedule, and responsible party; a discussion of existing and design conditions; preliminary cost estimates; project phasing requirements/recommendations; coordination requirements with other projects (as appropriate); and the approach to maintaining operation of existing facilities during construction (as required).

ARCHITECTURAL

- Space requirements (building types, functions, sizes, inter-relationships, etc.).
- Summary of Code Requirements and Standards.
- Architectural approach and philosophy.
- Schematic floor plans and building elevations.
- Description of proposed systems and materials.
 - Interior and exterior finishes.
 - Structure types (block, wood, CIP concrete, etc.).
 - Roof system(s).
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CIVIL

- Summary of Codes, Standards, and Regulatory Requirements.
- Summary of design criteria.
- Site use analysis.
 - General discussion of site requirements, facilities, function and constraints.
 - Traffic analysis (type, frequency, routing, access, parking, etc.).
 - Utility requirements.
- Discussion of alternatives (if applicable).
 - Description of alternatives considered.
 - Evaluation approach and criteria.
 - Results and recommendations.
 - Detailed back-up to be included in appendix (as appropriate).
- Need for additional easements and/or Right-of-Way.
- Security requirements and approach.
- Geologic considerations and impact on site development.
- Environmental considerations and impact on site development.
 - Hazardous materials and/or cultural resources.
 - Protected or endangered species (plants and animals).
- Landscape, buffering, and screening requirements and approach.
- Approach to storm water management and preliminary requirements.
- Schematic site plan(s).
 - Road/paving layouts with general dimensions.
 - Major site utilities/yard piping showing location and preliminary sizing.
 - Existing features and topography (if available).
 - Property lines, existing easements and Right-of-Way (if available).
 - Location of proposed fences/walls.



- Preliminary calculations documenting design criteria, code requirements, assumptions, and references used, and preliminary utility sizing.

STRUCTURAL

- Summary of Code Requirements and Standards.
- Type of structures and design criteria.
- Foundation requirements.
- Summary of additional data needs (if required).

MECHANICAL PROCESS

- Summary of existing and design conditions.
- Summary of process requirements and approach/strategy.
- Summary of Codes, Regulations, and Requirements.
- Summary of design criteria (by system and phase, if applicable).
- Alternative evaluations (if applicable).
 - Description of alternatives considered.
 - Evaluation approach and criteria.
 - Results and recommendations.
 - Detailed back-up to be included in appendix (as appropriate).
- Preliminary hydraulics.
 - Hydraulic profile, modeling results (if applicable).
 - Hydraulic calculations, including model schematics, input, and output files should be included in appendix (as applicable).
 - Results and recommendations.
- Schematic equipment and piping layout(s).
- Summary of preliminary equipment selection by system (number, sizes, etc.).
 - Calculations and catalog cuts to be provided in appendix.

ELECTRICAL/landC

- Summary of Codes, Standards, and Regulatory Requirements.
- Summary of design criteria.
- Description of power requirements and sources (including redundant and/or stand-by).
 - Site, process, building.
 - Identify outside utility (e.g. SRP) requirements.
- Approach to power distribution.
- Preliminary equipment list of major equipment.
 - Calculations and catalog cuts to be provided in appendix.
- Schematic electrical site plan and equipment layouts.
- Discussion of control philosophy and approach by system.
- Communications requirements and approach.
- SCADA requirements and approach.
- Schematic control system layout.

PLUMBING/HVAC

- Summary of Codes, Standards, and Regulatory Requirements.



- Summary of design criteria.
- Description of HVAC requirements.
- List of major HVAC equipment.
- Description of HVAC control philosophy.

CONCEPTUAL DESIGN (30% SUBMITTAL)

During this design stage, design progresses using the Basis of Design Report approved in the previous review stage. At the Conceptual submittal, the project will be about 30% complete.

General Sheets

- Cover sheet, general notes, legend(s).
- Code analysis (sets forth basic code data for the project).

Architectural Sheets

- Design development floor plan and building elevations.
- Construction notes identifying building types (block, wood frame, precast, etc.), and major systems (roof, doors, windows, floor, finishes, etc.).

Civil Sheets

- Conceptual site plan(s).
 - Road/paving layouts with general dimensions and stationing.
 - Site utilities/yard piping showing location and preliminary sizing (*).
 - Existing features and topography.
 - Property lines and existing easements and Right-of-Way.
 - Location of proposed fences/walls.
 - Location of required easements and Right-of-Way.
 - Identify project benchmark.
- Conceptual landscape plan showing location and type of landscaping.
- Conceptual section and elevation of walls showing height and materials.
- Conceptual drainage plan (show proposed storm water management approach).
 - Conceptual grading.
 - Location of inlets, storm drains piping and retention areas.
 - Discharge points.

Structural Sheets

- No structural drawings required.

Mechanical Sheets

- Conceptual piping (>4") and equipment layouts and sections sufficient to show system components, configuration(s), size, and location of major equipment.
- Typical piping schedule identifying system, size, fluid carried, and pipe material.
- Typical valve schedule identifying application, valve type, and material by system.



Electrical/landC Sheets

- Conceptual single line diagram and motor load list.
- Conceptual power and lighting plan.
- Conceptual site/building electrical plans locating major equipment and field elements.
- Conceptual PandID.

Plumbing/HVAC

- Preliminary plumbing plan showing location and sizes of potable water piping, sanitary sewers, roof and floor drains.
- HVAC plan showing location of major equipment and ducts.

Specifications

- Outline specifications for all disciplines.
- Conceptual design calculations documenting equipment selection and sizing of major equipment for all systems.
- Conceptual equipment list of major equipment for all systems.
- Updated project cost estimate that reflects the additional project detail known at this design stage.

PRELIMINARY DESIGN (60% SUBMITTAL)

During this design stage, design progresses beyond the approved 30% submittal. At the preliminary submittal, the project will be about 60% complete. The project must secure DDC or DRB approval, if required, before proceeding beyond conceptual design. Only relatively minor items should be left unresolved by the time this stage is reached.

With the possible exception of small or simple projects, the 60% complete construction drawings should be submitted to the Development and Sustainability Department for a courtesy informal review at the end of this stage. This will help assure Development and Sustainability Department approval when you later submit the Final (90%) documents to them for their formal review.

General Sheets

- Cover sheet, general notes, legend(s), and standard details.
- Code analysis (sets forth basic code data for the project).

Architectural Sheets

- Floor plans showing grid references (e.g. column lines) all dimensions and locations of stairs, doors, louvers, and windows.
- Building sections showing all dimensions.
- Roof plans showing pitch, drain locations, section cuts, and detail callouts.
- Roof sections and details sufficient to show roofing system.
- Wall sections showing grid references, cross references, all vertical dimensions, proposed material, and interior and exterior finishes.



- Stair plans and sections showing all dimensions and cross references to plans and sections.
- Typical sections and details of windows, doors, and louvers.

Civil Sheets

- Site Plan
 - Roadway plan and profile.
 - All dimensions, horizontal and vertical control, geometry, survey control and construction notes.
 - Utility plan and profiles showing inverts of new facilities and utility crossings.
 - Property lines, existing and required easements, and Right-of-Way.
- Grading and paving plan.
 - Dimensions and/or coordinates.
 - Contours and/or spot elevations.
- Landscaping and irrigation plans and details.
- Wall/fencing plan, elevations, and sections.
 - Dimensions, GS and TOW elevations, and coordinates.
 - Materials.
 - Foundation.

Structural Sheets

- Final plans (foundation, slab, floor, tank, etc.).
 - Dimensions.
 - Key and general notes.
 - Section cuts and detail call-outs with cross references.
 - Construction joints and wall/slab openings.
- Sections and details (50% +/-) showing dimensions, elevations, and rebar.

Mechanical Sheets

- Updated/expanded piping and equipment layout plans.
 - Dimensions.
 - Key and general notes.
 - Section cuts and detail call-outs with cross references.
 - Pipe support locations.
- Sections and special details (90% +/-) showing dimensions, elevations.
- Updated piping schedule showing size, application, pipe material, linings/coatings.
- Valve schedule showing size, type, application.

Electrical/landC Sheets

- Updated motor and load list.
- Updated single line diagram.
- Power and lighting plan.
 - Location and type of fixtures.
 - Location of panels.
 - Cable and conduit runs.



- Electrical site plan (60%).
- Electrical plan(s).
 - Location of equipment, panels, MCCs, switchgear, field elements.
 - Preliminary cable and conduit runs.
- Typical cable and conduit schedule.
- Panel layouts, elevations, and dimensions.
- Final PandID, preliminary control schematics for MCCs, control panels, and RTU.

Plumbing/HVAC Sheets

- Complete plans, Sections, and riser diagrams.
- All details and schedules.
- HVAC control schematic diagrams.
- Final design calculations including heat loss/gain calculations.
- Final description of HVAC sequence of operations and control.
- Complete technical specifications.
- Special provisions and bid schedule – by City.
- Design calculations for all major systems and components.
- Updated project cost estimate that reflects the additional project detail known at this design stage.
- Value engineering report (if required).
- Drainage report demonstrating retention and bleed-off.
- Data sheets and catalog cuts for all equipment.
- Updated description of all control systems.
- Include all standard and special details.
- Prepare a draft construction sequencing specification or method of construction.
- Consider special coordination requirements or constraints.
- Prepare a utility conflict report with utility, agency, type of utility, conflict, resolution, and status of resolution.
- Continue to coordinate with outside agencies for permits and approvals.
- Submit 8.5" X 11" sealed legal descriptions and exhibits for acquisition of R/W, PUFÉ's or TCE's.
- Submit one (1) full size bond copy of plans, specifications and estimate (PSandE) submittal, including 30% comments with your response.
- Resolve 60% review comments before proceeding to 90% submittal.

FINAL DESIGN (90% SUBMITTAL)

During final design the drawings are advanced from the preliminary design stage, incorporating review comments, including comments from Development and Sustainability Department's informal review of the documents. The documents should advance to at least the 90% complete stage for them to be acceptable as final documents. The final drawings will be reviewed by Engineering, the end user, numerous other City departments, and Development and Sustainability Department. The submittal is Development and Sustainability Department's first formal review.



General Sheets

- All plans must be sealed for submittal to Development and Sustainability Department for permit review.
- Cover sheet, general notes, legend(s), and standard details.
- Code analysis (sets forth basic code data for the project).

Architectural Sheets

- Final plans incorporating adjudicated comments from 60% review.
 - All plan sections and details with dimensions and cross-references.
 - Stair, safety railing, and grating details.
 - Final building elevations.
 - All standard and miscellaneous details.
 - Door, window, transom, and louver details.
 - Door and window schedules.
 - Hardware schedules.
 - Finish schedules.

Civil Sheets

- Final plans incorporating adjudicated comments from 60% review.
 - All general and key notes.
 - Final geometry, dimensions, coordinates, elevations and control.
 - All final details and sections with cross-references.
 - Final grading and paving including existing/proposed contour/spot elevations.
 - Inverts of new and existing utilities.
 - Final standard and special details.

Structural Sheets

- Final plans incorporating adjudicated comments from 60% review (See Civil for details).

Mechanical Sheets

- Final plans incorporating adjudicated comments from 60% review.
 - All General and key notes.
 - All final details and sections with cross-references.
 - Final piping, valve, and equipment schedules.
 - Pipe support details.
 - Final standard and special details.

Electrical/landC Sheets

- Final plans incorporating adjudicated comments from 60% review.
 - Final panel layouts and elevations.
 - Final control schematics.
 - Final single line diagram.



- Final load list.
- Final electrical plans showing location of all equipment, filed elements, cable and conduit runs with references to cable and conduit schedule.
- Final cable and conduit schedule.
- Final standard and special details.

Plumbing Sheets

- Final plans incorporating adjudicated comments from 60% review.
 - Note: 60% submittal should have been complete, only changes will be responded to comments and/or final details.

HVAC Sheets

- Final plans incorporating adjudicated comments from 60% review.
 - Note: 60% submittal should have been complete, only changes will be responded to comments and/or final details.
- Include final bid form, front end boilerplate, special provisions, and any required technical specifications.
- Update utility conflict report with a status of each conflict resolution.
- Confirm utility relocation designs are progressing and obtain a written schedule from all outside agencies.
- Finalize construction sequencing or method of construction specification.
- Confirm Right-of-Way, PUFÉ's and TCE's are being finalized by City.
- Confirm all permits/approvals from other agencies have been submitted.
- Submit one (1) full size bond copy of 90% PSandE submittal, including 60% redlines with your responses.
- Submit PSandE package to MCESD (approval to construct).
- Submit catalog cut sheets for all equipment specified on the project.
- Submit final design calculations for the project. Redline drawings and/or comment summary log from 60% submittal.
- Resolve 90% review comments before proceeding to final submittal.

BID DOCUMENTS (100% SUBMITTAL)

- Prepare final PSandE addressing all prior review comments.
- Submit sealed mylars, specifications and estimate.
- Confirm all permits and approvals are completed.
- Confirm that all utility relocations are being completed (Qwest, SRP, Cox, City Electric or Gas, etc.).
- Confirm that utility companies have approved construction permits and their projects are scheduled for construction.
- Confirm all real estate acquisitions and TCE's are complete.
- Compare cost estimate to available construction budget.
- Submit bid advertisement, cost estimate and vicinity map to Deputy Engineer for approval to release project.