Missoula City Public Works
Standards and Specifications Manual

CHAPTER 3 – IMPROVEMENT PLANS

November 18, 2020

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3.1.1 References

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B. Montana Code Annotated (MCA)
C. Administrative Rules of Montana (ARM)
D. Missoula County *Public Works Manual*
E. Missoula County Subdivision Regulations
F. City of Missoula Subdivision Regulations
G. Missoula City-County Air Pollution Control Program
H. Missoula City-County Health Code
I. Missoula Municipal Code
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K. *Missoula Parks and Recreation Design Manual*
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M. Montana Department of Environmental Quality Circular-1: Standards for Water Works (DEQ-1)
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3.1.2 Appendices

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B. Appendix 3-B – Public Infrastructure Review Stage Process Checklists
C. Appendix 3-C – City of Missoula MFE Requirements

3.1.3 Standard Drawings & Modifications

A. It is the responsibility of the engineer of record, architect, developer, contractor, and/or permit holder to use the most current references, standards, and modifications for improvement plans and design reports.
B. This Manual is a living document and will be periodically updated when current standards and specifications are no longer in the best interest of the public. City staff will likely update these standards and specifications around mid-November on a yearly basis for predictability purposes.
C. The standards and specifications as written in this Manual shall govern those projects having previously submitted for a Stage 3 review. The standards and specifications in place when Stage 3 is submitted will govern over the projects' remaining design work and eventual construction. Once a submittal of Stage 3 occurs the City will not require the project to adhere to any updated standards and specifications until the project is constructed and accepted.
D. Some updates may occur to standards and specifications related to process during the warranty period (typically two years). In these rare cases the City will do its best to alleviate any warranty period concerns for individual projects affected by updates.

E. In general, the City will be reviewing and approving only those designs which will be going to construction in the same year or the subsequent year in which it was designed. The City will not be reviewing and approving projects that are more than a construction season away from being constructed.

F. The design standards in this Manual, City of Missoula Standard Drawings, and City of Missoula Modifications supersede the specifications in the *Montana Public Works Standard Specifications*, 6th Edition, 2010.

G. Specifications not specifically contained herein shall be in conformance with the *Montana Public Works Standard Specifications* (MPWSS), 6th Edition, 2010.

H. Current City of Missoula modifications to the *Montana Pubic Works Standards and Specifications* are contained in Appendix 2-A.

I. Current City of Missoula Standard Drawings are contained in Appendix 2-B.

3.1.4 Applicability

A. Projects requiring private or public infrastructure within the right of way and public easements as outlined in this Manual shall submit improvement plans in accordance with these standards along with those applicable standards included in the Parks and Recreation Design Manual.

B. Public or private infrastructure generally consists of streets, curbs, gutter, sidewalks, transit facilities, bicycle facilities, shared use paths, green infrastructure, water mains, sewer mains, storm sewer systems, and private utilities.

C. A brief mention of site development projects is mentioned herein to differentiate between site development projects and public infrastructure projects. Site development projects are not subject to all of the requirements listed in this chapter.

3.2 Plan Requirements

3.2.1 Project Submissions

A. Improvement plans include design drawings, specifications and design reports for infrastructure within the right of way and public easements.

B. Improvement plans shall be submitted, reviewed, and approved by the City before any required permits will be issued for construction.

C. Improvement plans will generally fall into two categories and are processed as follows:

1. **Site Development Projects**
    - **a.** Site development projects are initiated through commercial and residential building permits, zoning compliance permits, conditional use permits, subdivision exemption affidavits, and townhome exemption developments.
    - **b.** Site development projects that require minor or no infrastructure improvements within the right of way or public easements shall be required to submit improvement plans with the permit application.

c. Site development projects containing on-site infrastructure shall submit improvement plans with the permit application. Applications that do not include the required information will be returned without review.

d. Residential and commercial development improvement plans shall use the site plan checklists located in Appendix 3-A. Completed checklists shall be submitted with the permit application. The applicant is responsible for using the most current version of the checklists provided in the appendix and on the City permit information portal.

e. Site development projects that construct significant new public infrastructure may be required to submit improvement plans through the public infrastructure project process. Significant new public infrastructure includes public utility main extensions for water, sewer and storm water, street improvements establishing alignment and grade, etc. Typically, public infrastructure for a site development project will be reviewed through the site development project process and not through the public infrastructure project process.

f. The site development project review processor plan requirements will not be discussed in additional detail in this Manual.

2. Public Infrastructure Projects

a. Public infrastructure projects are initiated through the City Engineering public infrastructure projects process.

b. Projects submitted within this process include public and private utility projects and surface improvement projects, City subdivisions, applicable County subdivisions, townhome exemption developments that will be constructing public infrastructure, and other projects that affect right-of-way or public easements that are not initiated through a site development project process.

c. Public infrastructure improvement plans must be designed and/or prepared under the direction of a licensed professional engineer or other professional licensed in the State of Montana. For example, a landscape architect may design and/or direct the design work required for a landscaping plan. These licensed professionals will ultimately stamp the plans submitted for City approval.

d. All project improvements shall be shown in the plans.

e. Projects that involve both private site improvements and public infrastructure must show and/or document how those improvements will be coordinated and phased during design and construction. A clear delineation between public infrastructure and site development infrastructure shall be made to separate the process for individual development projects that contain both public infrastructure improvements and site development improvements.

f. Detailed requirements for the public infrastructure project review process are found in Section 3.5 of this Manual. Improvement plan submittals that do not include the required information will be returned without review.

3.2.2 Required Information for Public Infrastructure Projects

A. Required Improvement Plan Information. Improvement plans shall include a cover sheet with project title, vicinity map showing project limits, street names, true north arrow, scale bar; developer name and email address; engineer information, including name, address, telephone number, and engineer's stamp; utility note (811); sheet index; and legal description of the parcel. The following standard information shall be used on all plans:

1. **General Information**
    - **a.** True North Arrow
    - **b.** Scale bar
    - **c.** Right of way and public easements (existing and proposed)
    - **d.** Property Boundaries
    - **e.** Montana Licensed Professional Stamp
    - **f.** City Project Number
    - **g.** Date of Printing
    - **h.** Plan and profiles having a horizontal scale of not more than 20 feet to the inch and a vertical scale of not more than 10 feet to the inch, when printed on D-size paper, with both scales clearly indicated. Vertical engineering scale bar (may be exaggerated to adequately show slope)
2. **Coordinate System**
    - **a.** Horizontal (X/Y): NAD 1983 (2011) State Plane Montana FIPS 2500 (Intl ft.), WKID Code: 6515 Otherwise commonly referred to NSRS2011 Montana State Plane, EPSC Code: 6515
        1. Projection: Lambert Conformal Conic
        2. False Easting: 1968503.937007874
        3. False Northing: 0.0
        4. Central Meridian: -109.5
        5. Standard Parallel 1: 45.0
        6. Standard Parallel 2: 49.0
        7. Latitude Of Origin: 44.25
        8. Linear Unit: Foot (0.3048)
        9. Geographic Coordinate System: GCS NAD 1983 2011
        10. Angular Unit: Degree (0.0174532925199433)
        11. Prime Meridian: Greenwich (0.0)
        12. Datum: D NAD 1983 2011
        13. Spheroid: GRS 1980
        14. Semimajor Axis: 6378137.0
        15. Semiminor Axis: 6356752.314140356
        16. Inverse Flattening: 298.257222101
    - **b.** Vertical (Z): North American Vertical Datum 1988 (NAVD 88) (Intl ft.)
3. **Contours**. (existing – dashed line-style, proposed – continuous line-style)
    - **a.** 5-foot major contour interval

b. 1-foot minor contour interval

4. **Plan View and Alignment Data**
    a. Coordinate data (beginning of alignment, changes in direction, end of alignment)
    b. Curve Data (length of curve, curve radius, chord length, and bearing)
    c. Angle and distances between points on alignments
5. **Detail Sheets, Sections, and Modifications**
    a. Applicable, up to date, standard drawings—City (including Public Works/Engineering and Parks and Recreation), MDT, other (highlight additions, deletions, or modifications)
    b. Detail requirements of system components
6. **Existing Conditions and Demolition Plans**. Plans shall show existing site conditions, including source of utility locations (e.g., ticket # or record drawings), landscaping elements, proposed demolition, limits of construction activity, and safety notes.
7. **Utility Systems Plans**. Utility systems improvement plans that include all proposed and existing underground and overhead utilities, including water, sewer, and storm water facilities (public and private facilities); irrigation culverts; utility poles; electric, fiber optic, communication, and gas lines; transformer boxes; and communications junction boxes. Detailed requirements for these plans can be found in Section 4.2.2 (Water), Section 5.2.2 (Sewer), and Section 6.2.2 (Storm Water) in this Manual.
8. **Transportation Systems Plans**. Transportation systems improvement plans for streets, alleys, sidewalks, and trails shall show existing and proposed curb/gutter, sidewalk, bike facilities, transit facilities, trails/shared use paths, bridges, fire hydrants, traffic control devices, traffic calming elements, street lights, boulevard trees, asphalt repair limits, streets (names), and alleys. Detailed requirements for these plans can be found in Section 7.2.2 of this Manual.
9. **Erosion Control Plans**. Plans shall show key locations (street, driveway, building corners, etc.), flow arrows, and flow grades of key features (sidewalk, existing and proposed storm water structures, catch/spill curb and gutter, street, etc.). Detailed requirements for these plans can be found in Section 8.2.2 of this Manual.

B. Required Digital Data Submissions

1. **Accepted Formats**
    a. All digital files must be submitted in bookmarked pdf and DWG, GIS shapefile, or geodatabase format, as applicable. All digital drawings must include a legend and exclude borders and backgrounds.
    b. Data must be by cloud server or electronic transfer (CD-ROM, DVD, or USB). The submitted media shall be labeled with:
        1. City project number
        2. The project name (subdivision name, accepted project name, etc.);
        3. Submission date;
        4. Registered land surveyor or professional engineer's name; and

5. Any other established project identifier.

2. **Coordinate System**
    a. Horizontal (X/Y): Shall be georeferenced and projected horizontally.
    b. Vertical (Z): Inverts and other vertical information conveyed must be reported using NAVD 88, international feet.
3. **Ground vs. Grid**. The City requires that digital data for improvement plans be submitted in state plane grid. The City is required to keep our data in state plane projection for inter-jurisdictional consistency. The City recognizes there will be slight differences between ground distances and distances reported in state plane. The City understands that plats will show/list ground distances. The City encourages consulting a licensed surveyor when inconsistencies are encountered.
4. **Accuracy**
    a. Submissions shall be accurate to $1/10^{th}$ of a foot for as-builts (Stage 6). For other submissions an accuracy of $1/10^{th}$ of a foot is recommended. Items include all utilities and property corners within the project area or affected by the project.
    b. For local control points tied to the NSRS, contact the Missoula County Surveyors Office.
    c. If derived from GNSS measurements, the submissions must also note the geoid model. Valid models for the Missoula Area include: GEOID18, GEOID12A, GEOID12B
5. **Symbols**. Symbols used on improvement plans are required to be identified in a legend and are recommended to follow the United States National CAD Standards. The use of the standard will improve efficiency and benefit projects through design and construction.
6. **Annotations**
    a. Utility point features shall be annotated with the corresponding feature type. In the case of valves, provide the valve type, such as butterfly, gate, etc. Include invert elevations where applicable, such as dry wells, inlets, and manholes.
    b. Utility line features, such as water, storm, and sanitary sewer pipes, shall be annotated according to the feature type, material type, and diameter, as well as the upstream and downstream elevations.
7. **Resubmittal**. If any of these requirements or additional information is needed, the City of Missoula reserves the right to request further corrections and additional submissions.

3.3 Design Reports

Design reports, as required by the appropriate chapters in this Manual, shall be submitted with improvement plans as applicable. All design reports shall be prepared by a professional engineer licensed by the State of Montana with the engineer stamp on the cover page.

3.3.1 Water Design Report

Water system projects involving new water mains shall include a design report addressing the fire, irrigation, and domestic flow requirements at each phase and full buildout. The design report shall demonstrate compliance with these requirements and provide an overview of the proposed project or

development, proposed water system improvements, water service demands, system impact, feasibility, and basic design standards, as required by Chapter 1 of DEQ Circular-1. Water system modeling is available from Missoula Water. Additional requirements for this design report can be found in Section 4.2.3 of this Manual.

3.3.2 Sanitary Sewer Design Report

Sanitary sewer system projects involving new sewer mains shall submit a design report addressing sewer flows at each phase and full buildout of the development. The design report must demonstrate all sanitary sewer facilities have adequate capacity to convey wastewater from the anticipated service area and meet the minimum flow velocities and/or flow depth requirements in Chapter 30 of DEQ Circular-2. The engineer of record shall be responsible for all modeling input. Additional requirements for this design report can be found in Section 5.2.3 of this Manual.

3.3.3 Storm Water Drainage Design Report

Medium- and high-priority projects, per the Storm Water Site Evaluation Form (Appendix 6-B), shall be required to submit a Storm Water Management Sit Plan and Design Report addressing pre- and post-development runoff conditions and off-site drainage areas both up gradient and down gradient. The type of design report required is dependent on the development type and size. Additional requirements for this report can be found in Section 6.2.3 of this Manual.

3.3.4 Geotechnical Report

A geotechnical report (soils report) is required for the following types of projects:

- If a building permit is necessary using hillside standards (greater than 15% slope),
- If proposed street sections differ from city standard sections,
- If an improvement plan is proposing infiltration as part of a storm water facilities design, and
- If required by City Engineering.

Additional requirements for a geotechnical report can be found in Section 6.2.3 of this Manual for storm water systems and Section 7.4.3 of this Manual for transportation systems.

3.3.5 Traffic Impact Study

Developments that will contribute 200 or more vehicle trips per day to streets shall submit a traffic impact study with the improvement plans. The traffic impact study shall include analysis and impacts to all transportation facilities including transit, bicycle, and pedestrian. It shall include considerations for access management, transportation demand management, traffic calming, and mitigation measures. If the development affects infrastructure under MDT's jurisdiction, those plans may also require MDT review and approval. Additional requirements for this traffic impact study can be found in Section 7.4.3 of this Manual.

3.4 External Coordination

External coordination may be required for improvement plan development and ultimately approval. This coordination may involve federal, state, and local agencies or private organizations and should take

place prior to submission of improvement plans. Example agencies and private utility companies are listed below with links to their websites, where applicable. In general, various City of Missoula departments will be included in the public infrastructure review process and therefore will not need to be contacted separately or outside of the review process.

3.4.1 Federal Agencies

A. Environmental Protection Agency
B. Federal Emergency Management Agency

3.4.2 State Agencies

A. Montana Department of Environmental Quality (MDEQ)
B. Montana Department of Transportation (MDT)
C. Montana Department of Natural Resources and Conservation (MDNRC)

3.4.3 Local Agencies

A. City of Missoula departments
B. Missoula Redevelopment Agency
C. Missoula Development Authority
D. Missoula City-County Health Department
E. Missoula Conservation District
F. Missoula County
G. Downtown Missoula Partnership
H. Mountain Line Transit

3.4.4 Private Utilities Companies

Prior to submitting improvement plans, coordination with private utility companies shall be conducted. This coordination should include impacts on existing overhead and underground utilities as well as proposed development conditions.

3.4.5 Private Property Owners

Coordinate development projects with affected property owners for potential public and private impacts.

3.5 Public Infrastructure Project Submissions

Public infrastructure projects shall utilize the Public Infrastructure Review Stage Process. This process was set up to guide consulting firms, developers, and developer representatives through the City's review process for projects involving public infrastructure. The Public Infrastructure Review Stage Process contains seven stages, which may or may not be applicable for each public infrastructure project. General information for each stage can be found below and additional information and submission requirements can be found in Appendix 3-B.

3.5.1 Stage 1 – Project/Development Initiation

A. Stage 1 identifies the scope, concept, relevant planning documents, policies, and regulations supporting the proposed project.

B. For projects requesting connection to City water and/or sewer systems, this stage includes the request for an Intent to Serve letter from the City.

C. Projects outside the city limits requesting connection to City water and/or sewer systems are required to gain approval from the Utility Service Review Committee (USRC) prior to requesting an Intent to Serve letter.

D. By writing an Intent to Serve Letter, the City is agreeing to supply water to and/or accept sanitary sewerage waste from the proposed development, and the Intent to Serve Letter satisfies subdivision application requirements. The developer is obligated to design and construct infrastructure necessary to serve the development, and the City will review and approve design prior to construction. The project may need to extend system mains and/or construct other system improvements in order for the system to be "available" or ready for use. Therefore, "availability" of systems will be determined at Stage 3 once improvement plans (including design reports) are submitted for City review.

E. Generally, the City needs a minimum of one week to process Intent to Serve requests outside of any other process such as USRC.

3.5.2 Stage 2 – Conceptual Design Review

A. Stage 2 identifies the major design features and constraints, alignments, profiles, external connections, pipe sizing, lane configurations, typical sections, boulevard tree types, and design alternatives, as applicable.

B. The Stage 2 checklist shall be submitted to City Engineering when submitting a sufficient subdivision packet for agency review. City Engineering will also review a zoning compliance permit (ZCP) for a townhome exemption development (TED) as part of the Stage 2 process. Therefore, submit a Stage 2 checklist to City Engineering when submitting a ZCP for a TED. The Stage 2 checklist required at the time these developments are being reviewed by the City will help City Engineering staff review infrastructure needs to support the development as identified in Section 3.5.2.A. above.

C. Stage 2 may be required for water and sewer main extensions, storm water, or other surface infrastructure projects, depending on the size and complexity of the project, as determined by City Engineering at the start of the project.

D. City Engineering may require a Stage 2 review when the subdivision is outside the city limits if annexation may occur.

E. Generally, the City needs a minimum of two weeks to process, review and provide comments to fully compliant Stage 2 submittals.

3.5.3 Stage 3 – Preliminary Construction Plan Review

A. Stage 3 requires the submittal, review, and approval of the preliminary construction improvements documents, as listed in the Stage 3 Checklist.

B. Insufficient submittals will be rejected and must be corrected and resubmitted. Sufficient submittals will be reviewed and comments, if any, will be distributed back to the developer's representative.

C. Approved Stage 3 submittals will receive a Stage 3 Preliminary Construction Plan Review letter. The developer's representative will address any remaining comments prior to submitting the required information to DEQ, as applicable, and prior to submitting for Stage 4 review.

D. A sewer and/or water availability letter may be requested by the developer's representative at the time Stage 3 is submitted, but this letter won't be signed by the City until Stage 3 is approved. It is recommended that the developer's representative wait to submit plans for DEQ's approval until after Stage 3 review and approval.

E. If a Municipal Facilities Exclusion is needed, refer to the required DEQ application and additional City required information in Appendix 3-C.

F. If a DEQ deviation is required for City approval, the developer's representative shall submit a draft deviation request during Stage 3 and the final, approved deviation request in Stage 4.

G. Generally, the City needs a minimum of three weeks to process, review and provide comments to fully compliant Stage 3 submittals.

3.5.4 Stage 4 – Release for Construction Plan Review

A. Stage 4 requires submittal and review of final construction improvement documents, stamped by a professional engineer, as listed in the Stage 4 checklist.

B. Stage 4 requires addressing any outstanding comments from Stage 3. Submittals that do not fully address Stage 3 comments will be deemed insufficient and rejected and required to resubmit. Sufficient plans will receive a Release for Construction (RFC) stamp on the cover page.

C. A proposed or final plat shall be submitted in Stage 4 so City staff can determine if all public infrastructure as proposed will be located within proposed or actual right-of-way or public easements.

D. Any and all applicable public easements shall be finalized (signed/notarized) and delivered to the City in Stage 4.

E. A DEQ approval letter and any approved deviation request shall be submitted as part of Stage 4.

F. Public infrastructure improvements shall be constructed in accordance with the Release for Construction Plans. Any changes must be approved by the City prior to being constructed. Substantial changes to the plans, such as major alignment changes or new infrastructure design, may require construction to halt while the City reviews and approves a Stage 4 re-submittal. City Engineering shall determine if a proposed change requires a Stage 4 resubmittal.

G. Generally, the City needs a minimum of two weeks to process, review and approve fully compliant Stage 4 submittals.

3.5.5 Stage 5 – Inspection and Testing

A. Stage 5 includes inspection and testing during and after construction.

B. When construction of all sub-surface infrastructure is complete, inspection and testing shall be performed prior to final paving or surface restoration.

C. Inspection and testing of all sub-surface utility work shall be performed and submitted to City Engineering prior to partial or conditional acceptance of those sub-surface utility improvements. The submittals required for this stage include, but are not limited to, daily inspection logs, proctor/compaction/density tests, photographs, stub drawings, draft as-builts, pressure tests, TV tests, lamp tests, and vacuum tests and are based on that portion of the infrastructure desired to be partially or conditionally accepted by the City.

D. Once this inspection and testing information has been reviewed by the City, the City shall schedule an inspection/walk-through with all appropriate people.

E. Any and all identified outstanding punch list items identified during Stage 5 shall be completed to City satisfaction prior to progressing to Stage 6 or receiving partial or conditional acceptance.

F. Generally, the City needs a minimum of three weeks to process, review, conduct inspections and generate a punch list or conditionally accept infrastructure for fully compliant Stage 5 submittals. This timeframe is exclusive of the time it takes the contractor to correct any and all punch list items.

3.5.6 Stage 6 – Final Inspection and Acceptance

A. Stage 6 includes a final site inspection and submission of all surface related construction close-out documents, including final as-built drawings (pdf and ACAD), remaining testing results, service drawings, construction diaries, construction photos, final quantities, cost information, and other project-related documentation as identified in the Stage 6 checklist.

B. Once City staff has received all final documentation and determined the constructed infrastructure meets all requirements, an acceptance letter is written. The letter defines the warranty period, which is typically 2 years.

C. Generally, the City needs a minimum of three weeks to process, review, conduct inspections, generate punch list items, and accept infrastructure for fully compliant Stage 6 submittals. This timeframe is exclusive of the time it takes the contractor to correct any and all punch list items. The time of the City's infrastructure acceptance does not increase the time of the warranty period as the City typically back dates the warranty period to begin at the time when a fully compliant Stage 6 submittal is received.

3.5.7 Stage 7 – Warranty Inspection

A. Independent warranty inspections shall be conducted by the engineer of record and City Engineering and corrective action taken to correct deficiencies.

B. If, at the end of the warranty period, all previously constructed improvements are deemed adequate, then a warranty inspection approval letter is issued and the project is considered complete.

C. Generally, the City needs a minimum of two weeks to process, review, conduct an inspection, and close-out the project for fully compliant Stage 7 submittals.

3.6 Design Deviation

Improvement plan submittals are required to make every reasonable effort to meet the design standards specified in this Manual. Where it is not practical or appropriate to meet specific design

standards, design deviations will be considered on a case-by-case basis. Design deviations are intended to provide flexibility where a customized approach is necessary to better meet the project context, desired outcomes, or other constraints.

A. A design deviation shall be requested when either of the following circumstances occur:
   1. Non-standard methods, analysis, design elements, products/materials, or construction practices are proposed; or,
   2. The project proposes design elements that are below the minimum criteria found in this Manual.

B. Design deviations shall be submitted in writing by the engineer of record with supporting documentation, including at a minimum, the following information:
   1. The applicable standard proposed for deviation;
   2. The special or unique physical circumstances or conditions affecting the project that prohibit the application of existing requirements;
   3. How the deviation advances adopted plans, policies, and/or goals; and
   4. The alternatives considered.

C. Design deviations will only be approved when all of the following apply:
   1. The proposed deviation does not conflict with or modify a condition of approval;
   2. The proposed deviation is based on sound engineering principals and/or are supported by nationally recognized design guidelines/manuals;
   3. The proposed deviation is consistent with other federal, state, or local regulations; and
   4. The deviation is in the public interest.

Analysis of the risks and benefits of deviating from the standard, including demonstration that the deviation will not result in any adverse impact on surrounding development, adopted plans, or public health and safety.