2024 Amendments to Flagstaff City Code, Title 13, Engineering Design Standards and Specifications for New Infrastructure

Amendment for Adoption Engineering Design Standards

Provisions that are being deleted are shown in bold strikethrough.
Provisions that are being added are shown in bold red text.

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13-04: Easements and Rights-of-Way

Section 1. Amend Title 13 Engineering Design Standards, Chapter 13-04: Easements and Rights-of-Way, as follows:

CHAPTER 13-04
EASEMENTS AND RIGHTS-OF-WAY

Divisions:

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Section 2. Amend Title 13 Engineering Design Standards, Chapter 13-04: Easements and Rights-of-Way, Division 13-04-001: Easements, Section 13-04-001-0003: Types, as follows:

A. Typical easement purposes are water, sewer, drainage, public utility, sidewalk, walkways, bike paths, urban trails, open space, slope, temporary turnaround, public service access, and temporary construction easements. However, any purpose agreed upon by both parties will constitute valid use. A vehicular no-access restriction may be required by the City, where vehicular access is not appropriate for safety or legal reasons.

B. More than one (1) type of easement may occupy the same ground, but if created at different times, the right and use by the senior grant may not be interfered with by the junior; nor can any easement be used for a purpose other than that recited in the grant.

~~1~~**C**. The grantor may make use of the land subject to the easement but ~~must~~**shall** not interfere with the particular easement use or access thereto.

~~2~~**D**. The ~~land owner~~ **grantor or successor** ~~must~~**shall** allow the authorized utility company or City representative access to any ~~piping and/or appurtenances~~ **facilities** that lie within the ~~public utility~~ easement.

> ~~a~~**1**. Access is defined as the ability to ~~walk~~ **drive ordinary construction equipment** to the ~~piping and/or appurtenance~~ **facility**.
>
> ~~(1)~~**2**. In the event that **a fence or wall is authorized within the easement,** ~~no access is available from the installation of a non-edifice,~~ a gate **of sufficient width to allow access by ordinary construction equipment**~~, four (4) feet, zero (0) inches minimum in width,~~ may be required ~~to be installed that will allow access~~.
>
> ~~(2)~~ The gate may be equipped with a City lock interlocked with a lock from the ~~private resident~~ **grantor or successor**.

~~3~~**E**. ~~No permanent structures will be allowed to~~ **Permanent obstructions shall not** be constructed within, or over the top of, ~~the~~ **a** public utility or drainage easement **except with written permission by the City Engineer. Unauthorized permanent obstructions constructed in an existing public utility or drainage easement shall be removed by the property owner at their expense**.

~~a~~1. A permanent ~~structure~~ **obstruction** is defined as ~~a masonry fence (including trash enclosures), or any part of a building or structure that requires a building permit~~ **any wall (including a trash enclosure), any fence that lacks panels that are removable by hand utilizing only simple hand tools, a retaining wall of any height or type (including stacked rock, railroad ties, interlocking masonry, landscape timbers, etc.), sport courts, shade structures, sheds, signage not easily removed with hand tools, or any part of a building or structure that requires a building permit. Trees and other large plantings are classified as permanent obstructions where such plantings would restrict access within the easement. Exceptions may be granted for certain permanent obstructions particularly at property lines where the easement on both sides of the permanent obstruction is otherwise accessible and the obstruction is generally placed perpendicular to the easement.**

~~b. A nonpermanent structure is defined as a wooden or chain link fence, curb and gutter, parking lot, landscaping, and buildings or structures that do not require a building permit.~~

~~c~~F. ~~In the event that the~~**If a** ~~pipe and/or appurtenance~~ **facility** must be repaired, maintained, or reconstructed, and ~~a nonpermanent structure~~ **an allowable feature** has been constructed over the easement, the City may require the property owner to remove the ~~nonpermanent structure~~ **feature** in order for the City to make the repair, perform maintenance, or do reconstruction.

1. Allowable features that may be placed in easements shall not interfere with drainage or access within the easement. Examples of features that ordinarily would be allowable include curb and gutter, pavement, sidewalks, landscaping and light weight fences with removable panels such as wood, iron or certain wire/chain link designs and which are generally perpendicular to the easement (other than drainage easements). Fences are not allowed across drainage easements with open channels. Removable fences with minimum eight (8) foot gates are permitted across drainage easements with underground storm drains.

~~(1)~~**2.** The property owner may reinstall the ~~structure~~ **feature** at the owner's expense.

~~d. In the event that the pipe and/or appurtenance must be either repaired, maintained, or reconstructed, and a permanent structure has been constructed over the easement, the permanent structure must be removed by the property owner in order to complete the repair, maintenance, or reconstruction and may not be reinstalled.~~

~~e~~G. ~~In the event that the structure, either permanent or nonpermanent,~~**If the City requires a property owner to remove a permanent obstruction or allowable feature under parts E or F of this section and the structure** is not removed ~~immediately~~**in a timely fashion**, the City shall have the right to remove the structure and charge the property owner for this effort.

~~f~~H. Private services shall not be installed in a public easement or right-of-way parallel to ~~public utility lines~~ **the easement or right-of-way**.

~~GI. Fences are not allowed across drainage easements with open channels. Removable fences with minimum eight (8) foot gates are permitted across drainage easements with underground storm drains~~.

I. No grading other than minor levelling or surface amendments shall be made within any easement that could affect drainage or cover over subsurface facilities without written approval from the City Engineer.

~~D~~J. An easement does not become void or nonexistent if it ceases to be used for the purpose for which granted unless the grant carries a limitation to that effect.

1. An easement can be of a temporary nature and cease to exist at the time specified on the grant. ~~One (1)~~An example would be a construction easement adjoining a permanent easement or a turnaround to be abandoned when the street is extended.

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Section 3. Add Title 13 Engineering Design Standards, Chapter 13-04: Easements and Rights-of-Way, Division 13-04-003: Work in Public Rights-of-Way and Easements, to read as follows:

Division 13-04-003

Work in Public Rights-of-Way and Easements

Sections:

13-04-003-0001: Permit Requirements

A. Prior to the issuance of a permit, the permittee shall provide the City of Flagstaff with:

1. One copy of the certificate of commercial general liability insurance naming the City as an additional insured, the general liability endorsement, and the additional insured endorsement. The endorsements shall include the policy numbers and the policy numbers must match those listed on the certificate of insurance. The minimum limits of coverage shall be those currently required by the City of Flagstaff Risk Management Section. This insurance shall in no way limit the extent or enforcement of the hold harmless agreement in Subsection C below.

2. An electronic copy of the construction plans. The City Engineer may waive this requirement for minor work, in which case the applicant shall submit a sketch that depicts, in suitable detail, the proposed work.

3. For work in public rights-of-way that requires the restriction of vehicle, bicycle, or pedestrian traffic, the permittee shall submit electronic copies of a traffic control plan conforming to the requirements of the MUTCD and Division 13-06-008. The City Engineer may suspend this requirement for minor work.

B. This permit is for the time period indicated. Should the permittee be unable to complete the work in the specified time (adverse weather conditions excepted), the permittee shall make application to the City of Flagstaff for a time extension and pay to the City an amount equal to 50% of the original permit fees.

C. All work permitted shall be done at no expense to the City of Flagstaff, and the permittee shall indemnify, defend, and hold harmless the City of Flagstaff from and against any and all liability or responsibility for any accident, loss, damage to persons or property, or expenses (including reasonable attorney fees and court costs), arising from and/or occurring as a result of any death, bodily injury, personal injury, or property damage of any kind or description that may directly or indirectly relate to or stem from any work or activities under the terms of this permit. In essence, permittee shall assume all said liabilities and/or responsibilities and protect and/or restore all property

both public and private damaged as a result of the activities of the permittee, its agents, employees, or contractor.

D. The permittee shall adhere to all Federal, State, and local laws, ordinances, and regulations.

E. All permitted work shall be performed in accordance with the requirements of the City Engineer, the Uniform Standard Specifications for Public Works Constructions (MAG Specifications), City of Flagstaff Addendum to MAG, Flagstaff City Code, Title 13, Engineering Design Standards and Specifications for New Infrastructure, Uniform Standard Details for Public Works Construction (MAG Details), and the City of Flagstaff Stormwater Design Manual; and the approved plans, construction schedules, and traffic control plans submitted with the application for permit.

F. Where a proposed underground utility is installed under an asphaltic or portland cement concrete surfaced roadway, the installation shall be made by boring or jacking beneath the road surface. Pavement cuts are permitted only when:

1. Physical constraints such as bedrock or indeterminable infrastructure prevent boring or jacking,

2. An unsuccessful attempt has been made to bore or jack the installation,

3. Connection to an existing utility located beneath the paved portion of the roadway is necessary,

4. Right-of-way limits do not accommodate a boring operation,

5. Boring will result in an inordinate cost when compared to an open cut (double the cost as demonstrated by an engineer's estimate or actual construction bid), or

6. The surface of the roadway is in a badly deteriorated condition such that a pavement cut will not detract from the integrity of the surface, as determined by the City Engineer.

G. When trenching is necessary, and permanent pavement patch is not practicable, temporary trench pavement shall consist of UPM (Unique Paving Material) or approved equal. In lieu of placing UPM, the permittee may elect to completely backfill the trench to within two inches of the finish trench grade with non-shrink slurry backfill conforming to Section 13-09-006-0003. The final two inches shall be MAG Class C concrete.

H. The use of trench plating shall be prohibited from November 1st to April 1st unless specifically allowed by the City Engineer. Approved trench plates shall be installed per MAG Standard Detail 211.

I. Temporary traffic control or signage shall not be placed in the right-of-way without written authorization of the City Engineer.

J. Should blasting be required, an additional permit shall be obtained from the City of Flagstaff Fire Department.

K. The permittee shall notify the assigned inspector on the working day immediately preceding the date work will commence, or recommence after a stoppage.

L. The permittee shall fully conform to the requirements of A.R.S. Section 40-360.21 et seq. (Arizona 811 requirements, call 811).

M. The permittee shall fully conform to the requirements of A.R.S. Section 40-360.41 et seq., restrictions for working near or over power lines.

N. The permittee shall be fully responsible for all work performed under this permit, including, but not limited to, workmanship, and worksite clean-up as specified in Section 13-04-003-0002.

O. All work permitted herein shall be guaranteed against all defects in material and workmanship for one year from the date it is accepted by the City Engineer.

P. Upon acceptance by the City Engineer, all public roadway drainage, water, and sewer facilities shall become and remain the property of the City of Flagstaff.

Q. The permittee may be required to perform special requirements as determined by the City Engineer.

13-04-003-0002: Project Clean-Up Requirements

A. All contractors working within the City of Flagstaff, both on public property or private property, shall perform their work in such a way as to minimize the dust, dirt, mud, trash, and other debris that leaves, by any means, the construction area. This may include necessary watering (the use of City reclaimed wastewater is encouraged and it is required on all major construction activity in accordance with Section 7-03-001-0015, Cross Connection Control), a dust palliative, silt fencing, best management practices, or whatever else that may be necessary to protect private and public property from undue inconvenience or hazards.

B. Any public or private property that is damaged, soiled, muddied, or otherwise marred shall be restored and returned to its original condition by the contractor, developer, or property owner. This work may include repairs to street pavement, removal of mud and debris, street sweeping, watering (the use of City reclaimed wastewater is encouraged), and other work as necessary to restore the public property to its previous condition. The restoration of private property shall include sweeping, debris removal, and other clean-up or repairs needed to restore the private property to its original condition.

C. When, in the opinion of the City Engineer, Street Superintendent, or Chief Building Official construction activity results in undue inconvenience or hazards to the public, the City Official may give a written order instructing the contractor to do any of the following:

1. **Change the work methods causing the damage or hazard within a specified time frame.**
2. **Perform the necessary clean-up work or repairs to remove the damage or hazard.**
3. **Cease immediately the construction activity causing the damage or hazard.**

D. The contractor, or property owner if no contractor is on the project, is responsible for any needed clean-up resulting from the construction activity on the property owner's project. This responsibility shall include damage resulting from vehicles or machinery of the subcontractor and materials suppliers.

E. Should the contractor or property owner not perform the needed repair or clean-up within 24 hours of written order, the City may arrange for the needed clean-up or repairs to be performed. The contractor or property owner shall pay the cost of the clean-up or repairs to the City prior to the

acceptance of the public improvements or occupancy of on-site buildings. Any unpaid charges may be collected from any sureties for the project on deposit with the City.

F. Contractor shall not store material within the rights-of-way of public streets without the written permission of the City Engineer or his authorized representative. When allowed, storage shall be performed to minimize inconvenience and hazard to the public. A traffic control plan shall be submitted by the contractor for review by the City Traffic Engineer. The Traffic Control Plan shall show all devices necessary to conform with MAG Part 400. Under normal conditions, storage of materials will be allowed only on streets closed to public travel.

G. The City Engineer may direct that the contractor access construction sites by routes causing the least potential inconvenience and damage to public and private property. This direction may include the use of alternate routes for construction vehicles, workers access to the construction site, and delivery materials.

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13-06-002: Plans Required

Section 4. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0001.1.1: Modifications, to modify 13-06-002-0001.1.1.A(3) as follows:

> 3. A narrative as to why the standard cannot be met. Cost **alone** is not a justification for modifying standards. **Where cost is a consideration, the narrative shall include a sealed Engineer's Estimate of Probable Cost (EOPC) for both the design which meets standard and the cost of the design utilizing the proposed modification.**

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Section 5. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0003: Format, to modify 13-06-002-0003.A as follows:

A. All construction plans (grading, drainage, street, water, and sewer) ~~**must**~~**shall** be submitted in a clear, neat format, with an uncluttered appearance, which conveys all pertinent information at a one (1) inch equals forty (40) feet ~~**(1:500)**~~ scale horizontal (one (1) inch equals twenty (20) feet may be required if necessary to meet the appearance of objectives), and one (1) inch equals four (4) feet, ~~**(1:50)**~~ vertical, or larger. Overall drawing size shall be twenty-four (24) inches by thirty-six (36) inches and shall have a left margin of two (2) inches and a margin of one half (1/2) inch on all other sides. An index map to a set of detailed plans in excess of two (2) sheets shall be presented.

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Section 6. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0004: Drafting Standards, as follows:

E. Plan originals shall be ~~**on a high quality transparent mylar similar or equal to K & E four (4) mil. reverse double matte**~~**submitted electronically, in PDF format**.

F. ~~**Stick-on materials, other than standard Blue Stake stickers, will not be allowed on plan originals.**~~**During the Civil Plan Review process, a description of any changes made to each plan sheet**

since the previous submittal shall accompany the resubmittal. The design engineer may choose to cloud the specific changes on the affected plan sheets or provide a list of changes organized by plan sheet and including a description of each substantive change made since the previous submittal. The itemization of the plan changes shall include a certification by the design engineer that the list of changes incorporates all changes since the previous submittal. Non-substantive changes such as typographical corrections, line weight changes or similar alternations to the plans and which do not affect the functional design need not be included in the list of changes. Where entire plan sheets are replaced or added additional plan review fees shall accompany the resubmittal in accordance with the fee schedule adopted at the time of the initial plan submittal.

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Section 7. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0005: Cover Sheets, to add the following:

O. Provide a blank space in the title block, in the same location on each sheet, with an aspect ratio of 2.5:1 for a City approval stamp. It shall be similar in scale to the Engineer's Stamp.

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Section 8. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0008: As-Built Plans, as follows:

C. Procedure.

1. All as-builts shall have an applicant transmittal attached as documentation of who is submitting them. This is necessary in order to process the plans and for contact information when the review is complete. Plans will not be reviewed if this documentation is missing and/or the submittal is deemed incomplete based on the checklist.

2. All as-built plans submitted for review shall ~~**consist of two (2) clean blue or black line paper sets (copied from the original mylars, not a permit set)**~~**be submitted electronically, in PDF/A format**, containing all the original signatures. ~~**One (1) set will be reviewed and returned i**~~If there are City comments~~**. A**~~**, a**ll comments ~~**must**~~**shall** be addressed **and resubmitted**~~**. Two (2) revised plan sets will be required with each resubmittal**~~ along with the previous redlined review set until final City approval.

3. ~~**Upon City approval, one (1) set of mylars shall be submitted to the City for permanent record.**~~ If the project is developed in phases, as-built ~~**information/**~~plans ~~**will**~~**shall** be submitted once the work is complete ~~**in that**~~**for each** phase.

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Section 9. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0009: Final Plan Submittal, as follows:

Upon approval of the construction plans, but prior to the issuance of a permit for construction, ~~**one (1)**~~**a** complete set of **"for construction"** plan**s which include the engineer's seal, date, and signature on each sheet** ~~**originals (which shall be a four (4) mil reverse double matte mylar of legible quality) and one (1) additional cover sheet**~~ shall be submitted to the City for signatures **in PDF format**. ~~**One (1) signed cover sheet**~~ **The City will apply the approval stamp and the signatures of the City Engineer, Water Services Director and Public Works Director and then** will ~~**be**~~ return~~**ed**~~ **the plans** to the ~~**consultant**~~ **design engineer** for their records **in PDF/A format**. ~~**The City will retain the complete original set as the official plans for the project.**~~ The ~~**consultant**~~ **design engineer** will then provide the City with **three (3) full-size, legible** ~~**blueline paper**~~-plan sets for issuance of ~~**construction**~~ **Engineering** permits. ~~**In addition, unless specifically**~~

~~**exempted by the City Engineer, the consultant shall provide to the City the approved plans digitally, as required by the City's "Digital Data Submission Standards" (when developed and adopted).**~~

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13-06-003: Grading Plans

Section 10. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-003: Grading Plans, Section 13-06-003-0002: Plan Presentation, as follows:

~~**One (1) mylar (four (4) mil. double matte) of t**~~**T**he approved grading and drainage plan(s) shall be submitted **electronically, in PDF/A format,** as public record prior to issuance of the grading permit.

At a minimum, the grading plan shall be prepared in accordance with the City of Flagstaff Stormwater Design Manual and the latest edition of the International Building Code.

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13-06-007: General Notes

Section 11. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-007: General Notes, Section 13-06-007-0001: General Notes, to add the following to 13-06-007-0001.A:

21. All survey monuments within or around the construction area shall be protected in place. Any monuments that are disturbed or displaced by construction shall be reset by the RLS at the contractor's expense in accordance with City of Flagstaff Engineering Standards Section 13-03-005-0004 and A.R.S. 33-103.

22. The use of trench plating shall be prohibited from November 1st to April 1st unless specifically allowed by the City Engineer.

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Section 12. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-007: General Notes, Section 13-06-007-0002: Water and Sewer Notes (Water and Sewer Plans), to add the following:

S. Any existing water stub which is not utilized as part of the approved civil plans shall be abandoned and the valve at the main shall be removed and replaced with a blind flange, repair coupling or other approved method.

T. The contractor shall verify that the size of water service and water meter indicated on these plans matches that indicated on the approved building plumbing plan set. In the event there is a discrepancy contact City of Flagstaff Water Services to confirm correct size prior to installation of water service. Where the new service is being installed to a parcel or lot for which no City-approved construction plans exist, consult Engineering Standard Table 13-09-003-04 for the most applicable water service size based on the anticipated use of the property and taking into account those subdivisions where residential fire sprinklers are required.

U. All new or relocated fire hydrants shall be tested in accordance with AWWA M-17 procedure and observed by a representative of the City Engineer with the test procedure and results documented on a form prescribed by the City Engineer. All hydrant testing shall be scheduled with the Engineering Division. Under no circumstances may an active hydrant be operated by persons other than authorized City of Flagstaff personnel.

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13-06-008: Construction Traffic Control Plans

Section 13. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-008: Construction Traffic Control Plans, Section 13-06-008-0001: General, as follows:

A. A construction traffic control plan is required for any survey, construction, utility, or maintenance activity performed in public rights-of-way or transportation-related easements that impacts the use or function of, or requires the temporary closure of streets, travel lanes, alleys, sidewalks, bikeways or bike lanes, or FUTS trails. Public utility companies responding to active emergency repairs may erect traffic control measures within the Right-of-Way in accordance with applicable regulations and best practices without first submitting a traffic control plan. The public utility must notify the City of Flagstaff Traffic Engineering Section as soon as practical and in no case later than the next business day after initiating such response where traffic control measures must remain in place more than one business day. Additional traffic control measures and/or a traffic control plan may be required by the City of Flagstaff Traffic Engineering Section.

B. Construction traffic control plans shall be in conformance with the requirements of the Federal Highway Administration's Manual of Uniform Traffic Control Devices (MUTCD). All traffic control plans shall be approved by the ~~**City's Traffic Engineering Manager**~~ **City of Flagstaff Traffic Engineering Section** prior to issuance of any permits associated with the plans. When a project involves construction that requires a substantial traffic control plan, the plan shall be submitted together with the construction plans to allow for the necessary review time **and implementation of phased construction as needed to minimize traffic impacts**.

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Section 14. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-008: Construction Traffic Control Plans, Section 13-06-008-0002: Plan Presentation, as follows:

A. Construction traffic control plans are required for controlling public and construction traffic through work areas and zones as well as for other permitted activities within the public rights-of-way and easements. Traffic control plans may reference particular typical drawings contained in Part VI of the MUTCD for work of a minor nature. Traffic control plans shall be prepared by **trained** persons knowledgeable with the fundamental principles of temporary traffic control and the work activities to be performed.

B. The traffic control plan shall include, but is not limited to, the following:

1. ~~**Scaled drawings conforming to City Standard Specification No. 6-05-010 of the construction zone, detours, construction stages, and affected surrounding areas. The scale of the drawings shall be one (1) inch equals twenty (20) feet (1:200), for construction zones under three hundred (300) feet in length and one (1) inch equals forty (40) feet (1:500) or one (1) inch equals fifty (50) feet (1:500) for construction zones greater than three hundred (300) feet in length.**~~ **Dimensioned drawings including construction zone, detours, construction staging, and affected surrounding areas.**

2. Project name and address.

~~**3. City permit number.**~~

~~4~~3. Plan preparation date.

~~5~~4. Time of day (if applicable) that construction traffic control is to be in place.

~~6~~5. Traffic control responsibility (name, address, telephone number and contact person for barricade company).

~~7~~6. A listing of all traffic control devices specified for installation.

~~8~~7. The size of the work area (all dimensions).

~~9~~8. The location of the work area in relation to the cross streets, alleys, or other major reference points (show all distances and dimensions).

~~10~~9. **Pedestrian and bicyclist accommodation through the construction zone, including temporary realignment or rerouting of** ~~**How**~~ existing pedestrian and bicycle facilities ~~**will be temporarily or permanently rerouted**~~ through or around the construction zone.

10. Accessible routes through or around the construction zone that comply with the Americans with Disabilities Act (ADA).

11. Relocation of transit stops and the continuation of pedestrian access to them. **When relocation of a transit stop is required, the traffic control plan shall include a note that reads as follows:**

a. Permittee shall contact the dispatch office responsible for the transit stop to coordinate relocation a minimum of 3 business days in advance.

12. Impacts on access to existing parking facilities including, but not limited to, garages, carports, and surface lots.

13. Provisions for special human resource requirements, such as flaggers (equipment, clothing, and flagging methods are required to conform to the MUTCD in every instance).

14. Telephone numbers of persons to be contacted in an emergency and for maintenance of traffic control devices.

15. A construction schedule, as well as a schedule of the times of day when work is permitted or when certain lanes are to remain open. **If work extends past approved traffic control plan, a new plan with the updated dates needs to be resubmitted for approval.**

16. A note indicating notification signage to be posted 5 business days prior to work, if required. Variable message boards shall be used for lane reductions on arterial streets, or full closures on arterial, collector, or commercial local streets. Static signage shall be used for full closures on local streets and alleys that are used for access to properties.

17. A note indicating that the Traffic Control Plan is only approved for implementation on the specific dates and times indicated and when the written approval stamp has applied been by the City of Flagstaff Traffic Engineering Section.

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13-09-001: Underground Utilities

Section 15. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-001: Underground Utilities, Section 13-09-001-0008: Utility Alignment and Easement Requirements to modify 13-09-001-0008.G, as follows:

G. Public utility**, sewer, and water** easements shall be free of all **permanent** obstructions and shall **comply with Division 13-04-001.** ~~**at all times be accessible to City service vehicles and equipment. No buildings, sport courts, fences, shade structures, or permanent structures of any kind shall be constructed upon, over, or under a water, sewer, or drainage easement. No landscaping shall be placed within an easement which would render the easement inaccessible by equipment. The City of Flagstaff Utilities Division has the right to cause any obstruction to be removed without notice to the property owner and all related costs shall be the property owner's responsibility.**~~

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Section 16. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-001: Underground Utilities, Section 13-09-001-0008: Utility Alignment and Easement Requirements to modify 13-09-001-0008.H, as follows:

H. For sewer or water easements not located within a public street, an all-weather access road is required if manholes, valves, fire hydrants, or other appurtenances requiring City access lie within the easement. The access road shall have a minimum width of ten (10) feet and shall be constructed in accordance with the structural section in Standard Detail No. ~~**t (unpaved)**~~**14-02-002. For those access roads not dedicated as FUTS trails, the aggregate surface course shall be replaced by a full-depth ABC section**. The access road shall connect to a public or private road.

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13-09-002: Sewer System Design

Section 17. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-002: Sewer System Design, Section 13-09-002-0005: Velocities of Flow, to modify Table 13-09-002-02 as follows:

Table 13-09-002-02

Pipe Size (inches)	Min. Slope (%) 2 fps **		Max. Slope (%) 10 fps *	
	n = 0.010	n = 0.013	n = 0.010	n = 0.013
8	0.20	0.34	4.91	8.29
10	0.15	0.26	3.65	6.16
12	0.11	0.20	2.86	4.83
15	0.085	0. 15	2.12	3.59

~~**Note:**~~ * PVC (n = 0.010) DIP (n= 0.013)

** **Minimum slopes for PVC shall also be calculated using a coefficient of roughness of 0.013.**

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Section 18. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-002: Sewer System Design, Section 13-09-002-0007: Design and Spacing of Manholes, as follows:

A. Manholes are to be installed at the end of each line; at all changes in grade, size, horizontal or vertical alignment, ~~**pipe material;**~~ at all intersections of mains and service connections greater than six (6) inches in diameter; and at distances not greater than four hundred (400) feet for sewers twelve (12) inches or less, and five hundred (500) feet for sewers greater than twelve (12) inches.

Table 13-09-02-004

Minimum Manhole Diameter

PIPE SIZE (INCHES)	MANHOLE DEPTH (FT)	MANHOLE DIAMETER (INCHES)	FRAME AND COVER DIAMETER (INCHES)
Less than 12"	12 and less	48	24

Table 13-09-02-004

Minimum Manhole Diameter

PIPE SIZE (INCHES)	MANHOLE DEPTH (FT)	MANHOLE DIAMETER (INCHES)	FRAME AND COVER DIAMETER (INCHES)
Greater than 12"	Greater than 12	60	30
15" and larger	Any	60	30
Drop Manholes	Any	60	30

C. A drop manhole is to be used when a sewer enters a manhole two and one-half (2.5) feet or more above the manhole invert in accordance with MAG Detail No. 426.

1. If there is less than two and one-half (2.5) feet of fall, redesign of sewer grades is required to result in a maximum of one-half (0.5) foot above the flow line of the outlet.

2. Sewer grades shall be normally designed to provide one-tenth (0.1) foot fall from the flowline inlet to the flowline outlet within the manhole.

3. When a sewer main joins a ten (10) inch or greater main, the top of each pipe shall match at their intersection of the manhole.

a. The maximum horizontal deflection angle (inlet to outlet) for an eight (8) inch main shall be ninety (90) degrees.

b. For mains ten (10) inches and larger the maximum defection angle shall be sixty (60) degrees.

c. The minimum flow line radius shall be two (2) feet.

D. Concrete caps on manholes located outside roadways or parking lots shall have a continuous No. 3 rebar centered in the cap.

E. One (1) adjustment ring or one (1) row of bricks is required on all manholes. The ring and cover shall not be set directly on the cone.

F. Manhole covers ~~**must**~~**shall** have a pickhole and watertight manhole covers ~~**must**~~**shall** have a concealed type pickhole for removal of the cover. Bolts on watertight manhole lids shall be stainless steel.

G. Where corrosive conditions due to septicity or other causes are anticipated, consideration shall be given to providing corrosion protection on the interior of the manholes.

H. Manholes shall be pre-cast concrete or poured-in-place concrete type. Manhole lift holes and grade adjustment rings shall be sealed with non-shrinking mortar.

1. Inlet and outlet pipes shall be joined to the manhole with a gasketed, flexible water-tight connection or any water-tight connection arrangement that allows differential settlement of the pipe and manhole wall to occur.

I. Watertight manhole covers shall be used whenever the manhole is located in a floodplain, wash, or other areas known to be subject to stormwater runoff.

J. Locked manhole covers may be required in isolated easement locations or where vandalism is anticipated.

K. When connecting to an existing manhole, coring will not be accepted. The connection shall be made with a new cast in place manhole.

L. Manholes should be located outside of sidewalks, bikeways, bike lanes, and FUTS trails when feasible.

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Section 19. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-002: Sewer System Design, Section 13-09-002-0010: Sewer Services, to modify 13-09-002-0010.A as follows:

A. Sewer services shall be installed perpendicular (not parallel) to the right-of-way or easement, within the right-of-way or easement, and shall not be installed across another**'~~s private property~~ parcel or lot except where service is perpendicular to, and entirely within a public utility or sewer easement. Private easements across separate parcels will not satisfy the requirements of this section**. Sewer services are prohibited on sewer transmission mains that are eighteen (18) inches or larger.

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13-09-003: Water System Design

Section 20. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-003: Water System Design, Section 13-09-003-0005: Valve Locations, to modify 13-09-003-0005.B as follows:

B. Valves shall be generally located as follows, unless otherwise approved by the Utilities Division:

1. At intervals to isolate no more than two (2) fire hydrants at any time.

2. At minimum intervals of five hundred (500) feet in commercially zoned areas and residential off-site water mains.

3. In residential areas to isolate a maximum of thirty (30) services (approximately six hundred (600) feet).

4. At minimum intervals of eight hundred (800) feet for transmission lines.

5. Valves shall not be located in street gutters, valley gutters, concrete aprons, or in driveways.

6. **Valves should be located outside of sidewalks, bikeways, bike lanes, and FUTS trails when feasible.**

7. Three (3) valves are required on a four (4) way cross, two (2) valves minimum are required on all three (3) way tee fittings.

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Section 21. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-003: Water System Design, Section 13-09-003-0007: Water Services, to modify 13-09-003-0007.F as follows:

F. Water services, meter, and box shall be installed perpendicular (not parallel) to the main line, within the right-of-way or easement~~, and~~. **Water services** shall not be installed across another~~'s private property~~ **parcel or lot except where service is perpendicular to, and entirely within a public utility or water easement containing a public water main on the affected lot. Water service easements across separate parcels will not satisfy the requirements of this section**. Water service lines between a water main and water meter shall be installed perpendicular to the water main unless otherwise approved by the City Engineer. **Water meters shall be located at the frontage of the lot being served.**

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13-09-006: Sewer and Water Line Materials

Section 22. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-006: Sewer and Water Line Materials, Section 13-09-006-0001: Sewer and Water Line Materials and Construction, to modify 13-09-006-0001.B.4 as follows:

4. Valves. Gate valves with AWWA C515 two hundred fifty (250) psi rating shall be used on water mains that are twelve (12) inches and smaller in diameter. Gate valves with nonrising stems shall be used for all locations and be resilient seat and epoxy coated inside and out. ~~**Butterfly valves with C504 two hundred fifty (250) psi rating shall be used on all water mains fourteen (14) inches and larger in diameter. All butterfly valves shall be resilient seat and epoxy coated.**~~ **For water mains fourteen (14) inches and larger in diameter, the gate valve shall be buried so that the top of the bonnet is at least 36" below subgrade. When circumstances don't allow for this minimum depth, the gate valve shall be buried horizontally and use a bevel gear actuator.**

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Section 23. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-006: Sewer and Water Line Materials, Section 13-09-006-0006.2: Fire Hydrant Specifications, to modify 13-09-006-0006.2.R as follows:

R. A class "A" concrete pad four (4) to six (6) inches thick and three (3) feet by three (3) feet square shall be placed around a fire hydrant barrel a minimum of ~~**three**~~**two** (~~**3**~~**2**) inches **and a maximum of eight (8) inches** below the bottom of a traffic flange~~**; six (6) inches maximum**~~.

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Section 24. Amend Title 13 Engineering Design Standards, Chapter 13-09: Water, Sewer, and Other Underground Utilities, Division 13-09-006: Sewer and Water Line Materials, Section 13-09-006-0006.3: Fire Hydrant Installation Notes, to add the following to 13-09-006-0006.3.A(5):

> **c. When ten (10) foot spacing from the edge of the driveway is not practical, the design shall maximize available space behind the sidewalk.**

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13-10-002: Street Design

Section 25. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-002: Street Design, Section 13-10-002-0001: Street Design, as follows:

Street design shall:

A. Provide for appropriate continuation of existing and proposed arterial and collector streets and bikeways in accordance with the most recently adopted version of the Regional Plan and Division 13-10-014.

B. Provide sufficient rights-of-way for local service or a frontage street along major highways, or other treatment by separation to protect residential properties along arterial and collector streets.

C. Correlate with the drainage facilities when streets are used for on-site local drainage.

D. Be designed so that through traffic in residential districts is carried on arterial and collector streets. Residential subdivisions shall be designed so that the local streets provide vehicular, bicycle, and pedestrian access to the residences and services of the homes fronting the streets. Table 13-10-~~011~~002-01 identifies the application of the different street cross sections, which are based on the total traffic volumes of the street.

1. In order to provide neighborhoods that are safe, functional, and express an atmosphere of community, subdivisions **shall** ~~**should**~~ be designed so that the **residential** local streets carry volumes no greater than **one thousand** ~~**five hundred**~~ (**1,000**~~**500**~~) ADT. When the traffic volumes on a given street exceed **one thousand** ~~**five hundred**~~ (**1,000**~~**500**~~) ADT, it **shall** ~~**should**~~ only provide access to a local street and not to residential properties. In those instances, the typical street section used shall be a minor collector as follows: The section will exclude the center left turn lane (left turn lanes will be required as needed where the minor collector intersects another collector or arterial street).

Table 13-10-002-01

Functional Classification/Design Criteria

URBAN							
Functional Classification(*)	**Major Arterial**	**Minor Arterial**	**Major Collector**	**Minor Collector**	**Commercial Local**	**Residential Local "Wide"**	**Residential Local**
Max. Through Lanes	**4**	**4**	**4**	**2**	**2**	**2**	**2**
Maximum Average Daily Traffic						**1,000**	**500**
On Street Parking	**Not allowed**	**Not allowed**	**Not allowed**	**Not allowed**	**Not allowed**	**Not striped**	**Not striped**
Bicycle Provision	**4.5'**	**4.5'**	**4.5'**	**4.5'**	**In travel lane**	**In travel lane**	**In travel lane**
Total A.C. Width	**68'**	**68'**	****68'/64'**	**42'**	**24'**	**33'**	**29'**

Table 13-10-002-01

Functional Classification/Design Criteria

URBAN							
Functional Classification(*)	**Major Arterial**	**Minor Arterial**	**Major Collector**	**Minor Collector**	**Commercial Local**	**Residential Local "Wide"**	**Residential Local**
Width (B.C. to B.C.)	**72'**	**72'**	****72'/68'**	**46'**	**28'**	**37'**	**33'**
Minimum R.O.W. (See Note No. 2)	**98'**	**98'**	****96'/92'**	**70'**	**52'**	**61'**	**57'**
Through Lane Width	**12'**	**12'**	**12'>/=40 mph 11'<40 mph**	**11'**	**12'**	**NA**	**NA**
Auxiliary Lane Widths	**11'**	**11'**	**11'**	**11'**	**NA**	**NA**	**NA**
Edge Treatments	**Vertical C/G**	**Vert. C/G**	**Vert. C/G**	**Vert. C/G**	**Vert. C/G**	**Vert. C/G**	**Vert. C/G *****
Min. Sidewalks (See Note No. 3)	**6'**	**6'**	**5'**	**5'**	**5'**	**5'**	**5'**
Min. Parkway (See Note No. 8)	**5'**	**5'**	**5'**	**5'**	**5'**	**5'**	**5'**
Parking Lane	**Not allowed**	**Not allowed**	**Not allowed**	**Not allowed**	**Not allowed**	**Not striped**	**Not striped**
Minimum Median Width (See Note No. 7)	**15'**	**15'**	**15'**	**NA**	**NA**	**NA**	**NA**
Max. A.C. Width @ Signal w/o Median	**68'**	**68'**	**68'**	**68'**	**NA**	**NA**	**NA**

Table 13-10-002-01

Functional Classification/Design Criteria

URBAN							
Functional Classification(*)	**Major Arterial**	**Minor Arterial**	**Major Collector**	**Minor Collector**	**Commercial Local**	**Residential Local "Wide"**	**Residential Local**
Max. A.C. Width at Nonsignalized Inters. w/o Median	48'	48'	48'	48'	NA	NA	NA
Corner Cut-Off (See Note No. 4)	25'	25'	20'	15'	15'	15'	15'
Curb Ret. Radius	30'	30'	25' **	20' **	20'	15'	15'
Design Speed	45 MPH	40 MPH	35–40 MPH	30 MPH	25 MPH	20 MPH	20 MPH
Superelevation (See Note No. 5)	4% Max.	4% Max.	4% Max.	None	None	None	None
Min. Curve Radius (See Note No. 5)	900'	667'	667' (40 mph) 454' (35 mph)	300'	181'	100'	100'
Maximum Grade	6%	6%	6%/7%	8%	10%	10%	10%
Property Access (See Note No. 6)	Major D/W Only	Major D/W Only	Major or Combined D/W Only	Individual D/W Head Out	Individual D/W Head Out	Individual D/W Back Out	Individual D/W Back Out

* Functional classifications are further defined in Division 13-10-014.

** 1. For travel lanes adjacent to a raised median, increase travel lane width by one (1) foot.

2. For all truck routes, there shall be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.

*** Roll curb is permitted on streets in townhome and planned options where lot widths are less than or equal to forty (40) feet. This is limited to those streets within the development that front the houses.

Roll curb is permitted on residential cul-de-sacs per Engineering Standard Detail 10-04-010 in order to meet ADA requirements for maximum sidewalk cross slope at driveway entrances.

Table 13-10-002-01 (Continued)

Functional Classification/Design Criteria

URBAN					
COMMERCIAL CENTER STREETS					
Functional Classification (*)	Major Arterial	Minor Arterial	Major Collector	Minor Collector	Local
Max. Through Lanes	4	4	4	2	2
On Street Parking	6'	6'	6'	6'	6'
Bicycle Provision	5'	5'	5'	5'	In travel lane
Total A.C. Width	81'	81'	81'/77'	55'	36'
Width (B.C. to B.C.)	85'	85'	85'/81'	59'	40'
Minimum R.O.W. (See Note No. 2)	117'	113'	113'/109'	87'	68'
Through Lane Width (**)	12'	12'	12'>/=40mph 11'<40mph	11'	12'
Auxiliary Lane Widths	11'	11'	11'	11'	11'
Edge Treatment	Vert. C/G	Vert. C/G	Vert. C/G	Vert. C/G	Vert. C/G
Min. Sidewalks	10'	10'	10'	10'	10'
Furnishing Strip	5'	3'	3'	3'	3'
Offset	1'	1'	1'	1'	1'
Parking Lane	6'	6'	6'	6'	6'

Table 13-10-002-01 (Continued)

Functional Classification/Design Criteria

URBAN					
COMMERCIAL CENTER STREETS					
Functional Classification (*)	**Major Arterial**	**Minor Arterial**	**Major Collector**	**Minor Collector**	**Local**
Minimum Median Width (See Note No. 7)	**15'=11' lane + 4' median**	**15'**	**15'**	**NA**	**NA**
Max. Number of Lanes at a Signal w/o Median	**6**	**6**	**6**	**6**	**NA**
Max. Number of Lanes at a Nonsignalized Intersection w/o Median	**4**	**4**	**4**	**4**	**NA**
Corner Cut-Off (See Note No. 4)	**25'**	**25'**	**25'**	**15'**	**15'**
Curb Ret. Radius	**30'**	**30'**	**20' ****	**20' ****	**25'**
Design Speed	**45 MPH**	**40 MPH**	**35–40 MPH**	**30 MPH**	**25 MPH**
Superelevation (See Note No. 5)	**4% Max.**	**4% Max.**	**4% Max.**	**None**	**None**
Min. Curve Radius (See Note No. 5)	**900'**	**667'**	**667' (40 mph)** **454' (35 mph)**	**300'**	**181'**
Maximum Grade	**6%**	**6%**	**6%/7%**	**8%**	**10%**
Property Access	**Major D/W Only**	**Major D/W Only**	**Major or Combined D/W Only**	**Individual D/W Head Out**	**Individual D/W Back Out**

*** Functional classifications are further defined in Division 13-10-014.**

**** 1. For travel lanes adjacent to a raised median, increase travel lane width by one (1) foot.**

2. For all truck routes, there shall be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.

Table 13-10-002-01 (Continued)

Functional Classification/Design Criteria

RURAL						
Functional Classification (*)	Major Arterial (See Note No. 3)	Minor Arterial (See Note No. 3)	Major Collector (See Note No. 1)	Minor Collector (See Note No. 1)	Local	Local Narrow
Max. Through Lanes	2	2	2	2	2	2
On Street Parking	Not allowed	Not allowed	Not allowed	Not allowed	Not striped	Not striped
Bicycle Provision	4'	4'	4'	4'	In travel lane	In travel lane
Total A.C. Width	32'	32'	32'	30'	26'	20'
Minimum R.O.W. (See Note No. 2)	60'	60'	60'	60'	50'	44'
Through Lane Width (**)	12'	12'	12'	12'	13'	10'
Edge Treatment	6 Foot Compacted Shoulders and Drainage Swales/Curb and Gutter Is Optional (See Note No. 9)					
Sidewalks	No Sidewalks or Parkway Section					
Parking Lane	Not allowed	Not allowed	Not allowed	Not allowed	N/A	N/A
Corner Cut-Off	30'	30'	20'	20'	20'	20'
Fillet Radius	30'	30'	20' **	20' **	20'	20'
Design Speed	45 MPH	40 MPH	35-40 MPH	30 MPH	20 MPH	20 MPH

Table 13-10-002-01 (Continued)

Functional Classification/Design Criteria

RURAL						
Functional Classification (*)	**Major Arterial (See Note No. 3)**	**Minor Arterial (See Note No. 3)**	**Major Collector (See Note No. 1)**	**Minor Collector (See Note No. 1)**	**Local**	**Local Narrow**
Superelevation (See Note No. 5)	**4% Max.**	**4% Max.**	**4% Max.**	**None**	**None**	**None**
Min. Curve Radius (See Note No. 5)	**900'**	**667'**	**667' (40 mph)** **454' (35 mph)**	**300'**	**100'**	**100'**
Maximum Grade	**6%**	**6%**	**7%**	**8%**	**10%**	**10%**
Property Access	**Major D/W Only**	**Major or Combined D/W Only**	**Major or Combined D/W**	**Individual D/W Head Out**	**Individual Back Out**	**Individual Back Out**
Min. D/W to Intersection	**(See Note No. 10)**	**(See Note No. 10)**	**(See Note No. 10)**	**(See Note No. 10)**	**10'**	**10'**

*** Functional classifications are further defined in Division 13-10-014.**

**** 1. For travel lanes adjacent to a raised median, increase travel lane width by one (1) foot.**

2. For all truck routes, there shall be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.

NOTES:

1. Rural residential local streets are for local access in lower density residential areas only. They provide a less intrusive design option for streets, which will experience low traffic volumes and no on-street parking. Critical to their successful operation is a site design that eliminates virtually all demand for on-street parking by providing large setbacks, long driveways, and many convenient on-site parking spaces for each dwelling.

The following minimum development criteria shall be met for the rural residential local streets:

Cluster and Single-Family Detached Development – The rural residential local street shall be used where the minimum lot size is twenty-five thousand (25,000) square feet. The rural residential local "narrow" street shall be used where the minimum lot size is one (1) acre.

2. Additional right-of-way and/or easements may be required to accommodate turn lanes, traffic signals at intersections, drainage features, et cetera.

3. Sidewalks wider than five (5) feet may be required if high volumes of pedestrian traffic are expected, or in order to match existing adjacent sidewalks and master development plans.

4. The corner cut-off is normally a straight diagonal right-of-way line. A circular arc of this radius may be used if approved by the City Engineer.

At the intersection of two (2) streets of different classifications, the corner cut-off dimension and the curb return or fillet radius of the higher classification street shall be used.

5. For arterial and major collector streets, the relationship between super-elevation rate, runoff, and curve radius shall be determined from AASHTO tables for e-max equals four percent (4.0%). For local streets, the minimum delta angle (D) shall be greater than thirty (30) degrees. Minimum curve radii in the table are based on no super-elevation.

6. Pavement edge tapers shall be designed in accordance with City of Flagstaff Detail No. 10-10-031.

7. Medians shall be required on all arterials and major collectors and as outlined, or as required by the City Engineer.

8. Where new sidewalk is required in an existing development, the City Engineer may waive the requirement of a parkway if it is not practical to construct.

9. Where two (2) local residential "narrow" streets do not intersect at a right angle, the radius of curb returns on the acute angles shall be twenty (20) feet.

10. See Section 13-10-006-0001 for location of driveways adjacent to intersections.

11. For design criteria not addressed in this table, refer to AASHTO.

E. Require that new designs incorporate traffic calming techniques into all new residential streets. The goal is to reduce residential traffic speeds to within the design speed limits, while maintaining safe and reasonable access for all intended normal traffic. In order to achieve this objective, the maximum length of a roadway section between speed control points shall be six hundred sixty (660) feet. A speed control point is defined as any one (1) of the following:

1. Any design condition that requires a complete stop such as the intersection of a local residential street with a collector or arterial street, or a "T" intersection between local streets. (Note: Stop sign control at the intersection between local streets does not qualify.)

2. A horizontal curve that does not exceed a radius of three hundred (300) feet and a corresponding delta of thirty (30) degrees minimum.

In the event that there are circumstances where it is not practical to achieve traffic calming measures with design features as stated above, Table 13-10-~~011~~**002**-02 is intended to provide the design engineer with a list of alternative traffic calming design features (listed in order of preference).

~~**See Design Criteria, Table 13-10-011-01, for the design overview.**~~

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

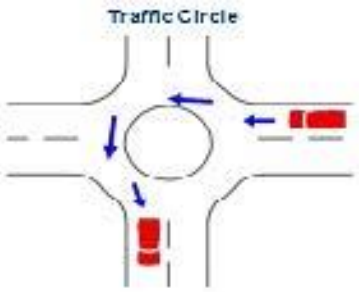
Design Option	Description	Diagram	Advantages	Disadvantages
Neighborhood Traffic Circle	Raised circular islands placed in intersections, around which traffic circulates. Typically, min. 14' diameter and includes 2-foot wide mountable truck apron and landscaping		a. Effective moderating speed b. Improves safety c. Located at intersections, the ability to calm two streets d. Fixes grid that is adjacent e. Aesthetic landscape opportunity	a. Difficult for large trucks to circumnavigate b. Designed such that the travel lane does not encroach upon crosswalks c. May eliminate on-street parking d. Maintenance e. Larger trucks may have to violate lane to navigate
Roundabout a. Local to collector b. Local to arterial c. Permitted under special circumstances	Larger than traffic circles and typically extends a minimum of 28' from center with 2' truck apron. The inscribed diameter should be 88' and 200'. Circulating roadway has a width of 14' to 19'		a. Moderates traffic speeds on arterials b. Enhanced safety as compared to signalization c. Less operating expenses as compared to signalization	a. May be difficult to navigate with large trucks b. Designed such that the travel lanes do not encroach into crosswalks c. Eliminates some on-street parking

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

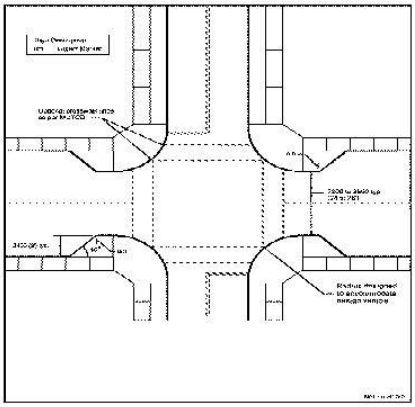
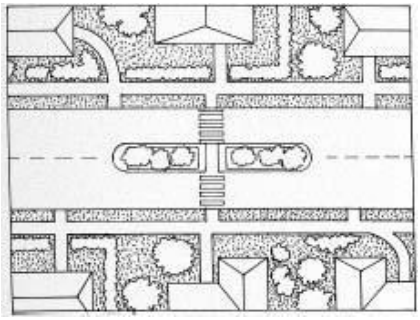
Design Option	Description	Diagram	Advantages	Disadvantages
Curb Extension a. Swells b. Elephant ears c. Located at intersections only	Comprises an angled narrowing of the roadway and widening of the sidewalk		a. Improves pedestrian circulation and space b. Through and left-turn movements are easily negotiable by large vehicles c. Creates protected on-street parking bays d. Reduces speeds, especially for right-turning vehicles	a. Effectiveness is limited by the absence of vertical or horizontal deflection b. May require the elimination of some on-street parking near the intersection c. May require slow right-turning emergency vehicles d. May require bicyclists to briefly merge with vehicular traffic e. May create pedestrian conflict
Center Island Narrowing	A raised island located along the centerline of a street that narrows the travel lanes at that location. A min. of 6' x 20' and landscaped with pedestrian cut-through		a. Increases pedestrian safety b. Reduces traffic volume	a. Speed reduction effect is limited by absence of any vertical and horizontal deflection b. Eliminates some on-street parking

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

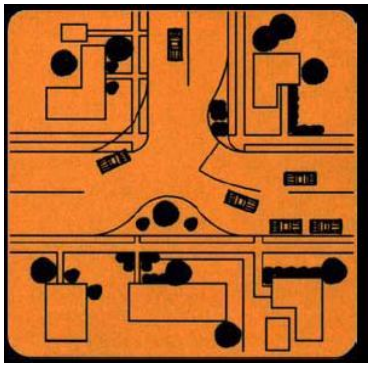
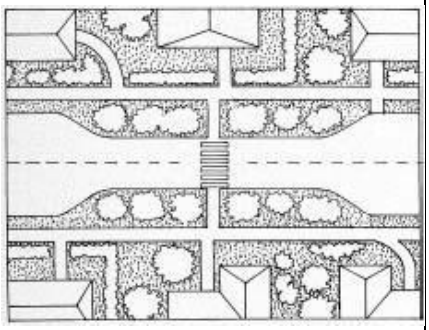
Design Option	Description	Diagram	Advantages	Disadvantages
				c. 300' to 500' spacing between center islands for smooth speeds
Realigned Intersection	Changes in alignment that convert T-intersections with straight approaches into curving streets that meet at right-angles		a. Effective at reducing speeds and improving safety at T-intersections that have been ignored by motorists b. Eliminates unnecessary pavement	a. Curb realignment could be costly b. May require additional right-of-way
Choker	Midblock curb extensions that narrow the street by expanding the sidewalk or adding a planting strip and often are installed at midblock crossings		a. Easily negotiated by large vehicles b. Reduces speed and volume	a. Effect upon speed is limited by the presence of vertical and horizontal deflection b. Bicycles briefly merge with traffic c. Eliminates some on-street parking

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

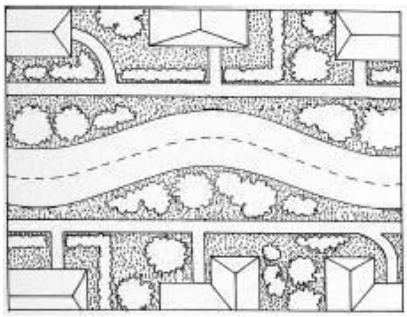
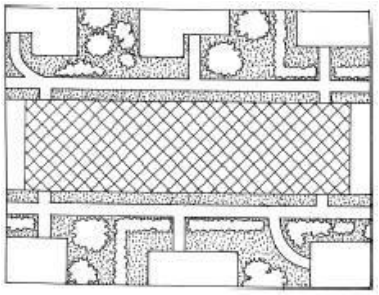
Design Option	Description	Diagram	Advantages	Disadvantages
Chicane	Literal shifts that alternate on both sides of the street creating a S-shaped path of travel		a. Reduces speed through horizontal deflection b. Larger vehicles can easily negotiate	a. Designed to prevent drivers from varying from lane b. Curb alignment and landscaping could be costly c. Drainage a consideration d. May eliminate some on-street parking e. Snow plowing may be difficult to maneuver
Textured Pavement	A surface material on the roadway (such as stamped asphalt or concrete) which is installed to produce small, constant changes in vertical alignment		a. Reduces speed over an extended length b. Located at intersection, can reduce speeds on two streets	a. Generally expensive due to material b. Cross-walk application may cause difficulties for those with disabilities and cyclists to traverse c. Less effective

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

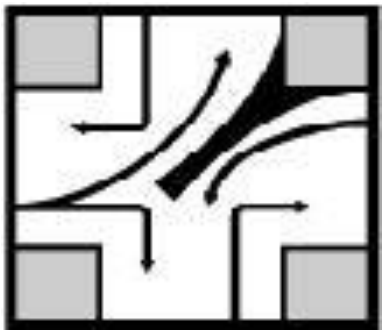
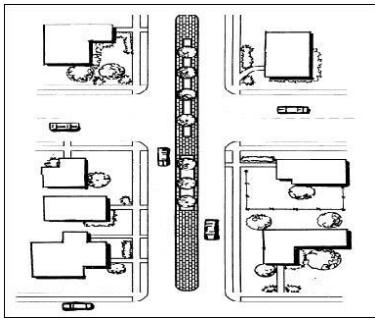
Design Option	Description	Diagram	Advantages	Disadvantages
Truncated Diagonal Diverter	A diagonal diverter with one end open to allow for additional turning movements		a. Discourages commuter traffic by forcing turns	a. Reduces local access b. Displaces traffic to other streets c. Costs
One-Way, Two-Way	Curb bulge or center island narrows 2-lane, forcing traffic for each direction to take turns		a. Limited, rarely used	a. Limited, rarely used
Median Barriers (Applied at intersections in special circumstances)	Intersection island blocking movement of a through street		a. Improves safety at an intersection of a local street and a major street by prohibiting dangerous turning movements b. Reduces traffic volumes on a cut-through route that intersects a major street	a. Requires available street width on the major street b. Limits turns to and from the side street for local residents and emergency services c. Reduces access to driveways on major arterials

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

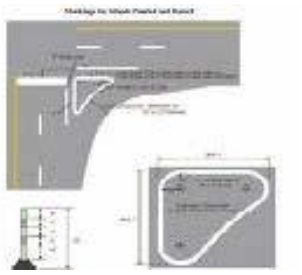
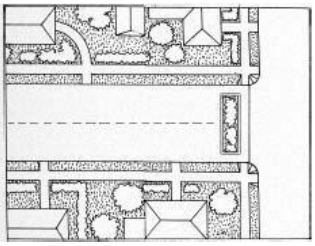
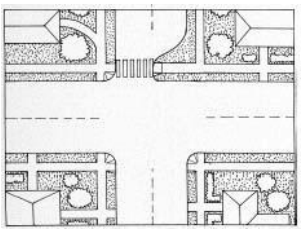
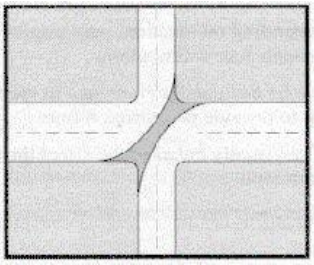
Design Option	Description	Diagram	Advantages	Disadvantages
Pavement Markings Note: Applies only to retrofit of existing streets	Painted striping or channelization to guide traffic		a. Modestly affects speed	a. Extreme unacceptable aesthetic
Full Closures Note: Applies only to retrofit of existing streets	Full closures divert traffic off the street, creating pedestrian and bicycle friendly areas		a. Maintains pedestrian and bicycle access b. Effective in reducing traffic volume	a. Causes circuitous routes for local residents and emergency service vehicles b. May be expensive c. May limit access to businesses d. May increase volumes in remaining routes
Half Closures Note: Applies only to retrofit of existing streets	Similar to full closures, are barricades located in the street and constructed of landscaped walls, gates, side-bollards, or other obstructions		a. Maintains pedestrian and bicycle access b. Effective in reducing traffic volume	a. Causes circuitous routes for local residents and emergency service vehicles b. May limit access to businesses c. Depending on the design, drivers may be

Table 13-10-002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

Design Option	Description	Diagram	Advantages	Disadvantages
				able to circumvent the barrier
Diagonal Diverters Note: Applies only to retrofit of existing streets	A barrier placed diagonally across an intersection disconnecting the legs of the intersection		a. Does not require a closure per se, only a redirection of existing streets b. Able to maintain full pedestrian and bicycle access c. Reduces traffic volumes	a. Cause circuitous routes for local residents and emergency service vehicles b. May be expensive c. May require reconstruction of corner curbs

F. LID Integrated Management Practices (IMPs) as detailed in the City's LID Guidance Manual as adopted as part of the City of Flagstaff Stormwater Management Design Manual may be allowed in the right-of-way on a case-by-case basis as approved by the City Engineer and Public Works section head.

Only stormwater generated in the public right-of-way will be allowed to be associated with an IMP. No stormwater generated on private property will be allowed to be associated with an IMP in the right-of-way.

LID IMPs, if allowed in the public right-of-way, shall be considered private drainage infrastructure. Ownership and maintenance responsibilities for LID IMPs shall be as described in the amendments to the Floodplain Management Regulations.

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13-10-006: Intersection Design

Section 26. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-006: Intersection Design, Section 13-10-006-0001: Intersection Design, as follows:

A. Intersections concerned with an arterial or collector shall be joined to provide a minimum length of tangent (at right angles to the adjoining street and measured from the curb return of the adjoining street) as follows:

arterial – one hundred (100) feet, major collector – seventy-five (75) feet, minor collector – fifty (50) feet, and local – fifty (50) feet. The only exception to this is when a local street intersects a minor collector.

B. Intersections not involving arterial and major collector streets shall have a minimum intersecting angle of seventy-five (75) degrees. Where two (2) residential local streets intersect, the minimum angle shall be sixty (60) degrees.

C. Through vehicle and bicycle lanes shall align through intersections involving Arterials and Major Collectors. Intersections involving Minor Collectors and Locals should align but may have offsets up to four (4) feet across the width of the intersection.

~~C~~**D**. Curb return radii shall be as shown in Table 13-10-~~011~~**002**-01.

~~D~~**E**. Distances between centerlines of adjacent intersections shall be a minimum of one hundred thirty-five (135) feet, regardless of the direction of the intersecting streets.

~~E~~**F**. Traffic control device locations shall be shown on the construction plans. Materials and workmanship shall be approved by the City Engineer and shall be in conformance with the guidelines of the Federal Highway Administration and the ~~**Manual on Uniform Traffic Control Devices (M.U.T.C.D.)**~~ current edition **of the MUTCD**. All traffic controls shall be installed by the developer prior to occupancy.

~~F~~**G**. Monuments shall be placed at the intersection of right-of-way centerlines. Refer to Section 13-03-002-0007 for survey monuments.

~~G~~**H**. Additional right-of-way will be required at intersections where turn lanes are required.

~~H~~**I**. Intersection grades shall conform to City of Flagstaff Standard Engineering Details except the maximum grade on all approaches to a signalized intersection or an intersection, which is likely to be signalized in the future, shall be plus or minus **three** ~~**two**~~ percent (3~~2~~%) for a distance of three hundred (300) feet from the center of the intersection. **Intersections that are roundabout controlled shall be plus or minus four percent (4%) for a distance of two hundred (200) feet measured along the approach to the entering leg crosswalk. Intersections shall maintain a maximum 2% cross slope in all direction inclusive of the crosswalks.**

~~I~~**J**. The minimum spacing of driveways to signalized and unsignalized intersections shall be according to Table 13-10-006-01. The minimum spacing shall be greater as needed to avoid the functional area of an intersection or the influence area of another driveway.

The functional area extends both upstream and downstream from the physical intersection area and includes the longitudinal limits of auxiliary lanes. The influence area associated with a driveway includes (1) the impact length (the distance back from a driveway that cars begin to be affected), (2) the perception-reaction distance, and (3) the car length. Additionally, the impact length represents the distance upstream when the brake lights of through vehicles are activated or there is a lane change due to a turning vehicle. Limited access driveways (i.e., right-in and right-out only) and driveways with right turn deceleration lanes may allow a shorter minimum spacing.

For signalized and unsignalized controlled intersections the m~~**M**~~inimum spacing shall be measured from curb return of the intersecting street to the pavement edge of the driveway. **For roundabout controlled intersections minimum spacing shall be measured from the pavement edge of the driveway to the crosswalk.**

Table 13-10-006-01

Minimum Spacing of Driveways to Intersections
SIGNALIZED

Table 13-10-006-01

Minimum Spacing of Driveways to Intersections	
Posted Speed (mph)	Minimum Spacing to Intersection (ft)
< or =30	230
35	275
40	320
45	365
UNSIGNALIZED	
30	115
35	135
40	155
45	180
ROUNDABOUT	
≤ 30	**50**
35	**50**
40	**75**
45	**75**

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13-10-007: Horizontal Alignment

Section 27. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-007: Horizontal Alignment, Section 13-10-007-0002: Other Design Considerations, to modify 13-10-007-0002.A as follows:

A. Tangents from centerline deflection shall be connected by a curve in accordance with Table 13-10-~~011~~**002**-01.

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13-10-010: Driveways

Section 28. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-010: Driveways, Section 13-10-010-0001: Driveways, to modify 13-10-010-0001.B(1)(a) as follows:

a. The City Engineer shall limit the number, location, and design of access points from adjacent developments to arterials and collectors based on operation and safety considerations **(reference NCHRP Report 659, Guide for the Geometric Design of Driveways)**. Access to major arterials should be limited to major driveways only, while access to minor arterials and major collectors

should be major or combined driveways, and access to minor collectors may be individual but head-out only. The minimum spacing of driveways where practicable shall be in accordance with Table 13-10-010-01

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Section 29. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-010: Driveways, Section 13-10-010-0001: Driveways, to add the following:

K. For all developments which take direct access from a paved City street or alley (including single-family dwellings), the driveways and parking areas required by the zoning code, building codes, fire codes, or other requirements shall at minimum be paved in accordance with Standard Detail 10-09-010. Areas restricted by gates or other approved measures to limit access for emergency use only may be surfaced with alternate materials as approved by the Flagstaff Fire Department and City Engineer. Other portions of commercial or industrial sites may also be required to incorporate additional paved surfaces where excessive track-out onto the public right-of-way would be reasonably expected to occur based on the specific use of the site.

L. All projects incorporating commercial refuse containers shall be designed to allow solid waste collection access in accordance with detail PW-50-001.

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13-10-011: Resource and Slope Design Criteria

Section 30. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-011: Resource and Slope Design Criteria, Section 13-10-011-0001: Resource and Slope Design Criteria, as follows:

A. Tree and shrub resources located in existing or proposed right-of-way or easements granted or to be granted to the City of Flagstaff shall be considered in the civil design. The resources shall be saved and integrated into the design. Prior to the start of construction, resources shall be fenced, as required, so as to protect them during the construction process.

B. Roadway design criteria shall consider existing topography so as to minimize cuts and fills. Except as provided herein respecting maximum slope criteria, roadways shall follow existing topography as best as possible. Slope protection shall be provided pursuant to the City of Flagstaff Stormwater Design Manual (Chapter 10). If retaining walls are warranted, the design shall meet the following criteria:

1. Walls shall blend with the natural features of the setting by the use of native rock or other materials that convey a scale, color, and texture similar to that of traditional rock (split face block and scored and textured concrete are examples).

2. Limit the height of a retaining wall to five (5) feet or less when feasible.

3. Where greater heights are necessary, use a series of terraced or stepped walls with the width of the terrace no less than three (3) feet.

~~**Table 13-10-011-01**~~

~~**Functional Classification/Design Criteria**~~

~~**URBAN**~~							
~~**Functional Classification(*)**~~	~~**Major Arterial**~~	~~**Minor Arterial**~~	~~**Major Collector**~~	~~**Minor Collector**~~	~~**Commercial Local**~~	~~**Residential Local "Wide"**~~	~~**Residential Local**~~
~~**Max. Through Lanes**~~	~~**4**~~	~~**4**~~	~~**4**~~	~~**2**~~	~~**2**~~	~~**2**~~	~~**2**~~
~~**Maximum Average Daily Traffic**~~						~~**1,000**~~	~~**500**~~
~~**On Street Parking**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not striped**~~	~~**Not striped**~~
~~**Bicycle Provision**~~	~~**4.5'**~~	~~**4.5'**~~	~~**4.5'**~~	~~**4.5'**~~	~~**In travel lane**~~	~~**In travel lane**~~	~~**In travel lane**~~
~~**Total A.C. Width**~~	~~**68'**~~	~~**68'**~~	~~****68'/64'**~~	~~**42'**~~	~~**24'**~~	~~**33'**~~	~~**29'**~~
~~**Width (B.C. to B.C.)**~~	~~**72'**~~	~~**72'**~~	~~****72'/68'**~~	~~**46'**~~	~~**28'**~~	~~**37'**~~	~~**33'**~~
~~**Minimum R.O.W. (See Note No. 2)**~~	~~**98'**~~	~~**98'**~~	~~****96'/92'**~~	~~**70'**~~	~~**52'**~~	~~**61'**~~	~~**57'**~~
~~**Through Lane Width**~~	~~**12'**~~	~~**12'**~~	~~**12'>/=40 mph**~~ ~~**11'<40 mph**~~	~~**11'**~~	~~**12'**~~	~~**NA**~~	~~**NA**~~
~~**Auxiliary Lane Widths**~~	~~**11'**~~	~~**11'**~~	~~**11'**~~	~~**11'**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~
~~**Edge Treatments**~~	~~**Vertical C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G ***~~
~~**Min. Sidewalks (See Note No. 3)**~~	~~**6'**~~	~~**6'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~

~~**Table 13-10-011-01**~~

~~**Functional Classification/Design Criteria**~~

~~**URBAN**~~							
~~**Functional Classification(*)**~~	~~**Major Arterial**~~	~~**Minor Arterial**~~	~~**Major Collector**~~	~~**Minor Collector**~~	~~**Commercial Local**~~	~~**Residential Local "Wide"**~~	~~**Residential Local**~~
~~**Min. Parkway (See Note No. 8)**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~	~~**5'**~~
~~**Parking Lane**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not striped**~~	~~**Not striped**~~
~~**Minimum Median Width (See Note No. 7)**~~	~~**15'**~~	~~**15'**~~	~~**15'**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~
~~**Max. A.C. Width @ Signal w/o Median**~~	~~**68'**~~	~~**68'**~~	~~**68'**~~	~~**68'**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~
~~**Max. A.C. Width at Nonsignalized Inters. w/o Median**~~	~~**48'**~~	~~**48'**~~	~~**48'**~~	~~**48'**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~
~~**Corner Cut-Off (See Note No. 4)**~~	~~**25'**~~	~~**25'**~~	~~**20'**~~	~~**15'**~~	~~**15'**~~	~~**15'**~~	~~**15'**~~
~~**Curb Ret. Radius**~~	~~**30'**~~	~~**30'**~~	~~**25' ****~~	~~**20' ****~~	~~**20'**~~	~~**15'**~~	~~**15'**~~
~~**Design Speed**~~	~~**45 MPH**~~	~~**40 MPH**~~	~~**35–40 MPH**~~	~~**30 MPH**~~	~~**25 MPH**~~	~~**20 MPH**~~	~~**20 MPH**~~
~~**Superelevation (See Note No. 5)**~~	~~**4% Max.**~~	~~**4% Max.**~~	~~**4% Max.**~~	~~**None**~~	~~**None**~~	~~**None**~~	~~**None**~~
~~**Min. Curve Radius (See Note No. 5)**~~	~~**900'**~~	~~**667'**~~	~~**667' (40 mph)**~~ ~~**454' (35 mph)**~~	~~**300'**~~	~~**181'**~~	~~**100'**~~	~~**100'**~~

~~**Table 13-10-011-01**~~

~~**Functional Classification/Design Criteria**~~

~~URBAN~~							
~~Functional Classification(*)~~	~~Major Arterial~~	~~Minor Arterial~~	~~Major Collector~~	~~Minor Collector~~	~~Commercial Local~~	~~Residential Local "Wide"~~	~~Residential Local~~
~~Maximum Grade~~	~~6%~~	~~6%~~	~~6%/7%~~	~~8%~~	~~10%~~	~~10%~~	~~10%~~
~~Property Access (See Note No. 6)~~	~~Major D/W Only~~	~~Major D/W Only~~	~~Major or Combined D/W Only~~	~~Individual D/W Head Out~~	~~Individual D/W Head Out~~	~~Individual D/W Back Out~~	~~Individual D/W Back Out~~

~~*** Functional classifications are further defined in Division 13-10-014.**~~

~~**** 1. For travel lanes adjacent to a raised median, increase travel lane width by one (1) foot.**~~

~~**2. For all truck routes, there must be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.**~~

~~***** Rolled curb is permitted on streets in townhome and planned options where lot widths are less than or equal to forty (40) feet. This is limited to those streets within the development that front the houses.**~~

~~**Table 13-10-011-01 (Continued)**~~

~~**Functional Classification/Design Criteria**~~

~~URBAN~~					
~~COMMERCIAL CENTER STREETS~~					
~~Functional Classification (*)~~	~~Major Arterial~~	~~Minor Arterial~~	~~Major Collector~~	~~Minor Collector~~	~~Local~~
~~Max. Through Lanes~~	~~4~~	~~4~~	~~4~~	~~2~~	~~2~~
~~On Street Parking~~	~~6'~~	~~6'~~	~~6'~~	~~6'~~	~~6'~~
~~Bicycle Provision~~	~~5'~~	~~5'~~	~~5'~~	~~5'~~	~~In travel lane~~
~~Total A.C. Width~~	~~81'~~	~~81'~~	~~81'/77'~~	~~55'~~	~~36'~~

~~**Table 13-10-011-01 (Continued)**~~

~~**Functional Classification/Design Criteria**~~

~~**URBAN**~~					
~~**COMMERCIAL CENTER STREETS**~~					
~~**Functional Classification (*)**~~	~~**Major Arterial**~~	~~**Minor Arterial**~~	~~**Major Collector**~~	~~**Minor Collector**~~	~~**Local**~~
~~**Width (B.C. to B.C.)**~~	~~**85'**~~	~~**85'**~~	~~**85'/81'**~~	~~**59'**~~	~~**40'**~~
~~**Minimum R.O.W. (See Note No. 2)**~~	~~**117'**~~	~~**113'**~~	~~**113'/109'**~~	~~**87'**~~	~~**68'**~~
~~**Through Lane Width (**)**~~	~~**12'**~~	~~**12'**~~	~~**12'>/=40mph**~~ ~~**11'<40mph**~~	~~**11'**~~	~~**12'**~~
~~**Auxiliary Lane Widths**~~	~~**11'**~~	~~**11'**~~	~~**11'**~~	~~**11'**~~	~~**11'**~~
~~**Edge Treatment**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~	~~**Vert. C/G**~~
~~**Min. Sidewalks**~~	~~**10'**~~	~~**10'**~~	~~**10'**~~	~~**10'**~~	~~**10'**~~
~~**Furnishing Strip**~~	~~**5'**~~	~~**3'**~~	~~**3'**~~	~~**3'**~~	~~**3'**~~
~~**Offset**~~	~~**1'**~~	~~**1'**~~	~~**1'**~~	~~**1'**~~	~~**1'**~~
~~**Parking Lane**~~	~~**6'**~~	~~**6'**~~	~~**6'**~~	~~**6'**~~	~~**6'**~~
~~**Minimum Median Width (See Note No. 7)**~~	~~**15'=11' lane + 4' median**~~	~~**15'**~~	~~**15'**~~	~~**NA**~~	~~**NA**~~
~~**Max. Number of Lanes at a Signal w/o Median**~~	~~**6**~~	~~**6**~~	~~**6**~~	~~**6**~~	~~**NA**~~
~~**Max. Number of Lanes at a Nonsignalized Intersection w/o Median**~~	~~**4**~~	~~**4**~~	~~**4**~~	~~**4**~~	~~**NA**~~

~~**Table 13-10-011-01 (Continued)**~~

~~**Functional Classification/Design Criteria**~~

~~URBAN~~					
~~COMMERCIAL CENTER STREETS~~					
~~Functional Classification (*)~~	~~Major Arterial~~	~~Minor Arterial~~	~~Major Collector~~	~~Minor Collector~~	~~Local~~
~~Corner Cut-Off (See Note No. 4)~~	~~25'~~	~~25'~~	~~25'~~	~~15'~~	~~15'~~
~~Curb Ret. Radius~~	~~30'~~	~~30'~~	~~20' **~~	~~20' **~~	~~25'~~
~~Design Speed~~	~~45 MPH~~	~~40 MPH~~	~~35--40 MPH~~	~~30 MPH~~	~~25 MPH~~
~~Superelevation (See Note No. 5)~~	~~4% Max.~~	~~4% Max.~~	~~4% Max.~~	~~None~~	~~None~~
~~Min. Curve Radius (See Note No. 5)~~	~~900'~~	~~667'~~	~~667' (40 mph)~~ ~~454' (35 mph)~~	~~300'~~	~~181'~~
~~Maximum Grade~~	~~6%~~	~~6%~~	~~6%/7%~~	~~8%~~	~~10%~~
~~Property Access~~	~~Major D/W Only~~	~~Major D/W Only~~	~~Major or Combined D/W Only~~	~~Individual D/W Head Out~~	~~Individual D/W Back Out~~

~~* Functional classifications are further defined in Division 13-10-014.~~

~~** 1. For travel lanes adjacent to a raised median, increase travel lane width by one (1) foot.~~

~~2. For all truck routes, there must be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.~~

~~**Table 13-10-011-01 (Continued)**~~

~~**Functional Classification/Design Criteria**~~

~~**RURAL**~~						
~~**Functional Classification (*)**~~	~~**Major Arterial (See Note No. 3)**~~	~~**Minor Arterial (See Note No. 3)**~~	~~**Major Collector (See Note No. 1)**~~	~~**Minor Collector (See Note No. 1)**~~	~~**Local**~~	~~**Local Narrow**~~
~~**Max. Through Lanes**~~	~~**2**~~	~~**2**~~	~~**2**~~	~~**2**~~	~~**2**~~	~~**2**~~
~~**On Street Parking**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not striped**~~	~~**Not striped**~~
~~**Bicycle Provision**~~	~~**4'**~~	~~**4'**~~	~~**4'**~~	~~**4'**~~	~~**In travel lane**~~	~~**In travel lane**~~
~~**Total A.C. Width**~~	~~**32'**~~	~~**32'**~~	~~**32'**~~	~~**30'**~~	~~**26'**~~	~~**20'**~~
~~**Minimum R.O.W. (See Note No. 2)**~~	~~**60'**~~	~~**60'**~~	~~**60'**~~	~~**60'**~~	~~**50'**~~	~~**44'**~~
~~**Through Lane Width (**)**~~	~~**12'**~~	~~**12'**~~	~~**12'**~~	~~**12'**~~	~~**13'**~~	~~**10'**~~
~~**Edge Treatment**~~	~~**6 Foot Compacted Shoulders and Drainage Swales/Curb and Gutter Is Optional (See Note No. 9)**~~					
~~**Sidewalks**~~	~~**No Sidewalks or Parkway Section**~~					
~~**Parking Lane**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**Not allowed**~~	~~**N/A**~~	~~**N/A**~~
~~**Corner Cut-Off**~~	~~**30'**~~	~~**30'**~~	~~**20'**~~	~~**20'**~~	~~**20'**~~	~~**20'**~~
~~**Fillet Radius**~~	~~**30'**~~	~~**30'**~~	~~**20' ****~~	~~**20' ****~~	~~**20'**~~	~~**20'**~~
~~**Design Speed**~~	~~**45 MPH**~~	~~**40 MPH**~~	~~**35-40 MPH**~~	~~**30 MPH**~~	~~**20 MPH**~~	~~**20 MPH**~~
~~**Superelevation (See Note No. 5)**~~	~~**4% Max.**~~	~~**4% Max.**~~	~~**4% Max.**~~	~~**None**~~	~~**None**~~	~~**None**~~

~~**Table 13-10-011-01 (Continued)**~~

~~**Functional Classification/Design Criteria**~~

~~**RURAL**~~						
~~**Functional Classification (*)**~~	~~**Major Arterial (See Note No. 3)**~~	~~**Minor Arterial (See Note No. 3)**~~	~~**Major Collector (See Note No. 1)**~~	~~**Minor Collector (See Note No. 1)**~~	~~**Local**~~	~~**Local Narrow**~~
~~**Min. Curve Radius (See Note No. 5)**~~	~~**900'**~~	~~**667'**~~	~~**667' (40 mph)**~~ ~~**454' (35 mph)**~~	~~**300'**~~	~~**100'**~~	~~**100'**~~
~~**Maximum Grade**~~	~~**6%**~~	~~**6%**~~	~~**7%**~~	~~**8%**~~	~~**10%**~~	~~**10%**~~
~~**Property Access**~~	~~**Major D/W Only**~~	~~**Major or Combined D/W Only**~~	~~**Major or Combined D/W**~~	~~**Individual D/W Head Out**~~	~~**Individual Back Out**~~	~~**Individual Back Out**~~
~~**Min. D/W to Intersection**~~	~~**(See Note No. 10)**~~	~~**(See Note No. 10)**~~	~~**(See Note No. 10)**~~	~~**(See Note No. 10)**~~	~~**10'**~~	~~**10'**~~

~~*** Functional classifications are further defined in Division 13-10-014.**~~

~~**** 1. For travel lanes adjacent to a raised median, increase travel lane width by one (1) foot.**~~

~~**2. For all truck routes, there must be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.**~~

~~**NOTES:**~~

~~**1. Rural residential local streets are for local access in lower density residential areas only. They provide a less intrusive design option for streets, which will experience low traffic volumes and no on-street parking. Critical to their successful operation is a site design that eliminates virtually all demand for on-street parking by providing large setbacks, long driveways, and many convenient on-site parking spaces for each dwelling.**~~

~~**The following minimum development criteria must be met for the rural residential local streets:**~~

~~**Cluster and Single-Family Detached Development – The rural residential local street shall be used where the minimum lot size is twenty-five thousand (25,000) square feet. The rural residential local "narrow" street shall be used where the minimum lot size is one (1) acre.**~~

~~**2. Additional right-of-way and/or easements may be required to accommodate turn lanes, traffic signals at intersections, drainage features, et cetera.**~~

~~3. Sidewalks wider than five (5) feet may be required if high volumes of pedestrian traffic are expected, or in order to match existing adjacent sidewalks and master development plans.~~

~~4. The corner cut-off is normally a straight diagonal right-of-way line. A circular arc of this radius may be used if approved by the City Engineer.~~

~~At the intersection of two (2) streets of different classifications, the corner cut-off dimension and the curb return or fillet radius of the higher classification street shall be used.~~

~~5. For arterial and major collector streets, the relationship between super-elevation rate, runoff, and curve radius shall be determined from AASHTO tables for e-max equals four percent (4.0%). For local streets, the minimum delta angle (D) must be greater than thirty (30) degrees. Minimum curve radii in the table are based on no super-elevation.~~

~~6. Pavement edge tapers shall be designed in accordance with City of Flagstaff Detail No. 10-10-031.~~

~~7. Medians shall be required on all arterials and major collectors and as outlined in Table 13-10-011-01, or as required by the City Engineer.~~

~~8. Where new sidewalk is required in an existing development, the City Engineer may waive the requirement of a parkway if it is not practical to construct.~~

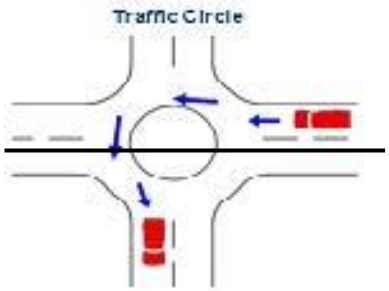
~~9. Where two (2) local residential "narrow" streets do not intersect at a right angle, the radius of curb returns on the acute angles shall be twenty (20) feet.~~

~~10. See Section 13-10-006-0001 for location of driveways adjacent to intersections.~~

~~11. For design criteria not addressed in this table, refer to AASHTO.~~

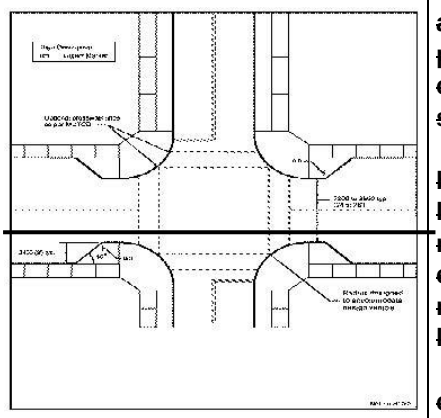
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
~~Neighborhood Traffic Circle~~	~~Raised circular islands placed in intersections, around which traffic circulates. Typically, min. 14' diameter and includes 2-foot wide mountable truck apron and landscaping~~		~~a. Effective moderating speed~~ ~~b. Improves safety~~ ~~c. Located at intersections, the ability to calm two streets~~	~~a. Difficult for large trucks to circumnavigate~~ ~~b. Designed such that the travel lane does not encroach upon crosswalks~~

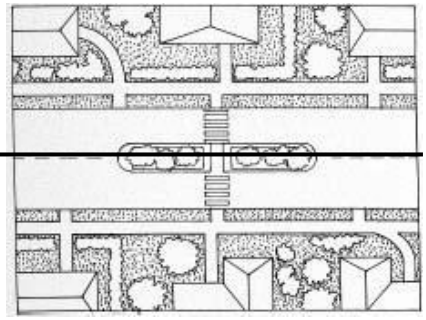
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
			~~d. Fixes grid that is adjacent~~ ~~e. Aesthetic landscape opportunity~~	~~c. May eliminate on-street parking~~ ~~d. Maintenance~~ ~~e. Larger trucks may have to violate lane to navigate~~
~~Roundabout~~ ~~a. Local to collector~~ ~~b. Local to arterial~~ ~~c. Permitted under special circumstances~~	~~Larger than traffic circles and typically extends a minimum of 28' from center with 2' truck apron. The inscribed diameter should be 88' and 200'. Circulating roadway has a width of 14' to 19'~~		~~a. Moderates traffic speeds on arterials~~ ~~b. Enhanced safety as compared to signalization~~ ~~c. Less operating expenses as compared to signalization~~	~~a. May be difficult to navigate with large trucks~~ ~~b. Designed such that the travel lanes do not encroach into crosswalks~~ ~~c. Eliminates some on-street parking~~
~~Curb Extension~~ ~~a. Swells~~ ~~b. Elephant ears~~ ~~c. Located at intersections only~~	~~Comprises an angled narrowing of the roadway and widening of the sidewalk~~		~~a. Improves pedestrian circulation and space~~ ~~b. Through and left-turn movements are easily negotiable by large vehicles~~ ~~c. Creates protected on-street parking bays~~	~~a. Effectiveness is limited by the absence of vertical or horizontal deflection~~ ~~b. May require the elimination of some on-street parking near the intersection~~ ~~c. May require slow right-turning~~

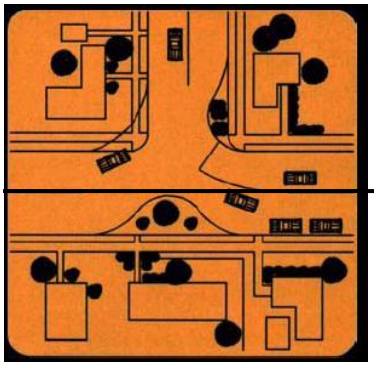
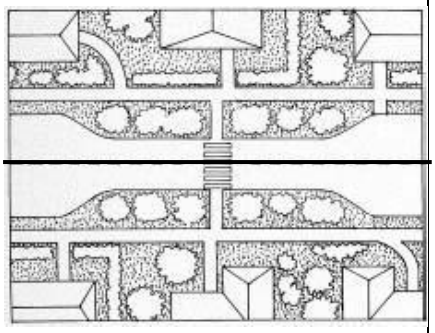
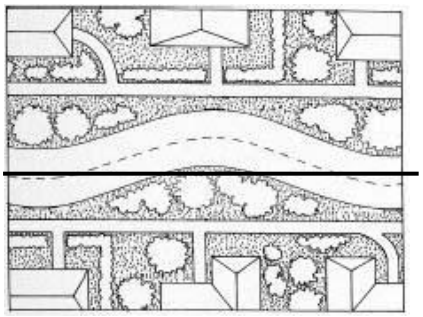
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
			~~d. Reduces speeds, especially for right-turning vehicles~~	~~emergency vehicles~~ ~~d. May require bicyclists to briefly merge with vehicular traffic~~ ~~e. May create pedestrian conflict~~
~~Center Island Narrowing~~	~~A raised island located along the centerline of a street that narrows the travel lanes at that location. A min. of 6' x 20' and landscaped with pedestrian cut-through~~		~~a. Increases pedestrian safety~~ ~~b. Reduces traffic volume~~	~~a. Speed reduction effect is limited by absence of any vertical and horizontal deflection~~ ~~b. Eliminates some on-street parking~~ ~~c. 300' to 500' spacing between center islands for smooth speeds~~

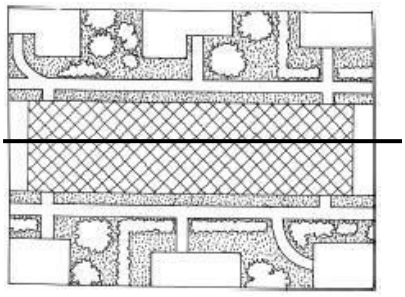
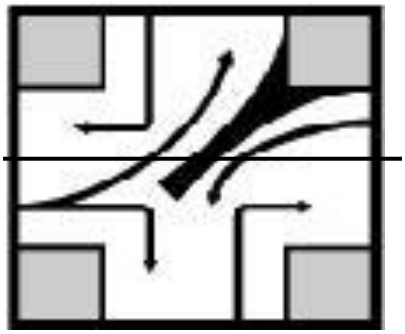
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
~~Realigned Intersection~~	~~Changes in alignment that convert T-intersections with straight approaches into curving streets that meet at right-angles~~		~~a. Effective at reducing speeds and improving safety at T-intersections that have been ignored by motorists~~ ~~b. Eliminates unnecessary pavement~~	~~a. Curb realignment could be costly~~ ~~b. May require additional right-of-way~~
~~Choker~~	~~Midblock curb extensions that narrow the street by expanding the sidewalk or adding a planting strip and often are installed at midblock crossings~~		~~a. Easily negotiated by large vehicles~~ ~~b. Reduces speed and volume~~	~~a. Effect upon speed is limited by the presence of vertical and horizontal deflection~~ ~~b. Bicycles briefly merge with traffic~~ ~~c. Eliminates some on-street parking~~
~~Chicane~~	~~Literal shifts that alternate on both sides of the street creating a S-shaped path of travel~~		~~a. Reduces speed through horizontal deflection~~ ~~b. Larger vehicles can easily negotiate~~	~~a. Designed to prevent drivers from varying from lane~~ ~~b. Curb alignment and landscaping could be costly~~ ~~c. Drainage a consideration~~

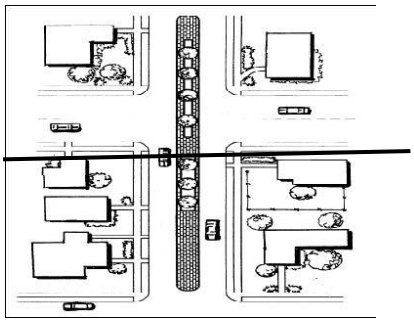
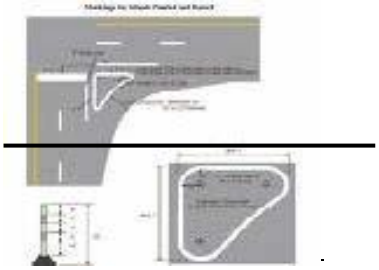
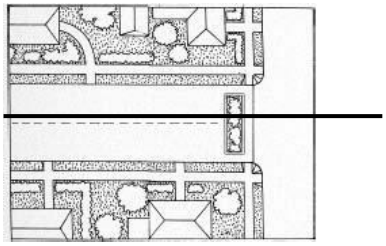
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
				~~d. May eliminate some on-street parking~~ ~~e. Snow plowing may be difficult to maneuver~~
~~Textured Pavement~~	~~A surface material on the roadway (such as stamped asphalt or concrete) which is installed to produce small, constant changes in vertical alignment~~		~~a. Reduces speed over an extended length~~ ~~b. Located at intersection, can reduce speeds on two streets~~	~~a. Generally expensive due to material~~ ~~b. Cross-walk application may cause difficulties for those with disabilities and cyclists to traverse~~ ~~c. Less effective~~
~~Truncated Diagonal Diverter~~	~~A diagonal diverter with one end open to allow for additional turning movements~~		~~a. Discourages commuter traffic by forcing turns~~	~~a. Reduces local access~~ ~~b. Displaces traffic to other streets~~ ~~c. Costs~~
~~One-Way, Two-Way~~	~~Curb bulge or center island narrows 2-lane, forcing traffic for each direction to take turns~~		~~a. Limited, rarely used~~	~~a. Limited, rarely used~~

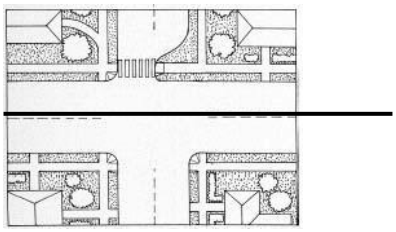
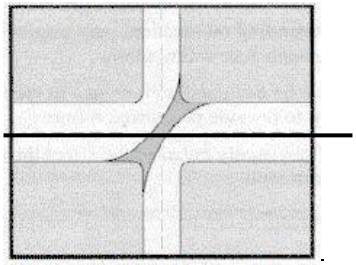
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
~~**Median Barriers (Applied at intersections in special circumstances)**~~	~~**Intersection island blocking movement of a through street**~~		~~**a. Improves safety at an intersection of a local street and a major street by prohibiting dangerous turning movements**~~ ~~**b. Reduces traffic volumes on a cut-through route that intersects a major street**~~	~~**a. Requires available street width on the major street**~~ ~~**b. Limits turns to and from the side street for local residents and emergency services**~~ ~~**c. Reduces access to driveways on major arterials**~~
~~**Pavement Markings Note: Applies only to retrofit of existing streets**~~	~~**Painted striping or channelization to guide traffic**~~		~~**a. Modestly affects speed**~~	~~**a. Extreme unacceptable aesthetic**~~
~~**Full Closures Note: Applies only to retrofit of existing streets**~~	~~**Full closures divert traffic off the street, creating pedestrian and bicycle friendly areas**~~		~~**a. Maintains pedestrian and bicycle access**~~ ~~**b. Effective in reducing traffic volume**~~	~~**a. Causes circuitous routes for local residents and emergency service vehicles**~~ ~~**b. May be expensive**~~ ~~**c. May limit access to businesses**~~

~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**Traffic Calming Design Features for Local Residential Streets**~~

~~Design Option~~	~~Description~~	~~Diagram~~	~~Advantages~~	~~Disadvantages~~
				~~d. May increase volumes in remaining routes~~
~~Half Closures Note: Applies only to retrofit of existing streets~~	~~Similar to full closures, are barricades located in the street and constructed of landscaped walls, gates, side-bollards, or other obstructions~~		~~a. Maintains pedestrian and bicycle access~~ ~~b. Effective in reducing traffic volume~~	~~a. Causes circuitous routes for local residents and emergency service vehicles~~ ~~b. May limit access to businesses~~ ~~c. Depending on the design, drivers may be able to circumvent the barrier~~
~~Diagonal Diverters Note: Applies only to retrofit of existing streets~~	~~A barrier placed diagonally across an intersection disconnecting the legs of the intersection~~		~~a. Does not require a closure per se, only a redirection of existing streets~~ ~~b. Able to maintain full pedestrian and bicycle access~~ ~~c. Reduces traffic volumes~~	~~a. Cause circuitous routes for local residents and emergency service vehicles~~ ~~b. May be expensive~~ ~~c. May require reconstruction of corner curbs~~

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13-12-003: Lighting Layout Requirements

Section 31. Amend Title 13 Engineering Design Standards, Chapter 13-12: Street Lighting, Division 13-12-003: Lighting Layout Requirements, Section 13-12-003-0003: Spacing of Streetlights, as follows:

In addition to intersection locations, streetlights shall be spaced along streets in accordance with the following table:

Table 13-12-003-01

Streetlight Spacing

FUNCTIONAL CLASSIFICATION	NO. LANES AT BUILDOUT	LAND USE AT BUILDOUT	TYPE	IESNA DISTRIBUTION	OUTPUT (LUMENs) NOTE 4	SPACING (FEET)	SINGLE- OR DOUBLE-SIDED
MAJOR ARTERIAL	2/3	RURAL	NBA	2	6000	250	SINGLE
	2/3	SUBURBAN/URBAN	NBA	2	6000	200	DOUBLE
	4/5	RURAL	NBA	2	6000	250	DOUBLE
	4/5	SUBURBAN/URBAN	NBA	2	6000	200	DOUBLE
MINOR ARTERIAL	2/3	RURAL	NBA	2	6000	250	SINGLE
	2/3	SUBURBAN/URBAN	NBA	2	6000	200	SINGLE
	4/5	RURAL	NBA	2	6000	250	DOUBLE
	4/5	SUBURBAN/URBAN	NBA	2	6000	200	DOUBLE
MAJOR COLLECTOR	2/3	RURAL	NBA	2	6000	250	SINGLE
	2/3	SUBURBAN/URBAN	NBA	2	6000	200	SINGLE
	4/5	RURAL	NBA	2	6000	250	DOUBLE
	4/5	SUBURBAN/URBAN	NBA	2	6000	200	DOUBLE
MINOR COLLECTOR	2	RURAL/SUBURBAN	NBA	2	2000	250	SINGLE
	2	URBAN	NBA	2	4000	250	SINGLE
	3	SUBURBAN/URBAN	NBA	2	4000	250	SINGLE
LOCAL (ALL)[1]	2	URBAN	NBA	~~1~~2	2000	300	SINGLE
LOCAL CUL-DE-SAC	2	URBAN	NBA	3	2000	N/A	SINGLE

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13-12-005: Street Light Equipment

Section 32. Amend Title 13 Engineering Design Standards, Chapter 13-12: Street Lighting, Division 13-12-005: Street Light Equipment, Section 13-12-005-0001: Luminaire, to modify Table 13-12-005-01 as follows:

Table 13-12-005-01

Luminaire Weight and EPA Criteria

Luminaire Output (Maintained)	Maximum Weight Including Ballast, Slip-Fitter, Lamp and Photo Cell (Pounds)	Maximum EPA (Square Feet)
2000 Lumens	30	~~1.4~~1.5
4000 Lumens	35	~~1.6~~1.5
6000 Lumens	50	~~2.0~~1.5
9000 Lumens	50	~~2.0~~1.5

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Section 33. Amend Title 13 Engineering Design Standards, Chapter 13-12: Street Lighting, Division 13-12-005: Street Light Equipment, Section 13-12-005-0002: Streetlight Support Structures, as follows:

Streetlight support structures consist of the base, pole, and mast arms. The standards of construction for streetlight equipment shall follow those of this chapter and those found on City of Flagstaff Standard Detail No. 12-05-010 pages one (1) through three (3). The streetlight pole, mast arm, and luminaire assembly shall be in accordance with AASHTO **"**Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals**"** (**6th edition, with 2015 Interim Revisions**~~**2001 Design Criteria**~~), to withstand a wind speed of ninety (90) miles per hour.

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13-14: Bicycle Facilities

Section 34. Amend Title 13 Engineering Design Standards, Chapter 13-14: Bicycle Facilities, as follows:

CHAPTER 13-14:

~~BICYCLE FACILITIES~~ FUTS TRAILS, PEDESTRIAN AND BICYCLE FACILITIES

Divisions:
13-14-001 **Pedestrian and** Bicycle Facilities
13-14-002 Flagstaff Urban Trails System (FUTS)

Division 13-14-001

Pedestrian and Bicycle Facilities

Sections:

13-14-001-0001 **Design Standards** ~~**Bicycle Facilities**~~

13-14-001-0001 **Design Standards** ~~**Bicycle Facilities**~~

Bicycle facilities ~~**and multi-use trails**~~ shall be designed in accordance with ~~**the City of Flagstaff and Coconino County's "Pedestrian and Bicycle Design Guide."**~~ **the most current AASHTO "Guide for the Development of Bicycle Facilities."**

Division 13-14-002

Flagstaff Urban Trails System (FUTS)

Sections:

13-14-002-0001 Design Standards

FUTS trails shall be designed in accordance with the most current AASHTO "Guide for the Development of Bicycle Facilities".

13-14-002-0002 Trail Dimensions

A. Trail width. The minimum treadway width for a standard FUTS trail is 10 feet.

B. Shoulders. 2-foot shoulders are required along both sides of all FUTS trails for the entire length of the trail

C. Parkways. Where FUTS trails are adjacent to streets, a minimum parkway of 5 feet in width is required between the back-of-curb or street edge and the trail treadway. The trail shoulder may be located within the 5-foot parkway.

D. Horizontal clearance. A minimum of 3 feet is required between the trail treadway and any vertical features or obstructions.

E. Vertical clearance. Minimum vertical clearance from the trail surface is 10 feet across the width of the trail treadway.

F. Grades. Running grades shall not exceed 8 percent without written approval from the City Engineer and upon documented evidence that flatter grades are not feasible or desirable in the present circumstance. When FUTS trails are aligned along public streets and replace the public sidewalk, the grade of the trail can match the grade of the adjacent street, even when the grade exceeds 8 percent.

G. Cross slope. The cross slope of the trail treadway and shoulder is 1 percent minimum and 2 percent maximum.

H. Design speeds. The design speed for a paved FUTS trail is 20 mph, and the design speed for an aggregate FUTS trail is 15 mph.

I. Horizontal curves. Minimum inside radii for horizontal curves are provided in the current AASHTO "Guide for the Development of Bicycle Facilities."

J. Vertical curves. Vertical curves are required where there is a difference in grade of more than 1 percent between 2 adjacent segments of trail at crests, sags, and grade breaks. The minimum length for vertical curves is provided in the current AASHTO "Guide for the Development of Bicycle Facilities."

13-14-002-0003 Structural Requirements

A. Paved trails

1. PCC (Portland Concrete Cement) is the only allowable material for a new paved FUTS trail.

2. Where a FUTS trail is constructed adjacent to a public street in lieu of the public sidewalk, the trail shall be constructed of PCC.

3. Trail sections with grades of 10 percent or greater for more than 50 feet shall be constructed of PCC.

4. The minimum structural section for a paved trail is 6 inches of PCC on 3 inches of ABC (Aggregate Base Course).

5. Aggregate base course shall be compacted to 95 percent per MAG Section 301.3.

6. Trail subgrade shall be scarified to a minimum depth of 8 inches and compacted to 95 percent per MAG Section 301.3.

7. The base course and trail subgrade shall extend a minimum of 1 foot beyond the edge of the trail treadway.

8. Where a trail segment across a commercial driveway is constructed of PCC, the concrete shall be 9 inches thick. A trail segment across a commercial driveway shall be constructed of PCC if

a. The trail is adjacent to the edge of the driveway pan,

b. The driveway is constructed of PCC, or

c. The trail is paved and the driveway is unpaved.

B. Aggregate trails

1. The minimum structural section for aggregate trails shall be 4 inches of aggregate surface course material over 6 inches of dirty cinders.

2. Aggregate surface course material shall have a plasticity index of 5-12, and the gradation shall be as follows:

Sieve size (square openings)	Percent by weight passing sieve
1/4"	100
No. 4	90 - 100
No. 8	65 - 95
No.10	60 - 80
No. 16	45 - 75
No. 30	35 - 60
No. 40	30 - 40
No. 50	25 - 40
No. 100	20 - 30
No. 200	12 - 23

3. Aggregate surface course shall be compacted to 95 percent.

4. Dirty cinders for the base course shall be compacted to 95 percent per MAG Section 301.3.

5. Dirty cinders shall comply with MAG Section 702 and City of Flagstaff Modification 13-21-001-0702.2.2, except that the Los Angeles Abrasion requirement is waived.

6. The base course and trail subgrade shall extend a minimum of 1 foot beyond the edge of the trail treadway.

7. Trail subgrade shall be scarified to a minimum depth of 8 inches and compacted to 95 percent per MAG Section 301.3.

8. A nonwoven geotextile fabric is required between the subgrade and the base course when indicated by geotechnical investigation.

9. Should unsuitable material be encountered at subgrade elevation, the unsuitable material shall be removed and replaced with suitable fill material in accordance with MAG Section 210 and MAG Section 211.

10. Aggregate surface course material shall be a color compatible with the natural surroundings and acceptable to the City of Flagstaff. White, light grey or other visually incompatible-colored aggregates will not be accepted. Sample shall be provided for approval prior to placement.

13-14-002-0004 Expansion and Contraction Joints

A. Expansion joints.

1. The maximum distance between expansion joints is 50 feet.

2. Expansion material shall be 1/2-inch thick, preformed, bituminous expansion joint board, ASTM D-1751, MAG Section 729.

3. An expansion joint is required at all cold joints.

4. Expansion joint requires a modified PVC joint seal (e.g. Greenstreak G-Seal or approved equal) be placed over the expansion material. Submit manufacturer's specification cut sheet for prior approval by the City. The joint seal shall have a minimum of two fins on legs that embed into the adjacent concrete, for the purpose of anchoring, creating a water stop, and providing a smooth travel surface. The top surface of the joint seal shall be 1/16-inch minimum to 1/4-inch maximum below the finished surface. Joints shall be installed perpendicular to the trail.

5. Expansion joints require 24-inch-long x 1/2-inch diameter smooth dowels at 28 inches on center, beginning 4 inches in from the outside edges of the trail.

B. Contraction joints.

1. Contraction joints shall be sawcut rather than troweled.

2. Contraction joint spacing shall be equal to the width of the trail, not to exceed 12 feet.

3. The maximum width of a control joint is 1/8-inch. Sawcut depth shall be 1/3 the depth of the concrete thickness.

13-14-002-0005 Shoulders

Trail shoulders shall be graded and have a smooth surface. Rip-rap, rocks, cinders, loose gravel, landscaping, and other materials that could cause bicyclists to lose control, fall, or crash shall not be used on the shoulder. Shoulders shall be seeded along with other disturbed areas.

13-14-002-0006 Street/Sidewalk Transitions

A. Where a FUTS trail intersects with another FUTS trail, a radius of 10 feet shall be provided. Where a FUTS trail intersects a sidewalk, a radius of 5 feet shall be used.

B. For aggregate trails, the first 20 linear feet of the trail after an intersection with a sidewalk, paved trail, or road shall be constructed of PCC.

C. Vehicle crossings of trails shall meet City of Flagstaff driveway standards (include reference).

D. A sidewalk ramp shall be provided whenever a trail crosses or ends at a street or driveway with a curbed edge. Sidewalk ramps shall meet City of Flagstaff Engineering Standards, except that the width of the ramp pan shall be a minimum of 10 feet or match the width of the trail treadway.

13-14-002-0007 FUTS Fencing

FUTS fencing shall be located in accordance with the most current AASHTO "Guide for the Development of Bicycle Facilities".

13-14-003-0008 Pedestrian and Bicycle Tunnels and Underpasses

A. The minimum inside width of a tunnel or underpass is determined by its length according to the following table, or by the total width of the trail treadway plus two-foot shoulders on each side, whichever is greater.

Length	Min. width
Up to 60 feet	16 feet
61 to 120 feet	18 feet
More than 120 feet	20 feet

B. The minimum clearance from the floor of the tunnel or underpass to the ceiling is 10 feet across the entire width of the trail treadway.

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13-15: Work in Public Rights-of-Way and Easements

Section 35. Delete Title 13 Engineering Design Standards, Chapter 13-15: Work in Public Rights-of-Way and Easements:

~~**CHAPTER 13-15**~~
~~**WORK IN PUBLIC RIGHTS-OF-WAY AND EASEMENTS**~~

~~**Divisions:**~~

~~**13-15-001 Permit Requirements**~~

~~**13-15-002 Project Clean-Up Requirements**~~

~~**Division 13-15-001**~~

~~**Permit Requirements**~~

~~**Sections:**~~

~~**13-15-001-0001 Permit Requirements**~~

~~**13-15-001-0001 Permit Requirements**~~

~~**A. This permit is for the time period indicated. Should the permittee be unable to complete the work in the specified time (adverse weather conditions excepted), the permittee shall make application to the City of Flagstaff for a time extension and pay to the City an amount equal to fifty percent (50%) of the original permit fees.**~~

~~**B. All work permitted shall be done at no expense to the City of Flagstaff, and the permittee shall indemnify, defend, and hold harmless the City of Flagstaff from and against any and all liability or responsibility for any accident, loss, damage to persons or property, or expenses (including reasonable attorney fees and court costs), arising from and/or occurring as a result of any death, bodily injury, personal injury, or property damage of any kind or description that may directly or indirectly relate to or stem from any work or activities under the terms of this permit. In essence, permittee shall assume all said liabilities and/or responsibilities and protect and/or restore all property both public and private damaged as a result of the activities of the permittee, its agents, employees, or contractor. Prior to the issuance of a permit, the permittee shall provide the City of Flagstaff with one (1) copy of a certificate of commercial general liability insurance naming the City as an additional**~~

~~insured. The minimum limits of coverage shall be those currently required by the City of Flagstaff Risk Management Section. This insurance shall in no way limit the extent or enforcement of the above listed hold harmless agreement.~~

~~C. The permittee shall adhere to all Federal, State, and local laws, ordinances, and regulations.~~

~~D. All permitted work shall be performed in accordance with the requirements of the City Engineer, the Uniform Standard Specifications for Public Works Constructions (MAG Specifications), City of Flagstaff Addendum to MAG, Flagstaff City Code, Title 13, Engineering Design Standards and Specifications for New Infrastructure, Uniform Standard Details for Public Works Construction (MAG Details), and the City of Flagstaff Stormwater Design Manual; and the approved plans, construction schedules, and traffic control plans submitted with the application for permit.~~

~~E. Where a proposed underground utility is installed under an asphaltic or Portland cement concrete surfaced roadway, the installation shall be made by boring or jacking beneath the road surface. Pavement cuts are permitted only when:~~

~~1. Physical constraints such as bedrock or indeterminable infrastructure prevent boring or jacking.~~

~~2. An unsuccessful attempt has been made to bore or jack the installation.~~

~~3. Connection to an existing utility located beneath the paved portion of the roadway is necessary.~~

~~4. Right-of-way limits do not accommodate a boring operation.~~

~~5. Boring will result in an inordinate cost when compared to an open cut (two (2) times the cost as demonstrated by an engineer's estimate or actual construction bid).~~

~~6. The surface of the roadway is in a badly deteriorated condition such that a pavement cut will not detract from the integrity of the surface, as determined by the City Engineer.~~

~~F. When trenching is necessary and permanent, pavement patch is not practicable, temporary trench pavement shall consist of UPMTM (Unique Paving Material), HPTM United Metro or approved equal. In lieu of placing UPM, the permittee may elect to completely backfill the trench to within two (2) inches of the finish trench grade with non-shrink slurry backfill conforming to Section 13-09-006-0003. The final two (2) inches shall be MAG Class C concrete.~~

~~G. Permittees shall submit to the City for approval:~~

~~1. Two (2) copies of the construction plans. The City Engineer may waive this requirement for minor work, in which case the applicant shall submit two (2) copies of a sketch that depicts in suitable detail the proposed work.~~

~~2. For work in public rights-of-way that requires the restriction of traffic or closure of public streets, the permittee shall submit two (2) copies of a traffic control plan conforming to the requirements of the MUTCD. The City Engineer may suspend this requirement for minor work.~~

~~H. Streets or alleys shall not be closed without written authorization of the City Engineer.~~

~~I. Should blasting be required, an additional permit shall be obtained from the City of Flagstaff Fire Department.~~

~~J. The permittee shall notify the City of Flagstaff Engineering Section, (928) 779-7650, on the working day immediately preceding the date work will commence, or recommence after a stoppage.~~

~~K. The permittee shall fully conform to the requirements of A.R.S. Section 40-360.21 et seq. (Blue Stake requirements, call 1-800-STAKE-IT).~~

~~L. The permittee shall fully conform to the requirements of A.R.S. Section 40-360.21, restrictions for working near or over power lines.~~

~~M. The permittee shall be fully responsible for all work performed under this permit, including, but not limited to, workmanship and worksite clean-up as specified in Division 13-15-002.~~

~~N. All work permitted herein shall be guaranteed against all defects in material and workmanship for one (1) year from the date it is accepted by the City Engineer.~~

~~O. Upon acceptance by the City Engineer, all public roadway drainage, water, and sewer facilities shall become and remain the property of the City of Flagstaff.~~

~~P. The permittee may be required to perform special requirements as determined by the City Engineer.~~

~~Division 13-15-002~~

~~Project Clean-Up Requirements~~

~~Sections:~~

~~13-15-002-0001 Project Clean-Up Requirements~~

~~A. All contractors working within the City of Flagstaff, both on public property or private property, shall perform their work in such a way as to minimize the dust, dirt, mud, trash and other debris that leaves, by any means, the construction area. This may include necessary watering (the use of City reclaimed wastewater is encouraged and it is required on all major construction activity in accordance with Section 7-03-001-0015, Cross Connection Control), a dust palliative, silt fencing, best management practices, or whatever else that may be necessary to protect private and public property from undue inconvenience or hazards.~~

~~B. Any public or private property that is damaged, soiled, muddied, or otherwise marred shall be restored and returned to its original condition by the contractor, developer or property owner. This~~

~~**work may include repairs to street pavement, removal of mud and debris, street sweeping, watering (the use of City reclaimed wastewater is encouraged), and other work as necessary to restore the public property to its previous condition. The restoration of private property shall include sweeping, debris removal, and other clean-up or repairs needed to restore the private property to its original condition.**~~

~~**C. When, in the opinion of the City Engineer, Street Superintendent, or Chief Building Official construction activity results in undue inconvenience or hazards to the public, the City Official may give a written order instructing the contractor to do any of the following:**~~

~~**1. Change the work methods causing the damage or hazard within a specified time frame.**~~

~~**2. Perform the necessary clean-up work or repairs to remove the damage or hazard.**~~

~~**3. Cease immediately the construction activity causing the damage or hazard.**~~

~~**D. The contractor or property owner, if no contractor is on the project, is responsible for any needed clean-up resulting from the construction activity on the property owner's project. This responsibility shall include damage resulting from vehicles or machinery of the subcontractor and materials suppliers.**~~

~~**E. Should the contractor or property owner not perform the needed repair or clean-up within twenty-four (24) hours of written order, the City may arrange for the needed clean-up or repairs to be performed. The contractor or property owner, as the case may be, shall pay the cost of the clean-up or repairs to the City prior to the acceptance of the public improvements or occupancy of on-site buildings. Any unpaid charges may be collected from any sureties for the project on deposit with the City.**~~

~~**F. Contractor shall not store material within the rights-of-way of public streets without the written permission of the City Engineer or his authorized representative. When allowed, storage shall be performed to minimize inconvenience and hazard to the public. A traffic control plan shall be submitted by the contractor for review by the City Traffic Engineer. The Traffic Control Plan shall show all devices necessary to conform with MAG Part 400. Under normal conditions, storage of materials will be allowed only on streets closed to public travel.**~~

~~**G. The City Engineer may direct that the contractor access construction sites by routes causing the least potential inconvenience and damage to public and private property. This direction may include the use of alternate routes for construction vehicles, workers access to the construction site and delivery materials.**~~

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13-16-002: Signal Design Elements

Section 36. Amend Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, Pavement Markings, and Fiber-Optic Conduit, Division 13-16-002: Signal Design Elements, Section 13-16-002-0002: Intersection Design Requirements, as follows:

E. Signals **shall** ~~**should**~~ be designed with an "8-pole" design; that is, two (2) signal poles on each corner of the intersecting streets.

1. The minimum distance between the two (2) poles shall be ten (10) feet, in accordance with ADA and MUTCD requirements for separation of pedestrian detectors for different phases.

2. Locations of all pedestrian detectors shall comply with MUTCD requirements.

3. Additional pedestrian push button poles **shall** ~~**may**~~ be used when needed to meet MUTCD spacing and location requirements.

G. **Signal cabinets, traffic signal poles, pedestrian push button poles, and street light p**~~**P**~~oles shall be located **outside of** ~~**so as not to impede**~~ **pedestrian and bicycle ways, including** sidewalk**s, bikeways and bike lanes, FUTS trails, accessible routes,** or **curb** ramp**s** ~~**traffic.**~~**, so that the full width of these facilities is maintained and not narrowed. Refer to City of Flagstaff Engineering Detail 16-02-010 for pedestrian push button locations.**

H. All poles having a pedestrian push button station shall be located adjacent to a sidewalk or sidewalk ramp, or shall have an access pad installed to meet the requirements of the Americans with Disabilities Act. Reach distance to push button stations shall not exceed ten (10) inches.

~~**H**~~**I.** Each pole foundation shall be provided with a one-half (1/2) inch PVC drain to allow water to drain from the pole adjusting-nut sump.

~~**I**~~**J**. Overhead left turn signal heads shall be **12" - 4 section heads** ~~**ADOT Type G**~~, unless protected only phasing, when **12" - 3 section heads** ~~**Type R**~~ shall be utilized.

~~**J**~~**K**. Side of pole mounted left or right turn signal heads shall be **12" - 4 section heads** ~~**ADOT Type G**~~, each installed on an individual Type V mount. **Shall be mounted as low as possible, adhering to MUTCD visibility and clearance standards and guidance.**

~~**K**~~**L**. Pole top mounted right or left turn signal heads shall be **12" - 4 section heads** ~~**ADOT Type G**~~. These may be mounted on a combination mount with one (1) other signal head.

M. All signal heads shall include a 1" fluorescent yellow prismatic retroreflective border around the entire perimeter of the backplate.

~~**L**~~**N**. Mast arm mounted signal heads shall be centered over **each** traffic lane~~**s**~~.

~~**M**~~**O**. Seven (7) conductor IMSA cable shall be run to each left turn signal head. Where left turn signals are not included in the initial construction, a seven (7) conductor IMSA cable shall be run to each far left signal head, and to the signal head at the far outboard end of the mast arm on all approaches. Where future dual left turn lanes are expected, an additional seven (7) conductor IMSA cable shall be run to the second-to-last outboard mast arm tenon. A seven (7) conductor IMSA cable shall also be run to each right turn signal head.

~~**N**~~**P**. A separate four (4) conductor IMSA cable shall be run to each inboard mast arm signal head, right side-mounted signal head (except for right turn signal heads), each pedestrian signal head, and each pedestrian push button.

~~**O**~~**Q**. The intersection will be "boxed" with two (2) three (3) inch diameter conduits.

1. One (1) conduit shall contain higher voltage signal and lighting conductors.

2. The second conduit shall contain lower voltage detection, preemption and communications conductors.

~~**P**~~**R**. All splicing will occur in the No. 7 pull boxes.

~~Q~~S. When the intersection lies along the path of a future fiber-optic interconnect route, two (2) additional four (4) inch conduits, each with a No. 8 green THW pull wire, shall be installed along that route throughout the project limits. Interconnect conduit shall be schedule 40 PVC or SDR 11 HDPE, unless otherwise approved by the City Traffic Engineer. Interconnect pull boxes shall not be placed in sidewalk areas when possible, but behind sidewalks or in greenways to minimize tripping hazards.

1. Interconnect pull boxes shall be installed no more than one thousand three hundred twenty (1,320) feet apart and shall be COF No. 9 per City of Flagstaff Engineering Detail 16-03-010.

2. A dedicated interconnect pull box shall be installed adjacent to a traffic signal pull box at intersections, preferably on the same corner as the signal control cabinet.

3. A three (3) inch conduit shall be installed to the traffic signal cabinet from the closest interconnect pull box.

4. Ninety (90) degree elbows are not to be used with the fiber-optic interconnect conduit unless specifically approved by the City Traffic Engineer. Where ninety (90) degree bends are necessary, they are to be made up of a series of forty-five (45) degree or less elbows, with a minimum radius of twenty-four (24) inches.

5. A maximum of three hundred sixty (360) degrees of cumulative bends between pull boxes is allowed, including both horizontal and vertical bends. Install additional No. 9 pull boxes if necessary to meet this requirement.

~~R~~T. All trenches in existing pavement shall be slurry backfilled and T-topped.

~~S~~U. A minimum of one (1) No. 7 pull box, with extension, shall be installed on each corner of the intersection.

~~T~~V. Controller operation shall be NEMA dual ring. Phase 2 shall be used for the main street through movement, either the eastbound or northbound direction.

~~U~~W. Flashing mode shall be all red.

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Section 37. Add Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, Pavement Markings, and Fiber-Optic Conduit, Division 13-16-002: Signal Design Elements, Section 13-16-002-0003: Traffic Signal Pole Design Requirements, to read as follows:

This section describes the general requirements for traffic signal equipment to be installed within, or supplied to, the City of Flagstaff.

A. General Requirements

1. All traffic signals and lighting equipment shall comply with the Arizona Department of Transportation, Standard Specifications for Road and Bridge Construction (current revision) and the Arizona Department of Transportation, Traffic Signals and Lighting, Standard Drawings (current revision), in addition to meeting the requirements of this specification. If there are any differences, City of Flagstaff standard details and specification will supersede Arizona Department of Transportation.

B. Traffic Signal Structure

1. A traffic signal structure is a complete pole and mast arm assembly attached to a concrete foundation. The traffic signal structure consists at a minimum of

a. Pole

b. Signal mast arm

c. Luminaire mast arm

d. Foundation anchor bolts

e. Mast arm connecting hardware

f. Signal tenons

g. Vibration device

h. Top cap hardware

i. Pole hardware including hand hole covers

j. Concrete foundation with steel reinforcing (where required)

2. Traffic Signal structures shall be supplied per City of Flagstaff standard detail 16-02-020.

3. Each signal mast arm shall include a dynamic vibration mitigation device. The dynamic vibration device shall meet the following specification:

a. The dynamic vibration mitigation device shall aesthetically fit behind a 3 section signal head and not accumulate dirt or snow buildup. It shall be an active, non-aerodynamic vibration damper system to effectively mitigate the vertical movement under fatigue loads. The pole manufacturer will be required to submit all the necessary documentation and independent 3rd party testing of the device to prove the device is greater than 85 percent or greater excitation reduction for the entire range of structures in the standard. The device shall be robust to dampening large displacements and small displacements and be self-adapting, not require structure-specific tuning. The mitigation device shall be tested to withstand over 17 million large amplitude cycles with no deterioration of the dampening performance.

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13-16-004: Intersection Design Requirements

Section 38. Amend Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, Pavement Markings, and Fiber-Optic Conduit, Division 13-16-004: Signal Construction, Section 13-16-004-0004: Construction Procedure, Scheduling, and Inspection, to modify 13-16-004-0004.L as follows:

L. Aboveground construction procedure:

1. All traffic signal and pedestrian heads will be "bagged" **with TAPCO Signal Head Covers, or approved equal,** as they are installed. ~~**Proposed material for signal bagging shall be included with material submittals for approval.**~~ Signal or pedestrian heads bagged with unapproved materials shall

be removed immediately until approved bagging material is available. The bagging material will not be removed until the signal turn-on has begun.

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Section 39. Amend Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, and Pavement Markings, Division 13-16-004: Signal Construction, Section 13-16-004-0006: Documentation and Warranties, as follows:

A. Prior to final acceptance, the contractor shall document and provide to the City the following documentation:

1. Construction plans – one (1) copy in digital format (~~**.dwg**~~**PDF**).

2. Signal cabinet plans – ~~**three (3) printed copies, one (1) mylar copy, and**~~ one (1) copy in digital format (~~**.dwg**~~**PDF**).

3. As-built plans - ~~**three (3) printed copies and one (1) mylar copy**~~**one (1) copy in digital format (PDF/A)**.

4. Operation and maintenance manuals for all traffic signal equipment and systems shall be provided in ~~**printed and**~~ digital format (~~**.pdf**~~**PDF/A**).

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13-16-005: Traffic Signs

Section 40. Amend Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, Pavement Markings, and Fiber-Optic Conduit, Division 13-16-005: Traffic Signs, Section 13-16-005-0001: Traffic Signs, as follows:

C. Traffic signs shall be located outside of pedestrian and bicycle ways, including sidewalks, bikeways and bike lanes, FUTS trails, accessible routes, and curb ramps.

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13-16-006: Pavement Markings

Section 41. Amend Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, Pavement Markings, and Fiber-Optic Conduit, Division 13-16-006: Pavement Markings, Section 13-16-006-0001: Longitudinal Pavement Markings, to add the following:

C. Design and layout of longitudinal pavement markings shall comply with the MUTCD, the Arizona Supplement to the MUTCD, the ADOT Traffic Safety for School Area Guidelines, and these standards.

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Section 42. Amend Title 13 Engineering Design Standards, Chapter 13-16: Traffic Signals, Signing, Pavement Markings, and Fiber-Optic Conduit, Division 13-16-006: Pavement Markings, Section 13-16-006-0002: Transverse Markings, Symbols, and Legends, to add the following:

D. Design and layout of transverse markings, symbols, and legends shall comply with the MUTCD, the Arizona Supplement to the MUTCD, the ADOT Traffic Safety for School Area Guidelines, and these standards.

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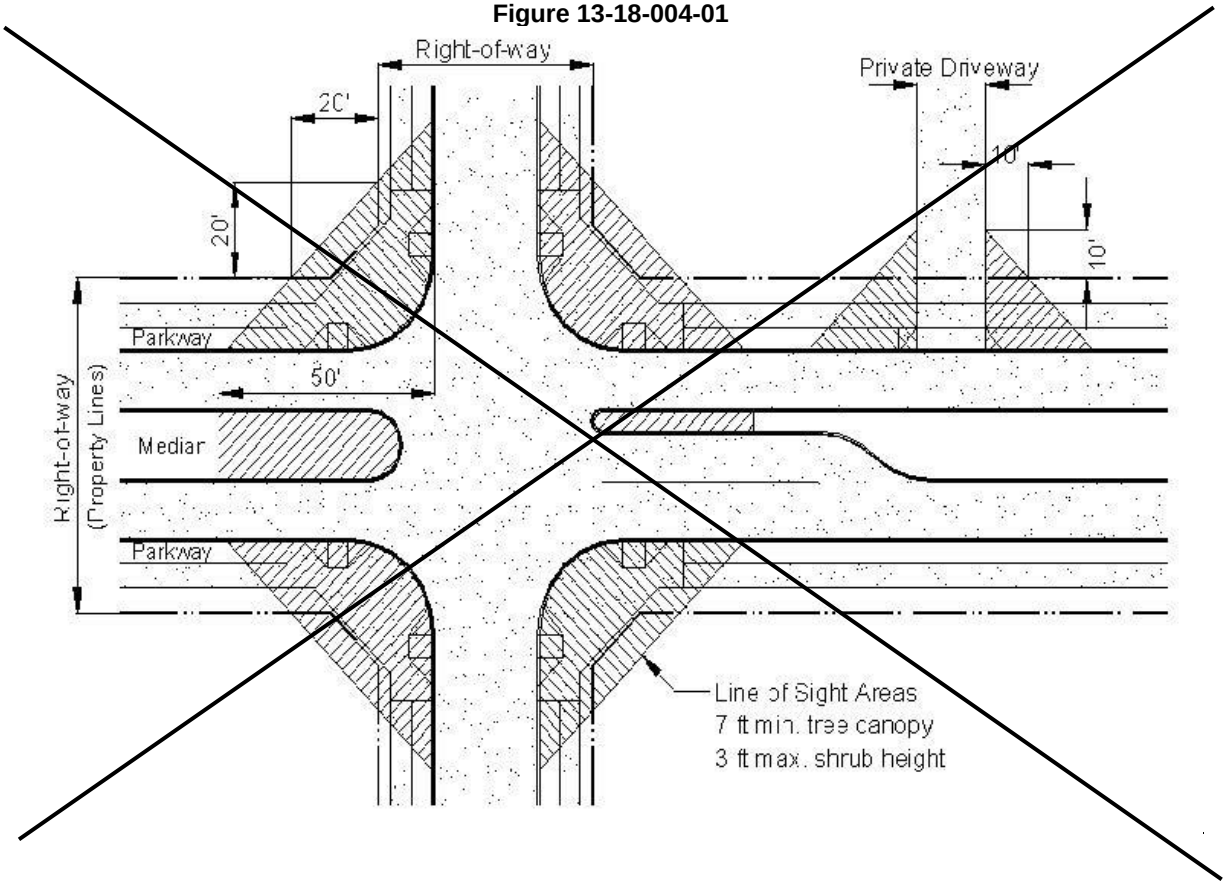
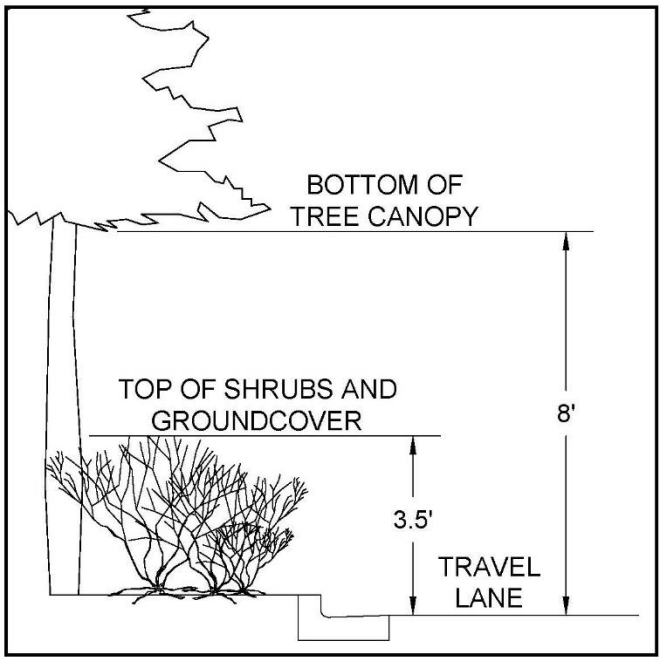
13-18-004: Installation, Placement, and Planting

Section 43. Amend Title 13 Engineering Design Standards, Chapter 13-18: Landscaping Standards for Right-of-Way, Division 13-18-004: Installation, Placement, and Planting, Section 13-18-004-0001.2: Safety, to modify 13-18-004-0001.2.A as follows:

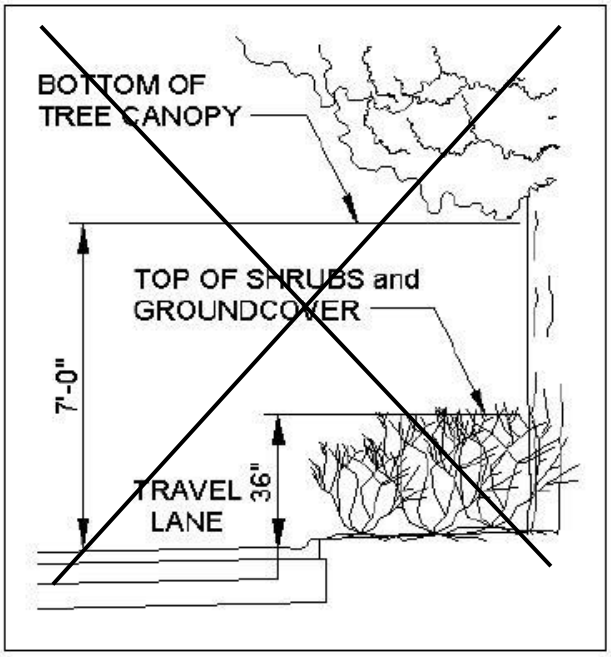
A. Lines of Sight. At intersections and driveways, landscaping proposed to be located within the **line of sight** ~~**triangular area on a corner lot formed by measuring twenty (20) feet along both street side property lines from their intersection, or ten (10) feet from the intersection of a property line adjacent and parallel to a public street and a private street or driveway,**~~ shall be selected for and maintained at a maximum **3.5 feet** ~~**thirty (30) inch**~~ top height. Trees located within or overhanging ~~**these triangular areas**~~ shall have canopies selected for and maintained at **eight** ~~**seven (7**~~**8**) feet above street level. ~~**The end fifty (50) feet of m**~~**M**edians **at intersections**~~**, measured parallel to the directions of traffic,**~~ shall be treated in the same manner. **See diagram below and Section 13-10-006-0002 for Intersection Sight Triangles, Clear View Zones.**

Figure 13-18-004-01





~~**Figure 13-18-004-02**~~



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13-21-002: Addendum to MAG Uniform Standard Details for Public Works Construction

Section 44. Add Title 13 Engineering Design Standards, Chapter 13-21: Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details, Division 13-21-002: Addendum to MAG

Uniform Standard Details for Public Works Construction, Section 13-21-002-0211: MAG Detail No. 211 – Standard Trench Plating Detail, to read as follows:

Revise to include the following note:

> **7. The use of trench plating shall be prohibited from November 1st to April 1st unless specifically allowed by the City Engineer.**

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Section 45. Amend Title 13 Engineering Design Standards, Chapter 13-21: Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details, Division 13-21-002: Addendum to MAG Uniform Standard Details for Public Works Construction, Section 13-21-002-0250: MAG Detail Nos. 250 and 251 – Driveway Entrances/Return Type Driveways, as follows:

Revise to include the following notes:

> The revised depth of concrete for residential driveways shall be 6" minimum.
>
> Class of concrete on all driveways shall be Class A.
>
> The radius on Detail 251 shall be 5 feet or designed to complement the adjoining parkway and sidewalk.
>
> **Commercial driveway widths shall be based on operation and safety considerations of the development (reference NCHRP Report 659, Guide for the Geometric Design of Driveways).**

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Section 46. Amend Title 13 Engineering Design Standards, Chapter 13-21: Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details, Division 13-21-002: Addendum to MAG Uniform Standard Details for Public Works Construction, Section 13-21-002-0420: MAG Detail No. 420 – Pre-Cast Concrete Sewer Manhole, as follows:

13-21-**0**02-0420 MAG Detail No. 420-**1** – ~~**Pre-Cast**~~ Concrete **Sanitary** Sewer Manhole

~~**Delete the Note "steps not required in 60" M.H."**~~

Revise to include the following:

> Manholes that have either two or more inlets or inlet/outlet pipes ranging between 12" and 18" in diameter shall be constructed using 60" inside diameter manhole material. Manholes having inlet/outlet pipes 24" to 36" in diameter shall be constructed using 72" inside diameter manhole material. Manholes for pipes greater than 36" in diameter shall be specially designed.
>
> ~~**Steps shall be installed in 60" manhole in accordance with 48" manhole standard.**~~
>
> ~~**Steps in all m**~~**M**anhole~~**s**~~ **access point** shall be ~~**placed**~~**oriented** so that climber faces traffic and ~~**the steps are**~~**is** on the same side of the manhole **that** the sewer pipe enters or exits the manhole.

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2024 Amendments to Flagstaff City Code, Title 13, Engineering Design Standards and Specifications for New Infrastructure

Section 47. Amend Title 13 Engineering Design Standards, Chapter 13-21: Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details, Division 13-21-002: Addendum to MAG Uniform Standard Details for Public Works Construction, Section 13-21-002-0421: MAG Detail No. 421 – Offset Manhole for 8" to 30" Pipe, as follows:

13-21-**0**02-0421 MAG Detail No. 421 – Offset Manhole ~~**for**~~ 8" to 30" Pipe

~~**Remove the Note beginning "1:3 Cement…"**~~

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Section 48. Amend Title 13 Engineering Design Standards, Chapter 13-21: Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details, Division 13-21-002: Addendum to MAG Uniform Standard Details for Public Works Construction, Section 13-21-002-0422: MAG Detail No. 422 – Sewer Manhole and Cover Frame Adjustment, as follows:

13-21-002-0422 MAG Detail No**s**. 422**-1 and 422-2** – ~~**Sewer**~~ Manhole **Frame** and Cover ~~**Frame**~~ Adjustment

~~**Remove the notes beginning "1:3 Cement…" and "M.H. step in 48"…"**~~

Revise to include the following notes:

> ~~**Steps shall be installed in 60" manholes in accordance with 48" manhole standard.**~~
>
> The manhole base shall be reinforced with #4 rebar 8" on center, placed 4" both ways above subgrade.
>
> All manhole frame and cover adjustments shall be made in accordance with City of Flagstaff Detail 9-03-062.

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Section 49. Amend Title 13 Engineering Design Standards, Chapter 13-21: Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details, Division 13-21-002: Addendum to MAG Uniform Standard Details for Public Works Construction, Section 13-21-002-0422: MAG Detail No. 422 – Sewer Manhole and Cover Frame Adjustment, as follows:

13-21-002-0424 MAG Detail Nos. 424**-1, 424-2,** and 425 – Manhole Frame and Cover

> ~~**All manhole frames and covers shall be aluminum**~~**In certain non-traffic areas, aluminum manhole frames and covers may be required by the City Engineer or Water Services Director.**
>
> The agency name is not required on manhole covers.

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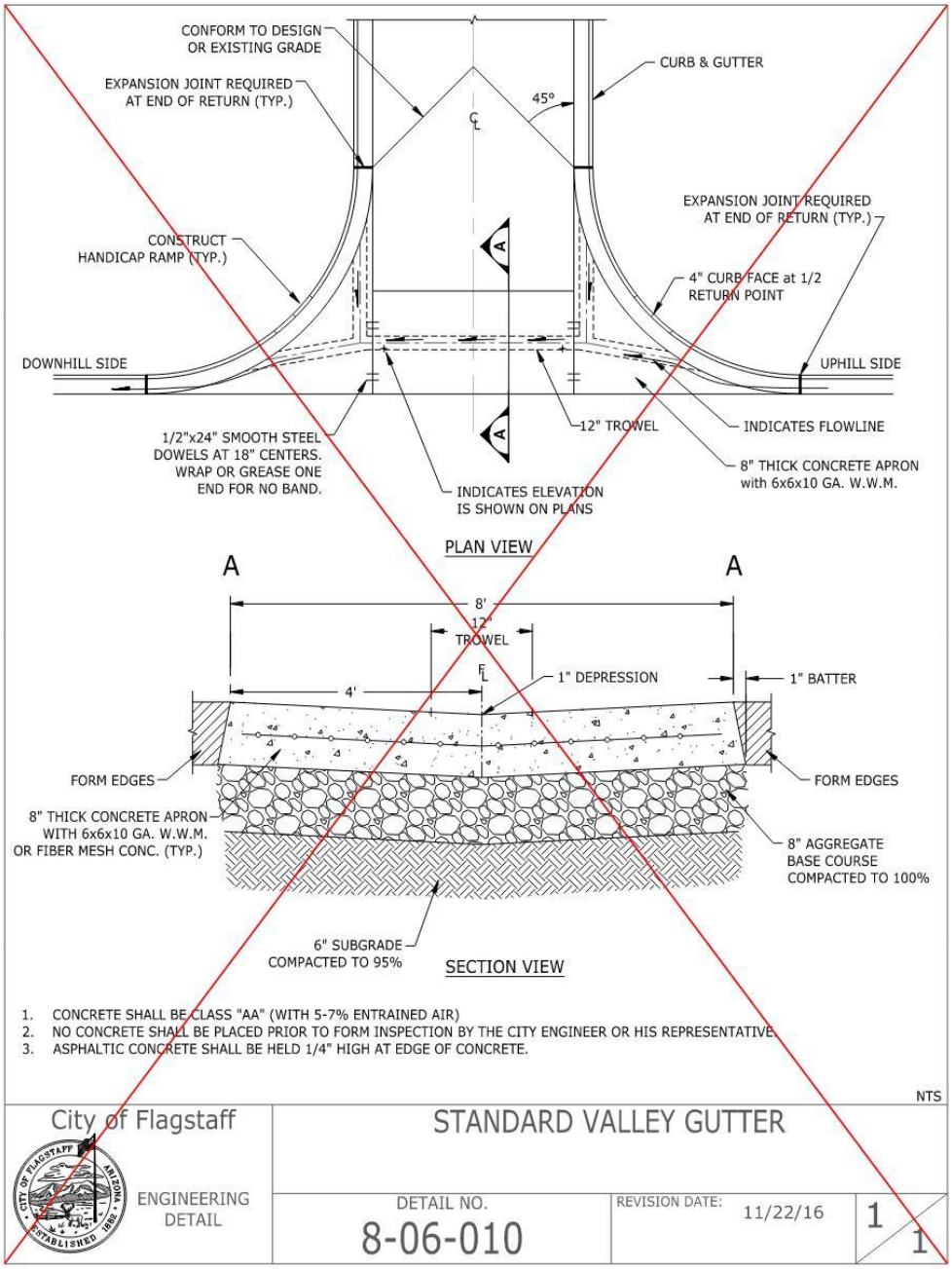
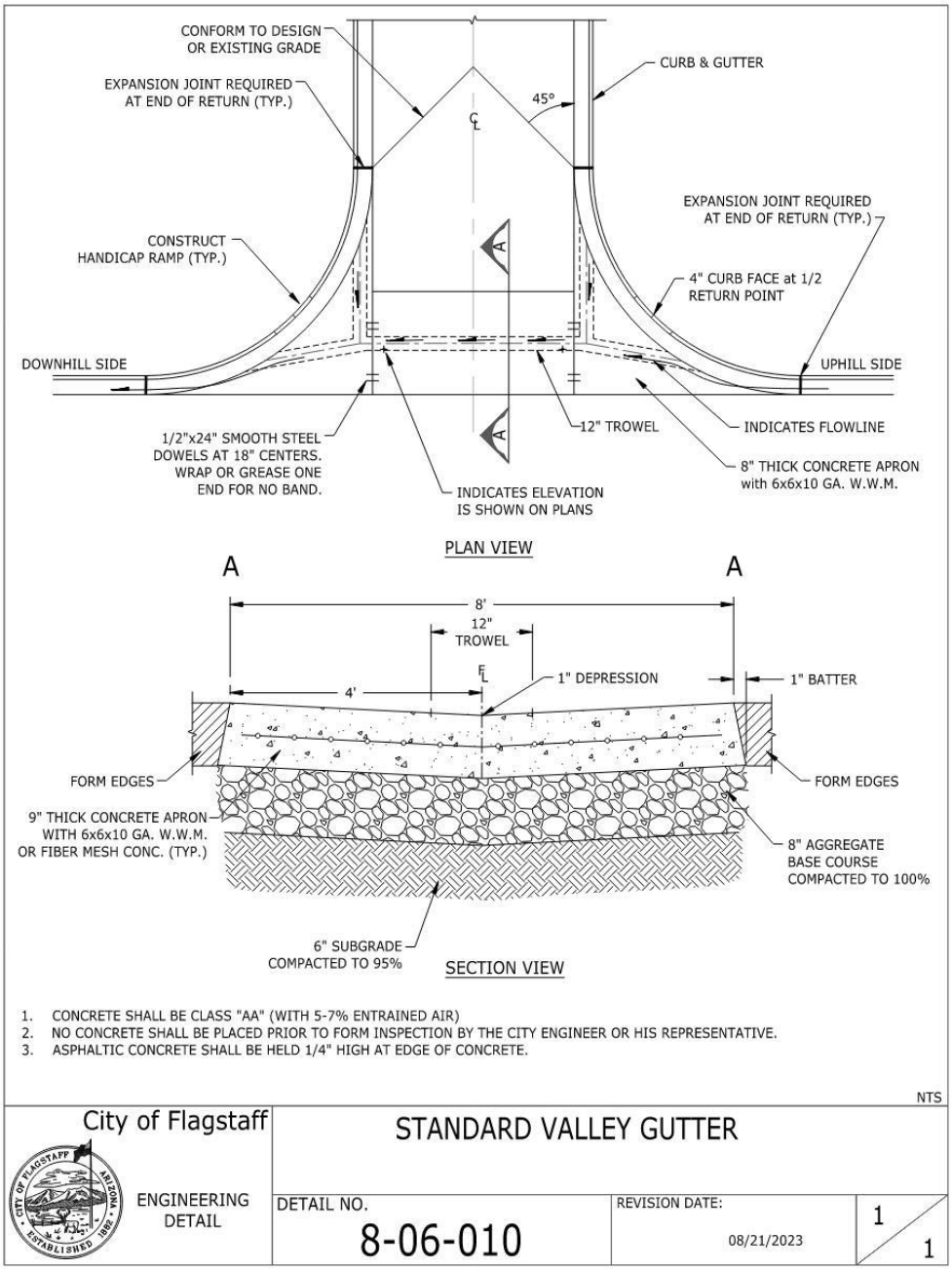
8-06-010: Standard Valley Gutter

Section 50. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 8-06-010: Standard Valley Gutter, delete existing standard drawing 08-06-010 and replace with standard drawing 08-06-010 below:




CONFORM TO DESIGN OR EXISTING GRADE
EXPANSION JOINT REQUIRED AT END OF RETURN (TYP.)
CURB & GUTTER
45°
EXPANSION JOINT REQUIRED AT END OF RETURN (TYP.)
CONSTRUCT HANDICAP RAMP (TYP.)
4" CURB FACE at 1/2 RETURN POINT
DOWNHILL SIDE
UPHILL SIDE
1/2"x24" SMOOTH STEEL DOWELS AT 18" CENTERS. WRAP OR GREASE ONE END FOR NO BAND.
12" TROWEL
INDICATES FLOWLINE
8" THICK CONCRETE APRON with 6x6x10 GA. W.W.M.
INDICATES ELEVATION IS SHOWN ON PLANS
PLAN VIEW
A
A
8'
12" TROWEL
4'
1" DEPRESSION
1" BATTER
FORM EDGES
FORM EDGES
9" THICK CONCRETE APRON WITH 6x6x10 GA. W.W.M. OR FIBER MESH CONC. (TYP.)
8" AGGREGATE BASE COURSE COMPACTED TO 100%
6" SUBGRADE COMPACTED TO 95%
SECTION VIEW
1. CONCRETE SHALL BE CLASS "AA" (WITH 5-7% ENTRAINED AIR)
2. NO CONCRETE SHALL BE PLACED PRIOR TO FORM INSPECTION BY THE CITY ENGINEER OR HIS REPRESENTATIVE.
3. ASPHALTIC CONCRETE SHALL BE HELD 1/4" HIGH AT EDGE OF CONCRETE.
NTS
City of Flagstaff
ENGINEERING DETAIL
STANDARD VALLEY GUTTER
DETAIL NO.
8-06-010
REVISION DATE:
08/21/2023
1
1

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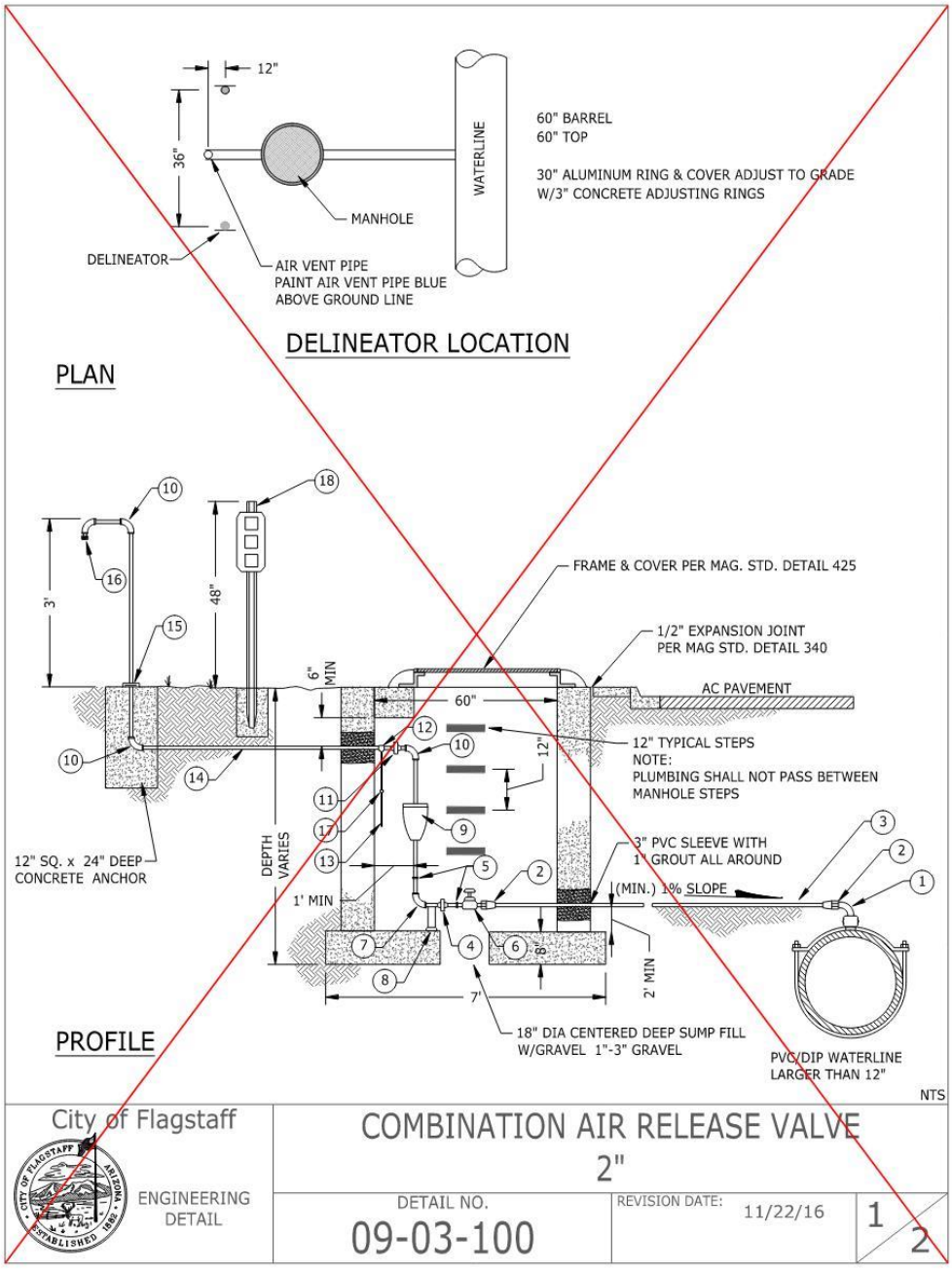
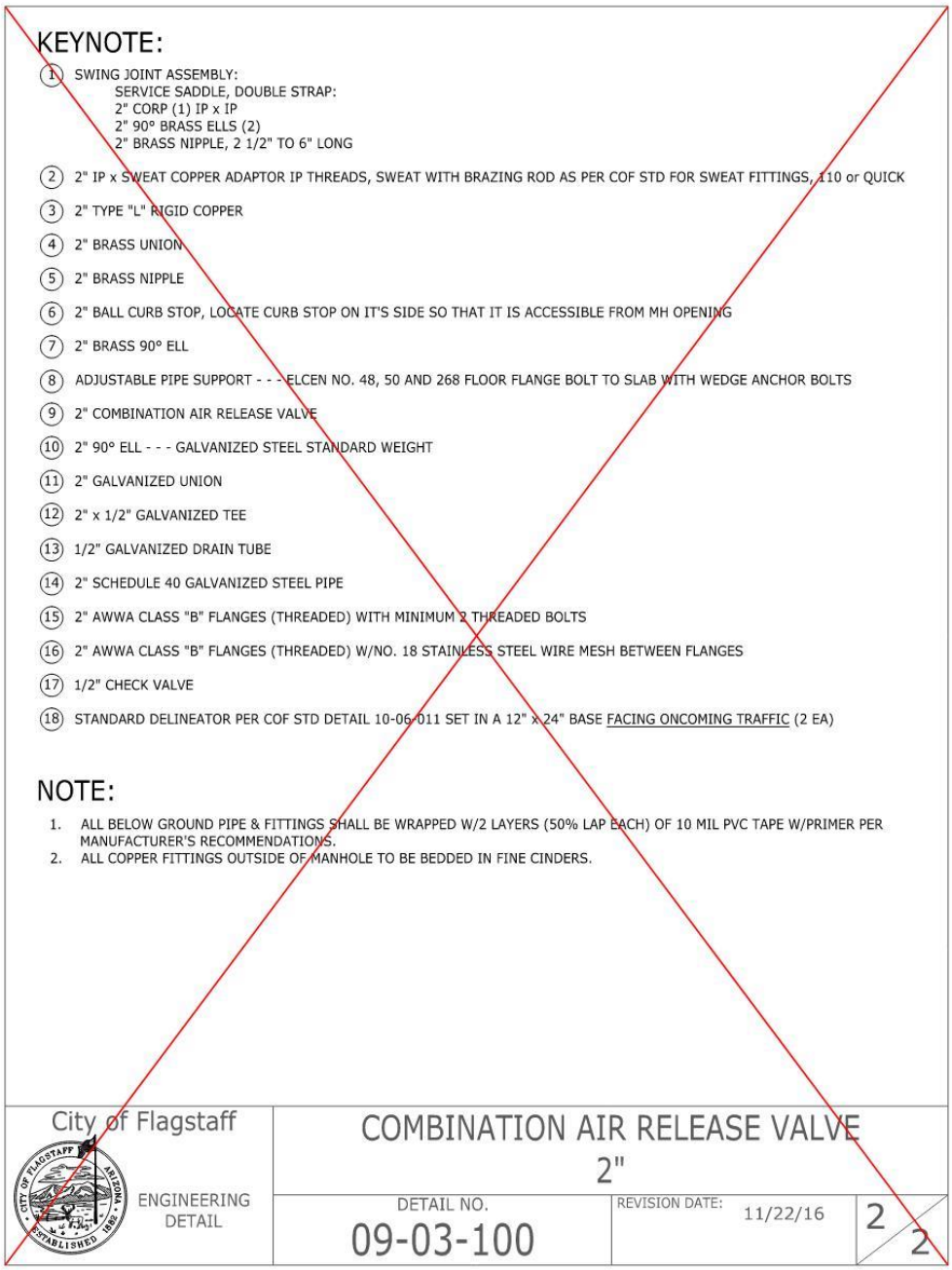
09-03-100: Combination Air Release Valve 2”

Section 51. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-03-100: Combination Air Release Valve 2”, delete existing standard drawing 09-03-100 and replace with standard drawing 09-03-100 below:





KEYNOTE:

1. SWING JOINT ASSEMBLY:
   SERVICE SADDLE, DOUBLE STRAP:
   2" CORP (1) IP x IP
   2" 90° BRASS ELLS (2)
   2" BRASS NIPPLE, 2 1/2" TO 6" LONG
2. 2" IP x SWEAT COPPER ADAPTOR IP THREADS, SWEAT WITH BRAZING ROD AS PER COF STD FOR SWEAT FITTINGS, 110 or QUICK
3. 2" TYPE "L" RIGID COPPER
4. 2" BRASS UNION
5. 2" BRASS NIPPLE
6. 2" BALL CURB STOP, LOCATE CURB STOP ON IT'S SIDE SO THAT IT IS ACCESSIBLE FROM MH OPENING
7. 2" BRASS 90° ELL
8. ADJUSTABLE PIPE SUPPORT - - - ELCEN NO. 48, 50 AND 268 FLOOR FLANGE BOLT TO SLAB WITH WEDGE ANCHOR BOLTS
9. 2" COMBINATION AIR RELEASE VALVE
10. 2" 90° ELL - - - GALVANIZED STEEL STANDARD WEIGHT
11. 2" GALVANIZED UNION
12. 2" x 1/2" GALVANIZED TEE
13. 1/2" GALVANIZED DRAIN TUBE
14. 2" SCHEDULE 40 GALVANIZED STEEL PIPE
15. 2" AWWA CLASS "B" FLANGES (THREADED) WITH MINIMUM 2 THREADED BOLTS
16. 2" AWWA CLASS "B" FLANGES (THREADED) W/NO. 18 STAINLESS STEEL WIRE MESH BETWEEN FLANGES
17. 1/2" CHECK VALVE
18. STANDARD DELINEATOR PER COF STD DETAIL 10-06-011 SET IN A 12" x 24" BASE FACING ONCOMING TRAFFIC (2 EA)

NOTE:

1. ALL BELOW GROUND PIPE & FITTINGS SHALL BE WRAPPED W/2 LAYERS (50% LAP EACH) OF 10 MIL PVC TAPE W/PRIMER PER MANUFACTURER'S RECOMMENDATIONS.
2. ALL COPPER FITTINGS OUTSIDE OF MANHOLE TO BE BEDDED IN FINE CINDERS.

City of Flagstaff

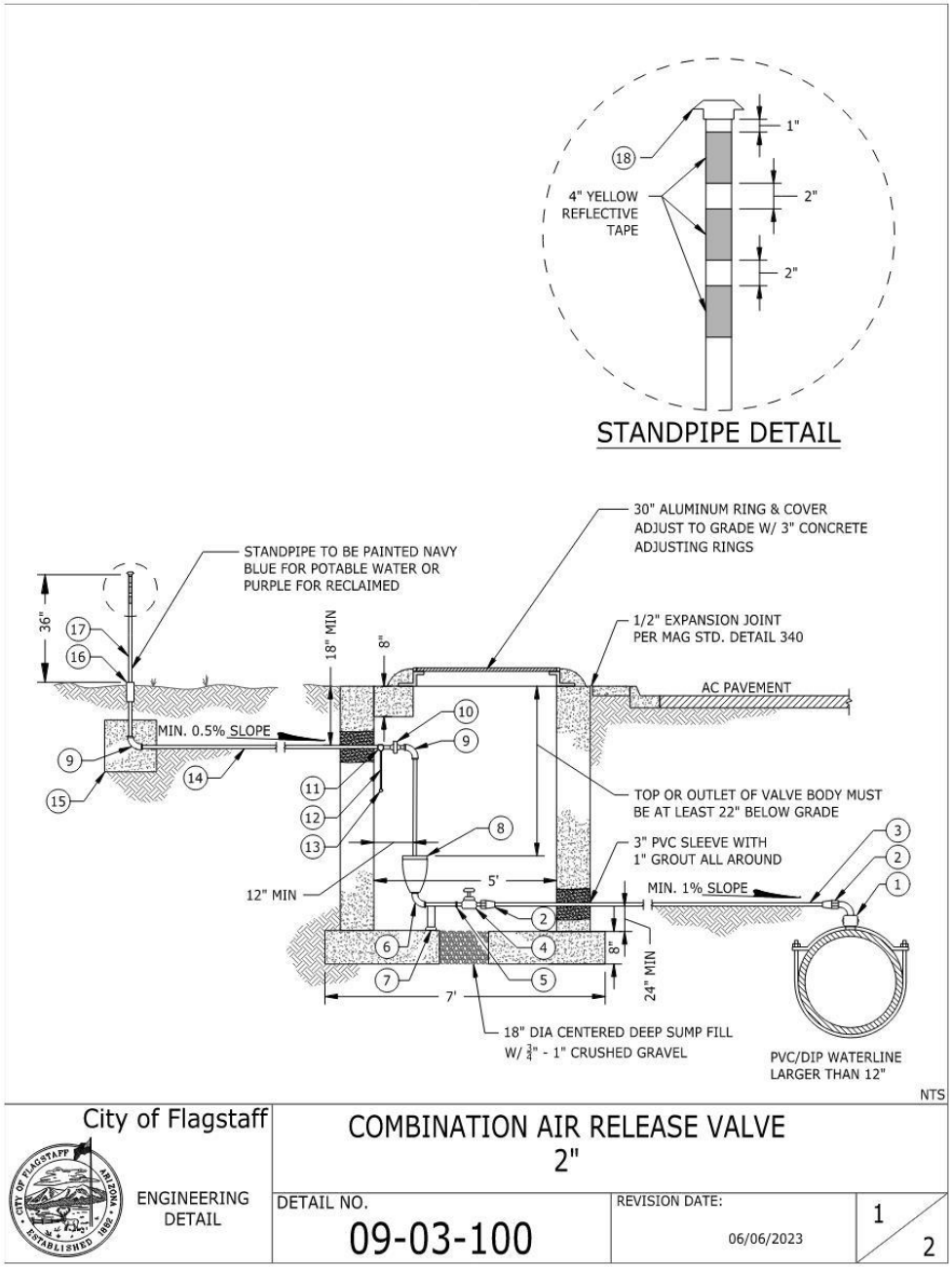
ENGINEERING DETAIL

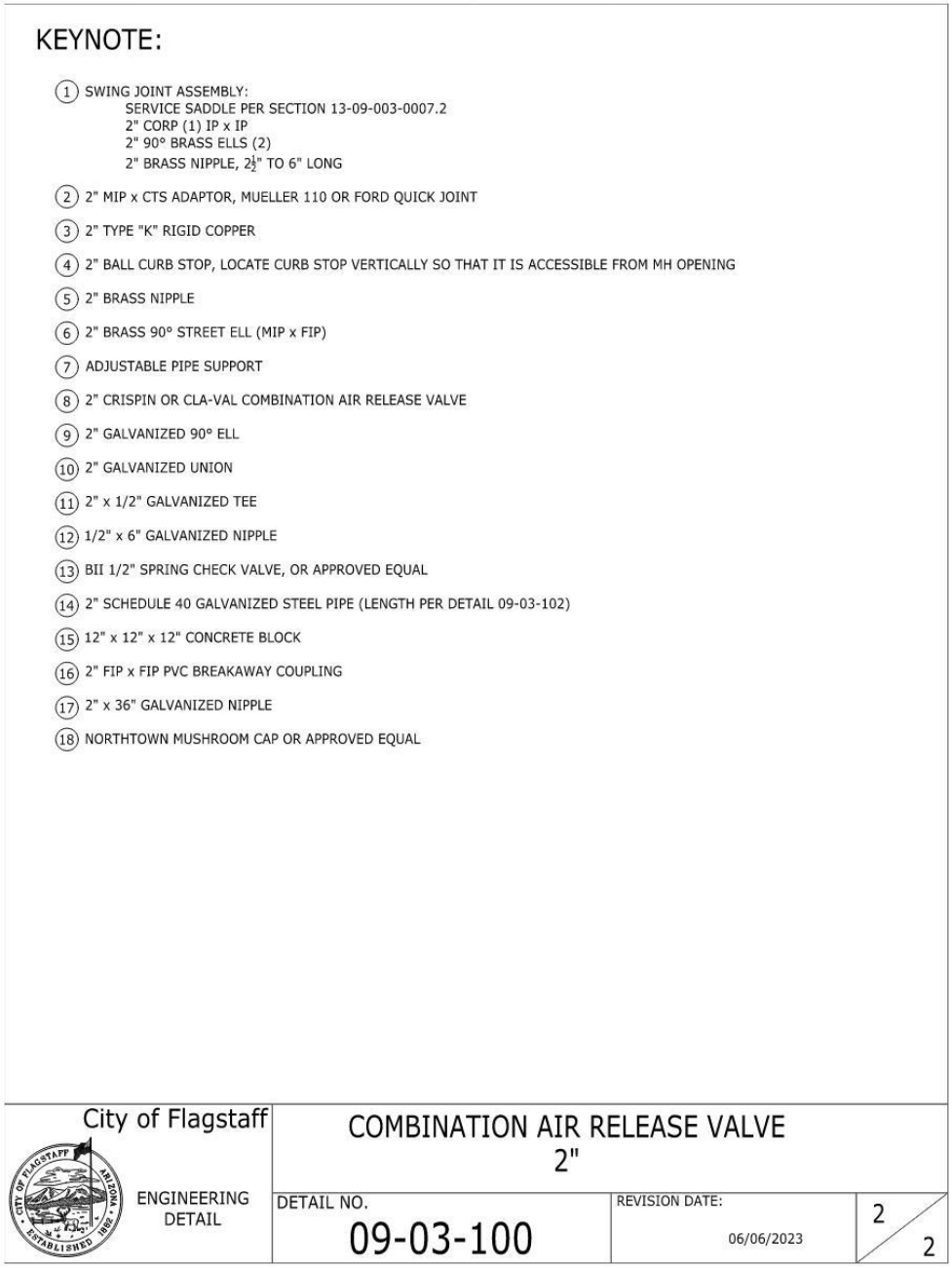
COMBINATION AIR RELEASE VALVE
2"

DETAIL NO. 09-03-100

REVISION DATE: 11/22/16

2 / 2


1"
2"
2"
18
4" YELLOW REFLECTIVE TAPE
STANDPIPE DETAIL
30" ALUMINUM RING & COVER ADJUST TO GRADE W/ 3" CONCRETE ADJUSTING RINGS
STANDPIPE TO BE PAINTED NAVY BLUE FOR POTABLE WATER OR PURPLE FOR RECLAIMED
1/2" EXPANSION JOINT PER MAG STD. DETAIL 340
AC PAVEMENT
36"
18" MIN
8"
MIN. 0.5% SLOPE
TOP OR OUTLET OF VALVE BODY MUST BE AT LEAST 22" BELOW GRADE
3" PVC SLEEVE WITH 1" GROUT ALL AROUND
MIN. 1% SLOPE
12" MIN
5'
8"
24" MIN
7'
18" DIA CENTERED DEEP SUMP FILL W/ ¾" - 1" CRUSHED GRAVEL
PVC/DIP WATERLINE LARGER THAN 12"
NTS
City of Flagstaff
ENGINEERING DETAIL
COMBINATION AIR RELEASE VALVE 2"
DETAIL NO.
09-03-100
REVISION DATE:
06/06/2023
1
2



KEYNOTE:

1. SWING JOINT ASSEMBLY:
   SERVICE SADDLE PER SECTION 13-09-003-0007.2
   2" CORP (1) IP x IP
   2" 90° BRASS ELLS (2)
   2" BRASS NIPPLE, 2½" TO 6" LONG
2. 2" MIP x CTS ADAPTOR, MUELLER 110 OR FORD QUICK JOINT
3. 2" TYPE "K" RIGID COPPER
4. 2" BALL CURB STOP, LOCATE CURB STOP VERTICALLY SO THAT IT IS ACCESSIBLE FROM MH OPENING
5. 2" BRASS NIPPLE
6. 2" BRASS 90° STREET ELL (MIP x FIP)
7. ADJUSTABLE PIPE SUPPORT
8. 2" CRISPIN OR CLA-VAL COMBINATION AIR RELEASE VALVE
9. 2" GALVANIZED 90° ELL
10. 2" GALVANIZED UNION
11. 2" x 1/2" GALVANIZED TEE
12. 1/2" x 6" GALVANIZED NIPPLE
13. BII 1/2" SPRING CHECK VALVE, OR APPROVED EQUAL
14. 2" SCHEDULE 40 GALVANIZED STEEL PIPE (LENGTH PER DETAIL 09-03-102)
15. 12" x 12" x 12" CONCRETE BLOCK
16. 2" FIP x FIP PVC BREAKAWAY COUPLING
17. 2" x 36" GALVANIZED NIPPLE
18. NORTHTOWN MUSHROOM CAP OR APPROVED EQUAL

City of Flagstaff ENGINEERING DETAIL	COMBINATION AIR RELEASE VALVE 2"		
	DETAIL NO. 09-03-100	REVISION DATE: 06/06/2023	2 2

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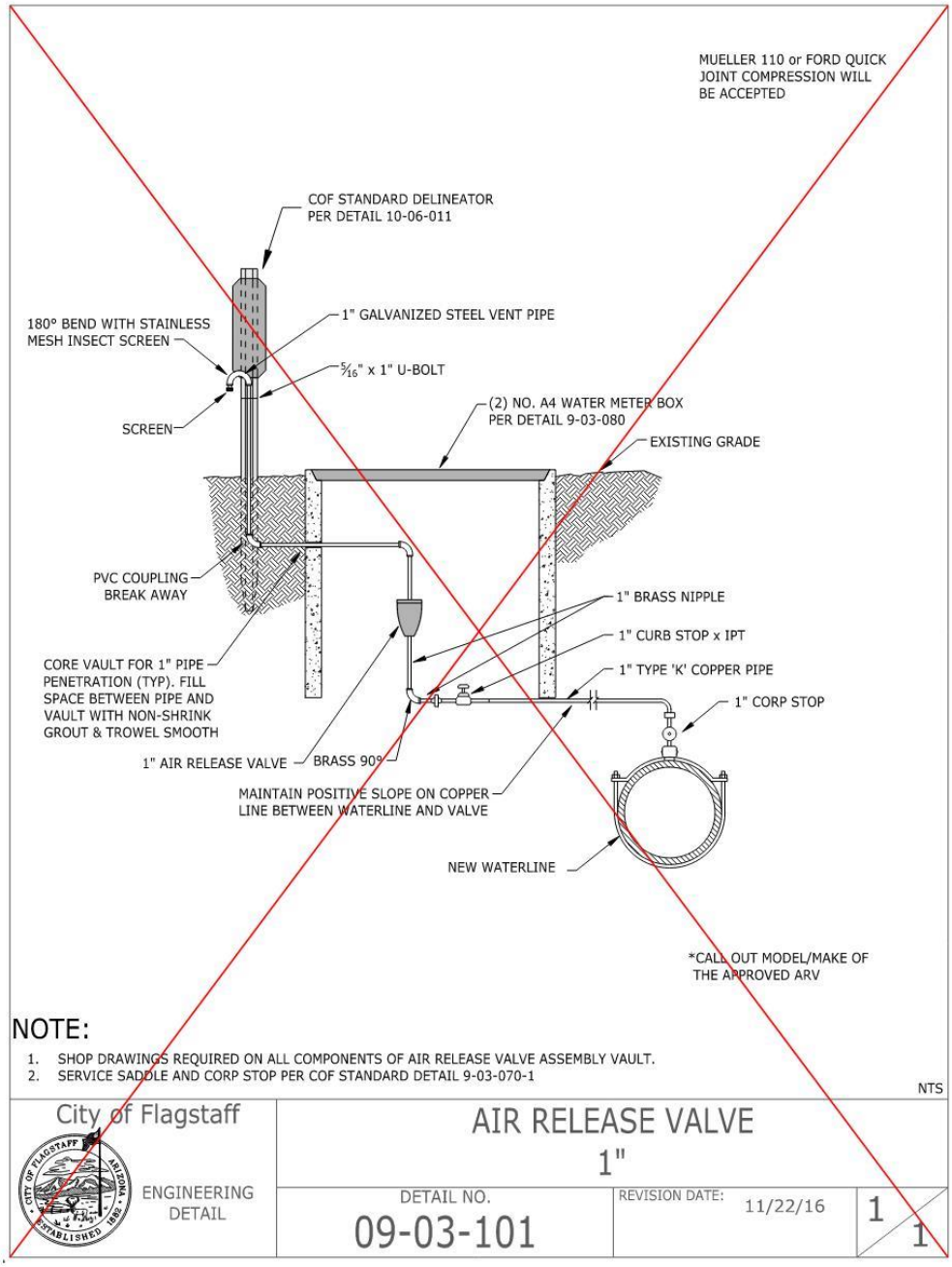
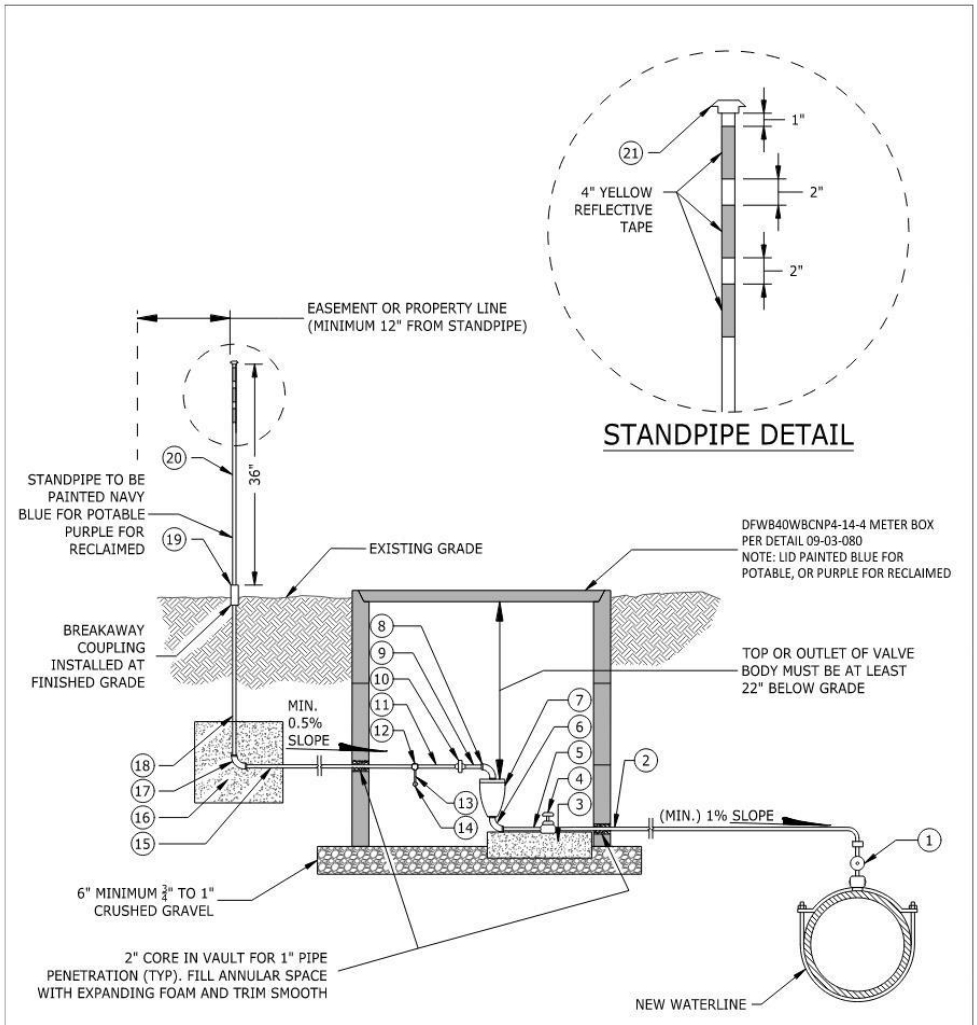
09-03-101: Air Release Valve 1”

Section 52. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-03-101: Air Release Valve 1”, delete existing standard drawing 09-03-101 and replace with standard drawing 09-03-101 below:



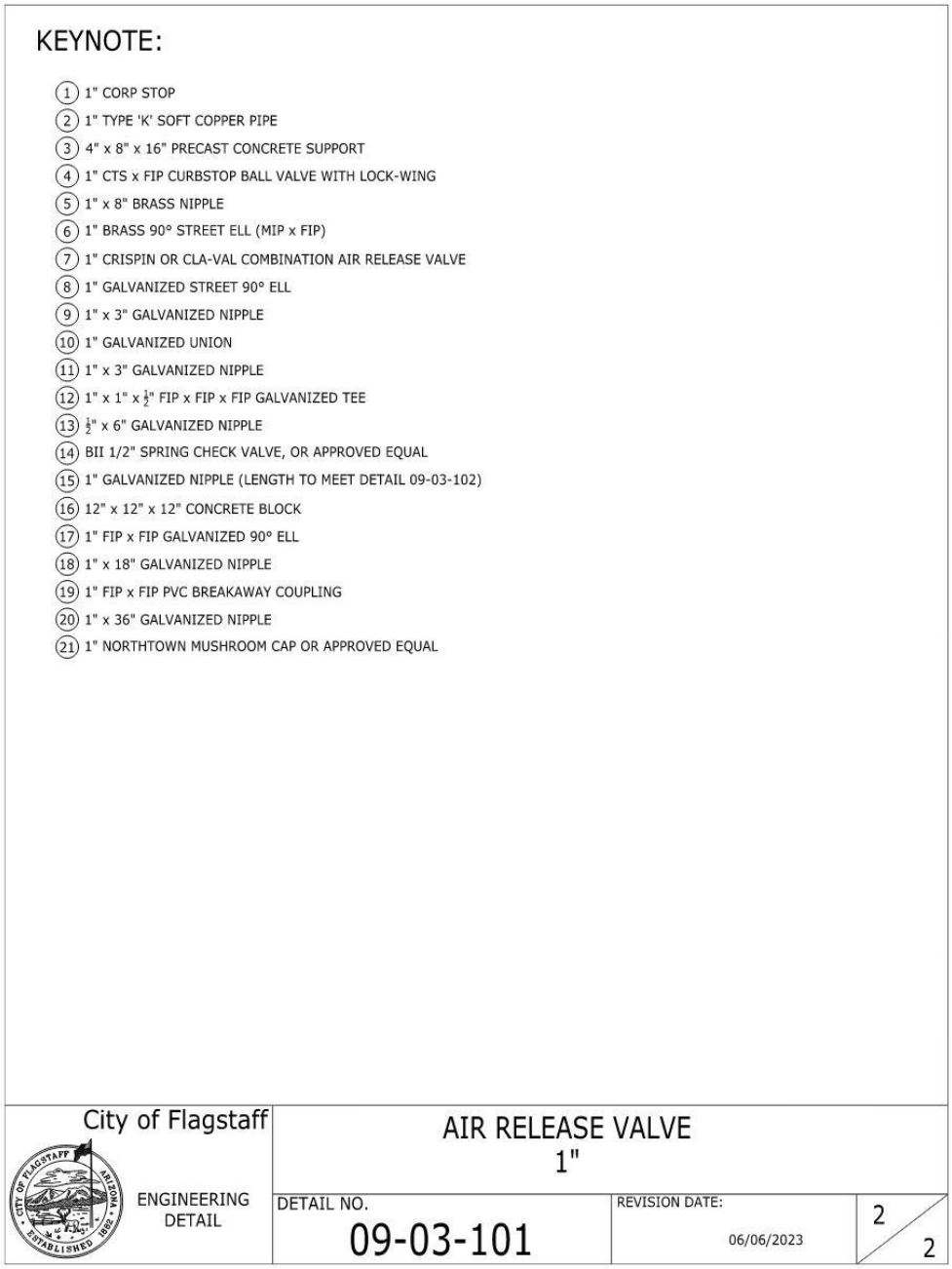


NOTE:

1. SHOP DRAWINGS REQUIRED ON ALL COMPONENTS OF AIR RELEASE VALVE ASSEMBLY VAULT.
2. SERVICE SADDLE AND CORP STOP PER COF STANDARD DETAIL 9-03-070-1.
3. SEE DETAIL 09-03-102 FOR PLACEMENT IN RELATION TO CURB, SIDEWALK, AND PARKWAY.

NTS

City of Flagstaff	AIR RELEASE VALVE 1"		
ENGINEERING DETAIL	DETAIL NO. 09-03-101	REVISION DATE: 06/06/2023	1 / 2



KEYNOTE:

1. 1" CORP STOP
2. 1" TYPE 'K' SOFT COPPER PIPE
3. 4" x 8" x 16" PRECAST CONCRETE SUPPORT
4. 1" CTS x FIP CURBSTOP BALL VALVE WITH LOCK-WING
5. 1" x 8" BRASS NIPPLE
6. 1" BRASS 90° STREET ELL (MIP x FIP)
7. 1" CRISPIN OR CLA-VAL COMBINATION AIR RELEASE VALVE
8. 1" GALVANIZED STREET 90° ELL
9. 1" x 3" GALVANIZED NIPPLE
10. 1" GALVANIZED UNION
11. 1" x 3" GALVANIZED NIPPLE
12. 1" x 1" x ½" FIP x FIP x FIP GALVANIZED TEE
13. ½" x 6" GALVANIZED NIPPLE
14. BII 1/2" SPRING CHECK VALVE, OR APPROVED EQUAL
15. 1" GALVANIZED NIPPLE (LENGTH TO MEET DETAIL 09-03-102)
16. 12" x 12" x 12" CONCRETE BLOCK
17. 1" FIP x FIP GALVANIZED 90° ELL
18. 1" x 18" GALVANIZED NIPPLE
19. 1" FIP x FIP PVC BREAKAWAY COUPLING
20. 1" x 36" GALVANIZED NIPPLE
21. 1" NORTHTOWN MUSHROOM CAP OR APPROVED EQUAL

City of Flagstaff ENGINEERING DETAIL	AIR RELEASE VALVE 1"		
	DETAIL NO. 09-03-101	REVISION DATE: 06/06/2023	2 / 2

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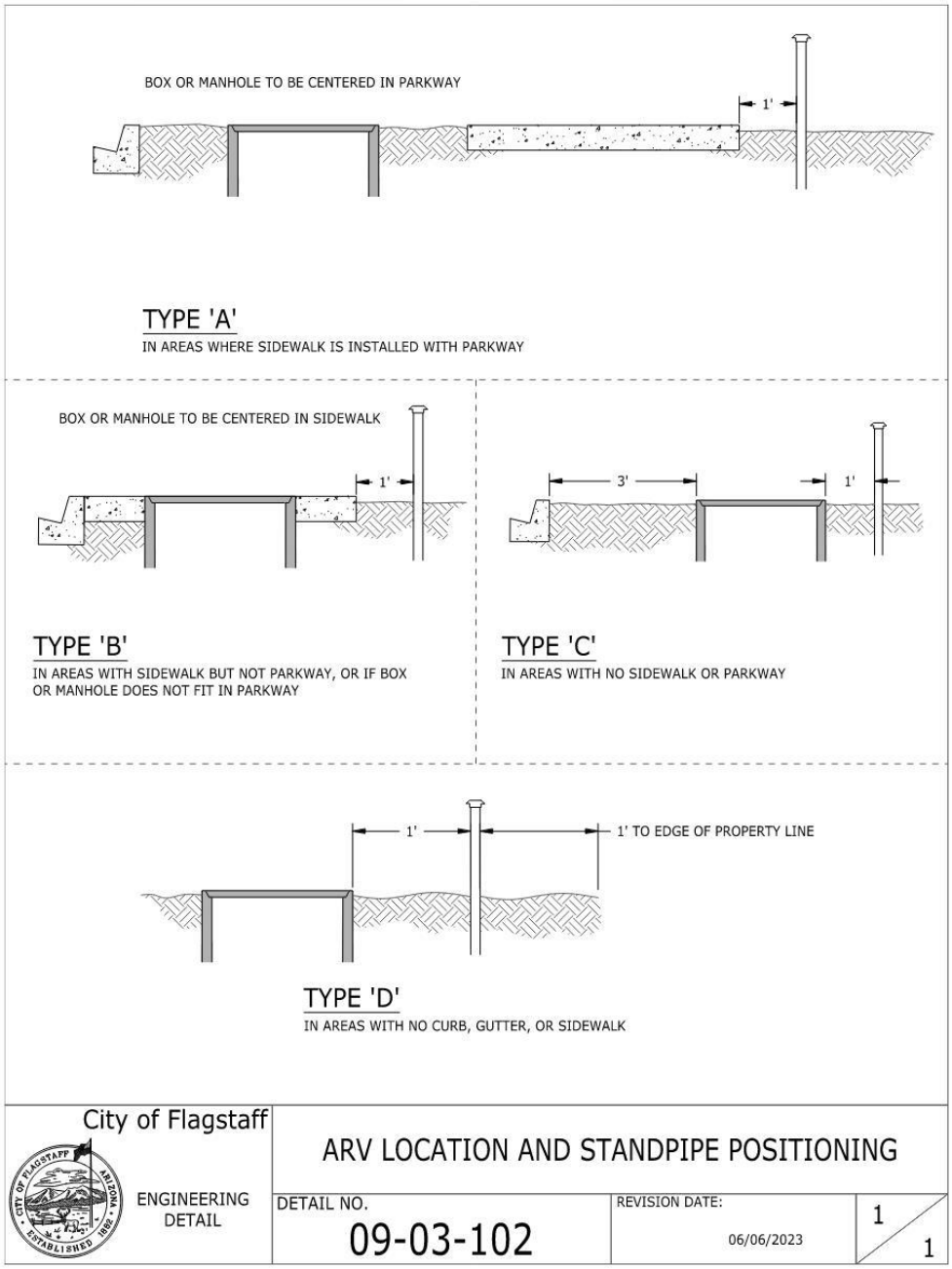
09-03-102: ARV Location and Standpipe Positioning

Section 53. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-03-102: ARV Location and Standpipe Positioning, to read as follows:



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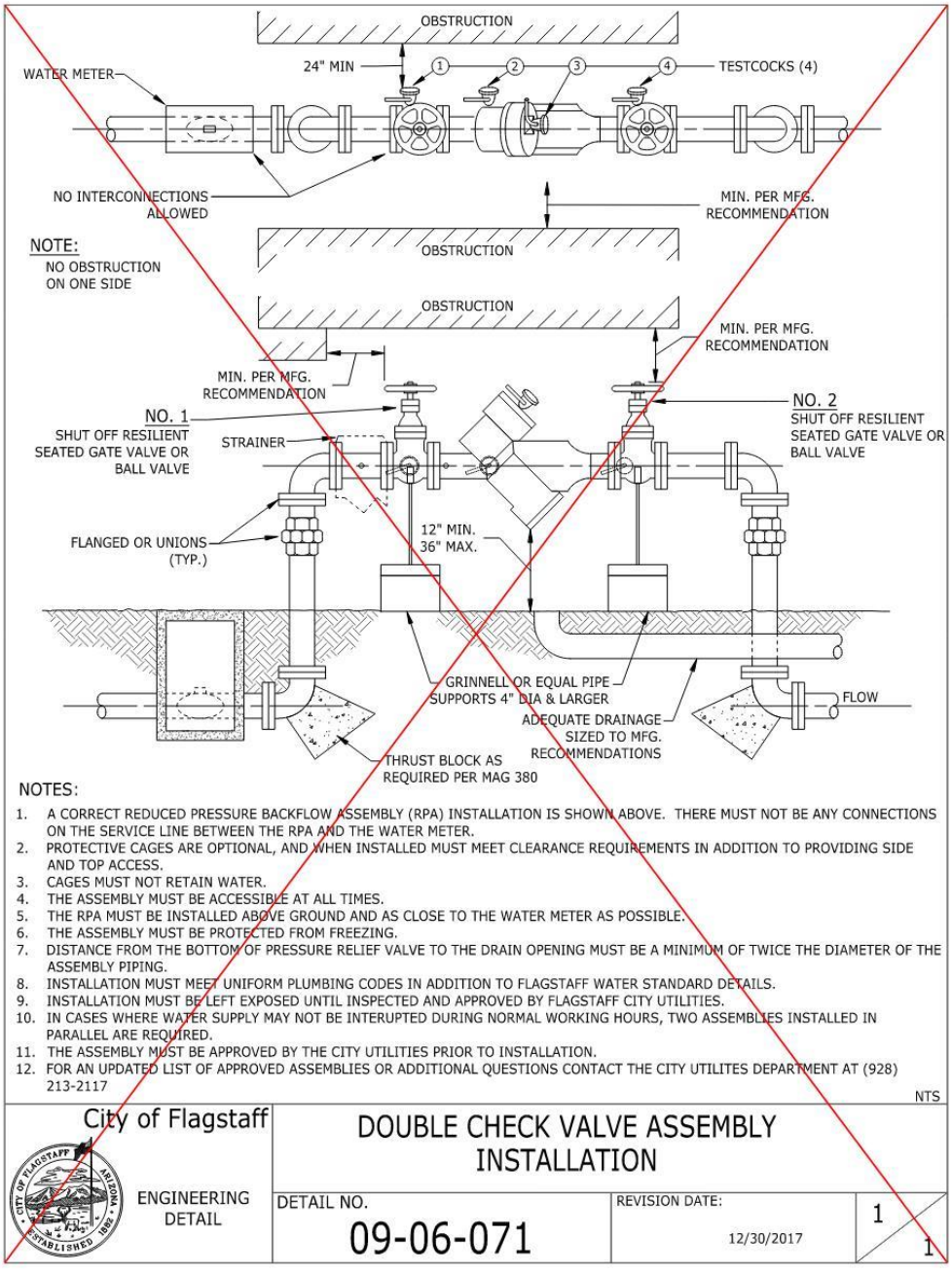
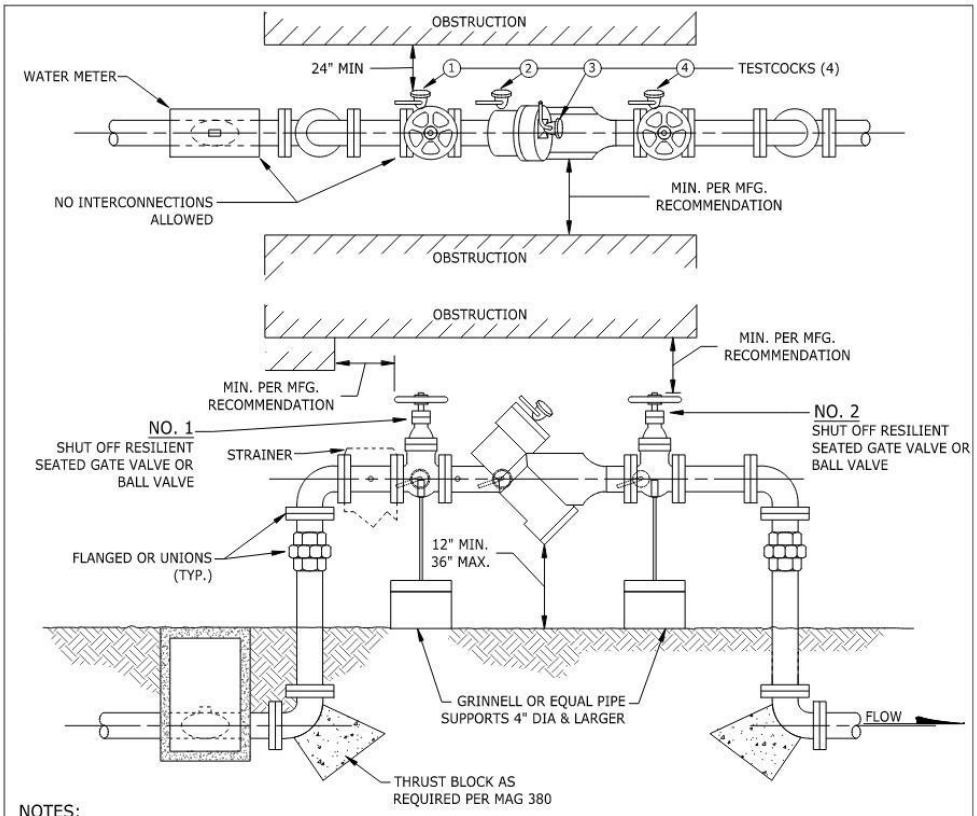
09-06-071: Double Check Valve Assembly Installation

Section 54. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-06-071: Double Check Valve Assembly Installation, delete existing standard drawing 09-06-071 and replace with standard drawing 09-06-071 below:





NOTES:

1. A CORRECT DOUBLE CHECK VALVE ASSEMBLY (DC). THERE MUST NOT BE ANY CONNECTIONS ON THE SERVICE LINE BETWEEN THE DC AND THE WATER METER.
2. PROTECTIVE CAGES MUST MEET CLEARANCE REQUIREMENTS IN ADDITION TO PROVIDING SIDE AND TOP ACCESS.
3. CAGES MUST NOT RETAIN WATER.
4. THE ASSEMBLY MUST BE ACCESSIBLE AT ALL TIMES.
5. THE DC MUST BE INSTALLED ABOVE GROUND AND AS CLOSE TO THE WATER METER AS POSSIBLE OR IN A FIRE SPRINKLER ROOM.
6. THE ASSEMBLY MUST BE PROTECTED FROM FREEZING.
7. INSTALLATION MUST MEET INTERNATIONAL PLUMBING CODES IN ADDITION TO FLAGSTAFF WATER STANDARD DETAILS.
8. INSTALLATION MUST BE LEFT EXPOSED UNTIL INSPECTED AND APPROVED BY FLAGSTAFF CITY WATER SERVICES.
9. IN CASES WHERE WATER SUPPLY MAY NOT BE INTERUPTED DURING NORMAL WORKING HOURS, TWO ASSEMBLIES INSTALLED IN PARALLEL ARE REQUIRED.
10. THE ASSEMBLY MUST BE APPROVED BY THE CITY WATER SERVICES PRIOR TO INSTALLATION.
11. FOR AN UPDATED LIST OF APPROVED ASSEMBLIES OR ADDITIONAL QUESTIONS CONTACT THE CITY WATER SERVICES DEPARTMENT.

NTS

City of Flagstaff ENGINEERING DETAIL	DOUBLE CHECK VALVE ASSEMBLY INSTALLATION - DRAFT		
	DETAIL NO. 09-06-071	REVISION DATE: 09/29/2023	1 1

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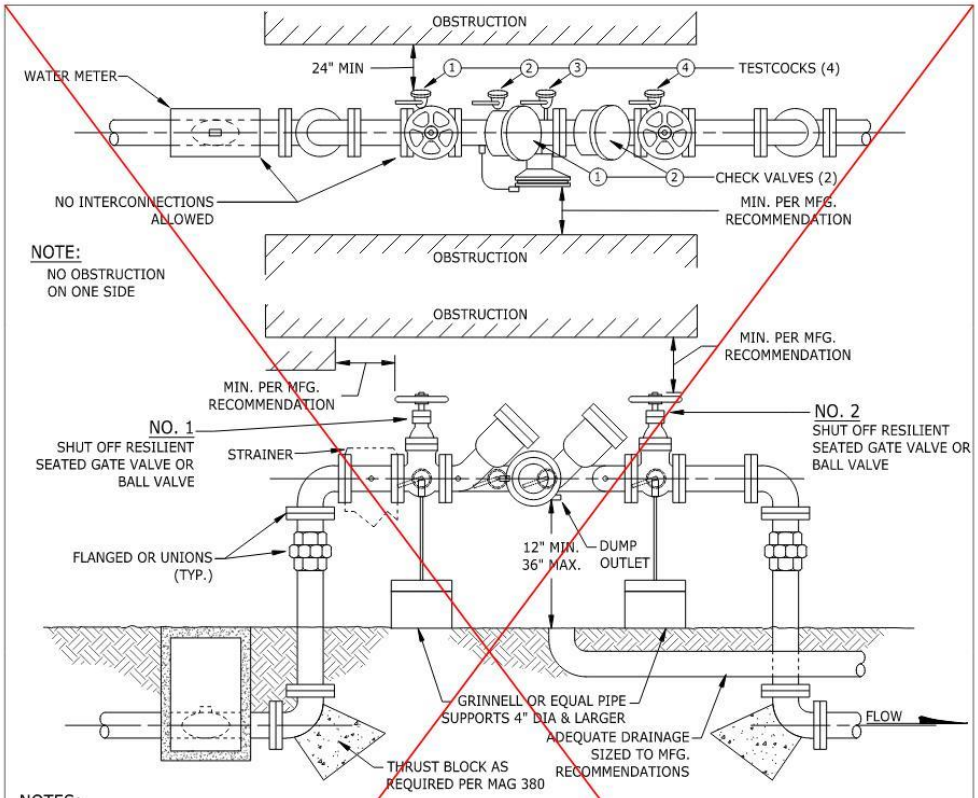
09-06-072: Reduced Pressure Assembly (RPA) Installation

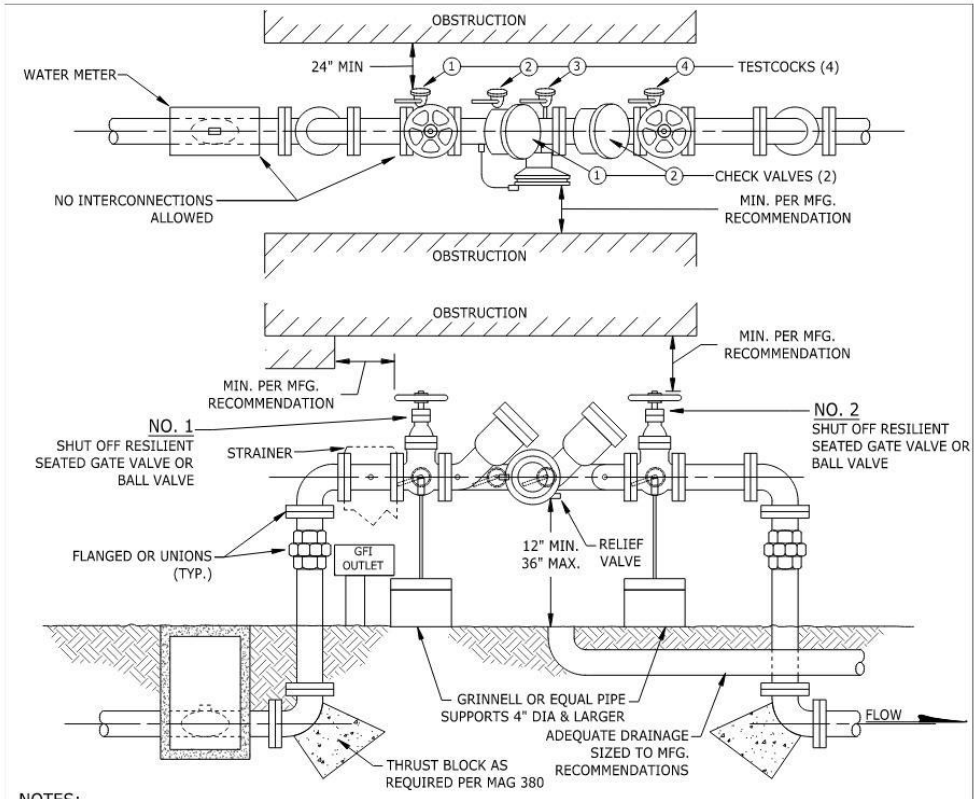
Section 55. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-06-072: Reduced Pressure Assembly (RPA) Installation, delete existing standard drawing 09-06-072 and replace with standard drawing 09-06-072 below:



NOTES:

1. A CORRECT REDUCED PRESSURE BACKFLOW ASSEMBLY (RPA) INSTALLATION IS SHOWN ABOVE. THERE MUST NOT BE ANY CONNECTIONS ON THE SERVICE LINE BETWEEN THE RPA AND THE WATER METER.
2. PROTECTIVE CAGES ARE OPTIONAL, AND WHEN INSTALLED MUST MEET CLEARANCE REQUIREMENTS IN ADDITION TO PROVIDING SIDE AND TOP ACCESS.
3. CAGES MUST NOT RETAIN WATER.
4. THE ASSEMBLY MUST BE ACCESSIBLE AT ALL TIMES.
5. THE RPA MUST BE INSTALLED ABOVE GROUND AND AS CLOSE TO THE WATER METER AS POSSIBLE.
6. THE ASSEMBLY MUST BE PROTECTED FROM FREEZING.
7. DISTANCE FROM THE BOTTOM OF PRESSURE RELIEF VALVE TO THE DRAIN OPENING MUST BE A MINIMUM OF TWICE THE DIAMETER OF THE ASSEMBLY PIPING.
8. INSTALLATION MUST MEET UNIFORM PLUMBING CODES IN ADDITION TO FLAGSTAFF WATER STANDARD DETAILS.
9. INSTALLATION MUST BE LEFT EXPOSED UNTIL INSPECTED AND APPROVED BY FLAGSTAFF CITY UTILITIES.
10. IN CASES WHERE WATER SUPPLY MAY NOT BE INTERRUPTED DURING NORMAL WORKING HOURS, TWO ASSEMBLIES INSTALLED IN PARALLEL ARE REQUIRED.
11. THE ASSEMBLY MUST BE APPROVED BY THE CITY UTILITIES PRIOR TO INSTALLATION.
12. FOR AN UPDATED LIST OF APPROVED ASSEMBLIES OR ADDITIONAL QUESTIONS CONTACT THE CITY UTILITIES DEPARTMENT AT (928) 213-2117
13. THREE SETS OF PLANS SHALL BE SUBMITTED TO CITY UTILITIES DEPARTMENT FOR APPROVAL BY SIGNATURE PRIOR TO INSTALLATION

City of Flagstaff	REDUCED PRESSURE ASSEMBLY (RPA) INSTALLATION	NTS
ENGINEERING DETAIL	DETAIL NO. 09-06-072	REVISION DATE: 11/22/16 — 1 / 1



NOTES:

1. A CORRECT REDUCED PRESSURE BACKFLOW ASSEMBLY (RPA) INSTALLATION IS SHOWN ABOVE. THERE MUST NOT BE ANY CONNECTIONS ON THE SERVICE LINE BETWEEN THE RPA AND THE WATER METER.
2. PROTECTIVE ENCLOSURES MUST MEET CLEARANCE REQUIREMENTS IN ADDITION TO PROVIDING SIDE AND TOP ACCESS. THE ENCLOSURE MUST BE ASSE 1060 CERTIFIED.
3. ENCLOSURES MUST NOT RETAIN WATER.
4. THE ASSEMBLY MUST BE ACCESSIBLE AT ALL TIMES.
5. THE RPA MUST BE INSTALLED ABOVE GROUND AND AS CLOSE TO THE WATER METER AS POSSIBLE.
6. THE ASSEMBLY MUST BE PROTECTED FROM FREEZING. THE GFI OUTLET CANNOT BE DIRECTLY BELOW THE RELIEF VALVE.
7. DISTANCE FROM THE BOTTOM OF PRESSURE RELIEF VALVE TO THE DRAIN OPENING MUST BE A MINIMUM OF TWELVE (12) INCHES.
8. INSTALLATION MUST MEET INTERNATIONAL PLUMBING CODES IN ADDITION TO FLAGSTAFF WATER STANDARD DETAILS.
9. INSTALLATION MUST BE LEFT EXPOSED UNTIL INSPECTED AND APPROVED BY FLAGSTAFF CITY WATER SERVICES.
10. IN CASES WHERE WATER SUPPLY MAY NOT BE INTERRUPTED DURING NORMAL WORKING HOURS, TWO ASSEMBLIES INSTALLED IN PARALLEL ARE REQUIRED.
11. THE ASSEMBLY MUST BE APPROVED BY THE CITY WATER SERVICES PRIOR TO INSTALLATION.
12. FOR AN UPDATED LIST OF APPROVED ASSEMBLIES OR ADDITIONAL QUESTIONS CONTACT THE CITY WATER SERVICES DEPARTMENT.

NTS

City of Flagstaff ENGINEERING DETAIL	REDUCED PRESSURE ASSEMBLY (RPA) INSTALLATION		
	DETAIL NO. 09-06-072	REVISION DATE: 02/20/2024	1 1

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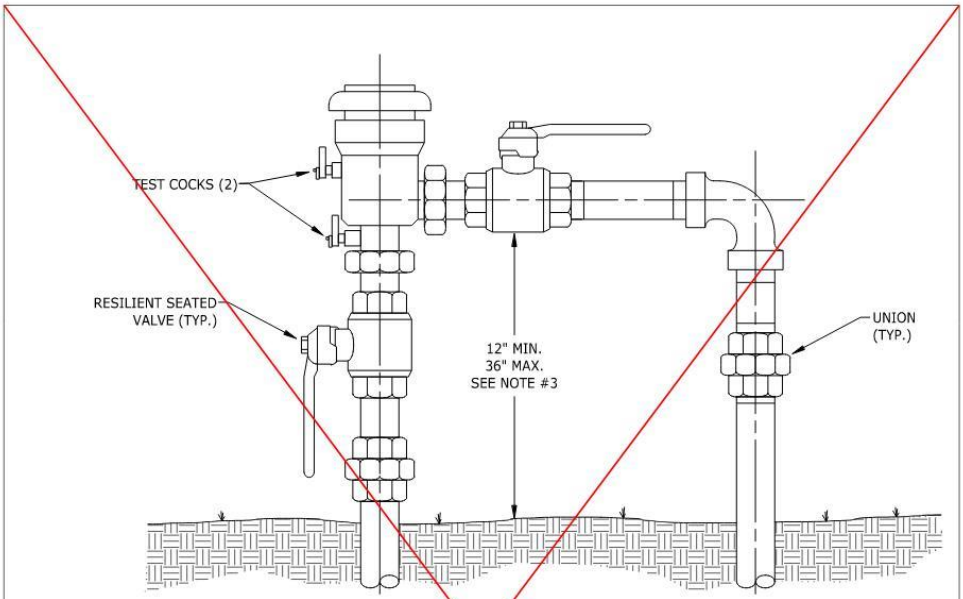
09-06-073: Pressure Vacuum Breaker Assembly (PVBA) Installation

Section 56. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-06-073: Pressure Vacuum Breaker Assembly (PVBA) Installation, delete existing standard drawing 09-06-073 and replace with standard drawing 09-06-073 below:



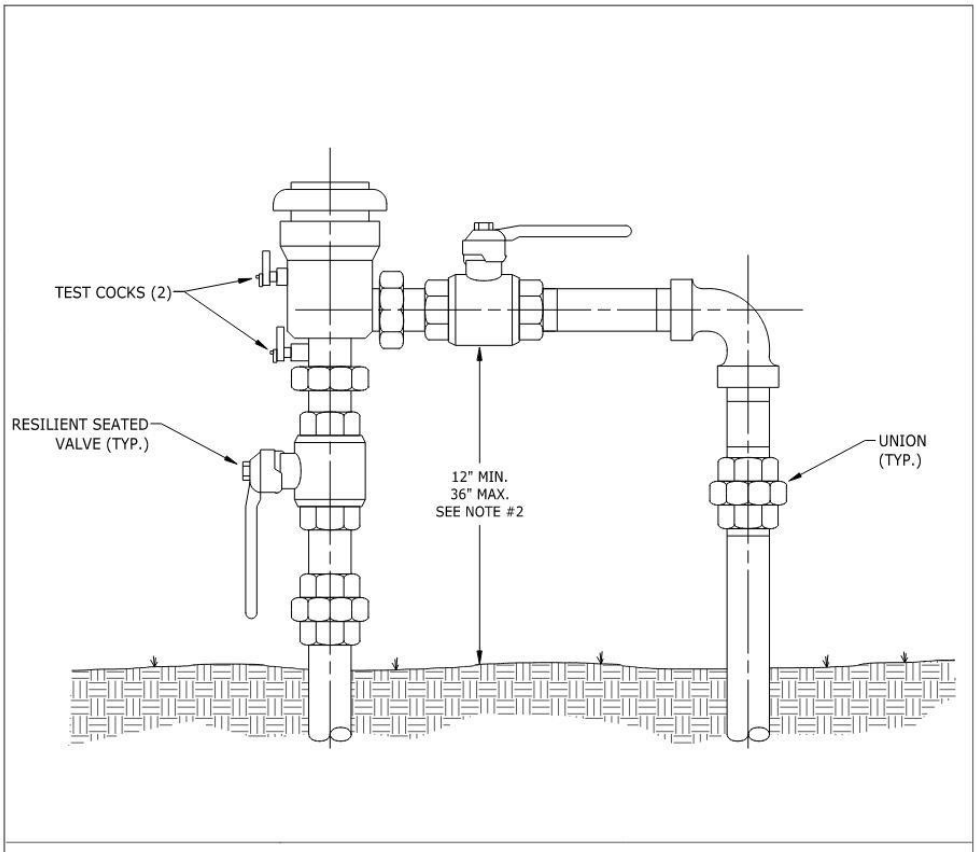
NOTES:

1. CONTACT CITY OF FLAGSTAFF UTILITIES DEPARTMENT FOR LATEST APPROVED LIST OF BACKFLOW PREVENTOR ASSEMBLIES.
2. TWO TEST COCKS SHALL BE INSTALLED PER U.S.C.*
3. ASSEMBLY MUST BE INSTALLED 12 INCHES ABOVE THE HIGHEST OUTLET ON THE SYSTEM. IF THIS DISTANCE EXCEEDS 36 INCHES A REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY MUST BE UTILIZED.
4. ASSEMBLY MUST BE PROTECTED FROM FREEZING.
5. 3 SETS OF PLANS SHALL BE SUBMITTED TO THE CITY UTILITIES DEPARTMENT FOR APPROVAL BY SIGNATURE PRIOR TO INSTALLATION.
6. ALL SHUT OFF VALVES MUST BE RESILIENT SEATED.
7. FLANGES OR UNIONS TO BE AS CLOSE TO THE ASSEMBLY AS POSSIBLE.
8. DEVICE MAY BE REMOVED FOR WINTER THEN REINSTALLED AND TESTED IN THE SPRING.

* U.S.C. IS UNIVERSITY OF SOUTHERN CALIFORNIA (FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH).

NTS

City of Flagstaff	PRESSURE VACUUM BREAKER ASSEMBLY (PVBA) INSTALLATION		
ENGINEERING DETAIL	DETAIL NO. 09-06-073	REVISION DATE: 11/22/16	1 / 1



NOTES:

1. CONTACT CITY OF FLAGSTAFF WATER SERVICES DEPARTMENT FOR LATEST APPROVED LIST OF BACKFLOW PREVENTOR ASSEMBLIES.
2. ASSEMBLY MUST BE INSTALLED 12 INCHES ABOVE THE HIGHEST OUTLET ON THE SYSTEM (I.E. THE END OF THE IRRIGATION LINE). IF THIS DISTANCE EXCEEDS 36 INCHES A REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY MUST BE UTILIZED.
3. ASSEMBLY MUST BE PROTECTED FROM FREEZING.
4. ALL SHUT OFF VALVES MUST BE RESILIENT SEATED.
5. FLANGES OR UNIONS TO BE AS CLOSE TO THE ASSEMBLY AS POSSIBLE.
6. DEVICE MAY BE REMOVED FOR WINTER THEN REINSTALLED AND TESTED IN THE SPRING.

NTS

City of Flagstaff	PRESSURE VACUUM BREAKER ASSEMBLY (PVBA) INSTALLATION		
ENGINEERING DETAIL	DETAIL NO. 09-06-073	REVISION DATE: 03/01/2022	1 / 1

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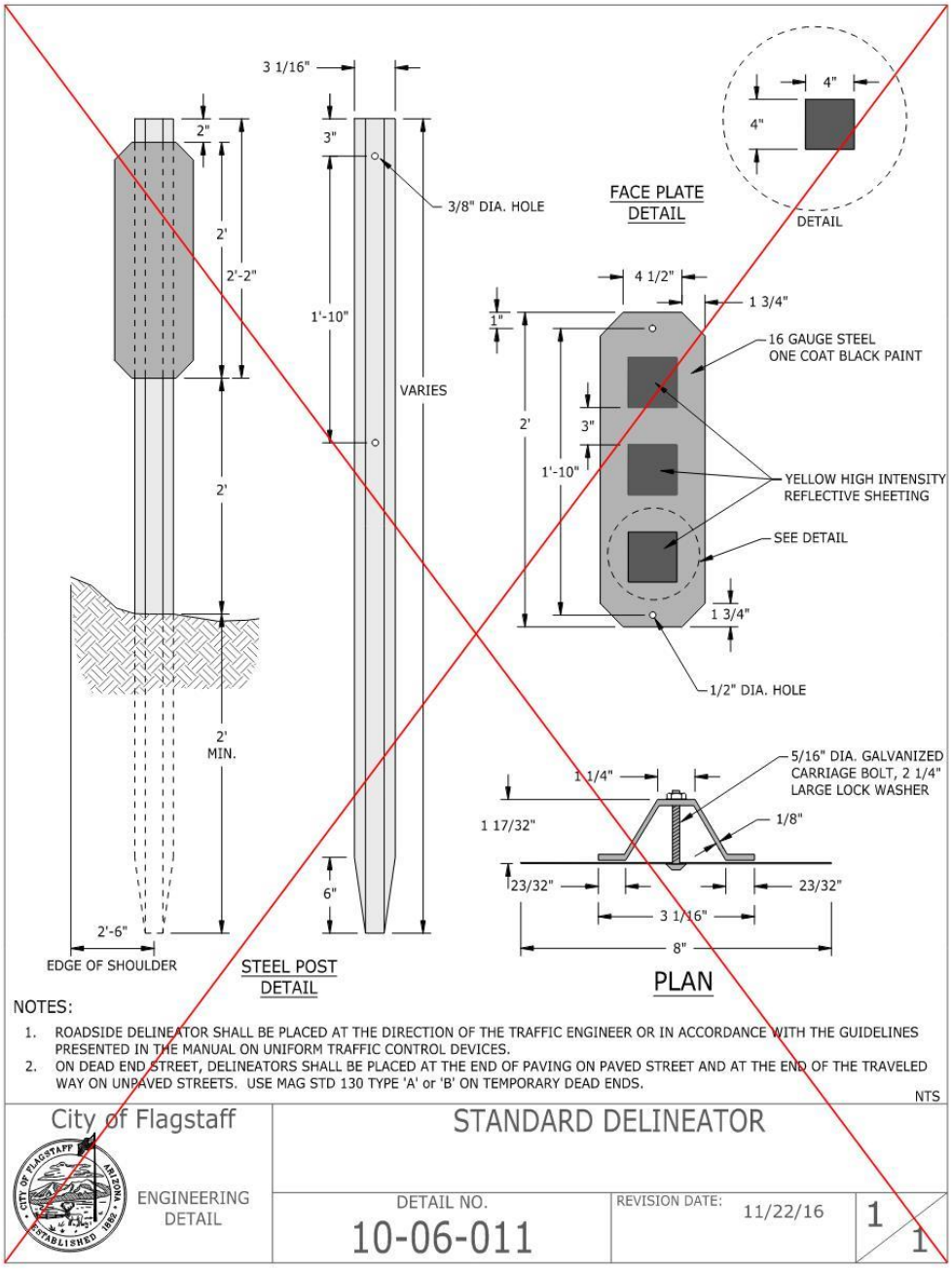
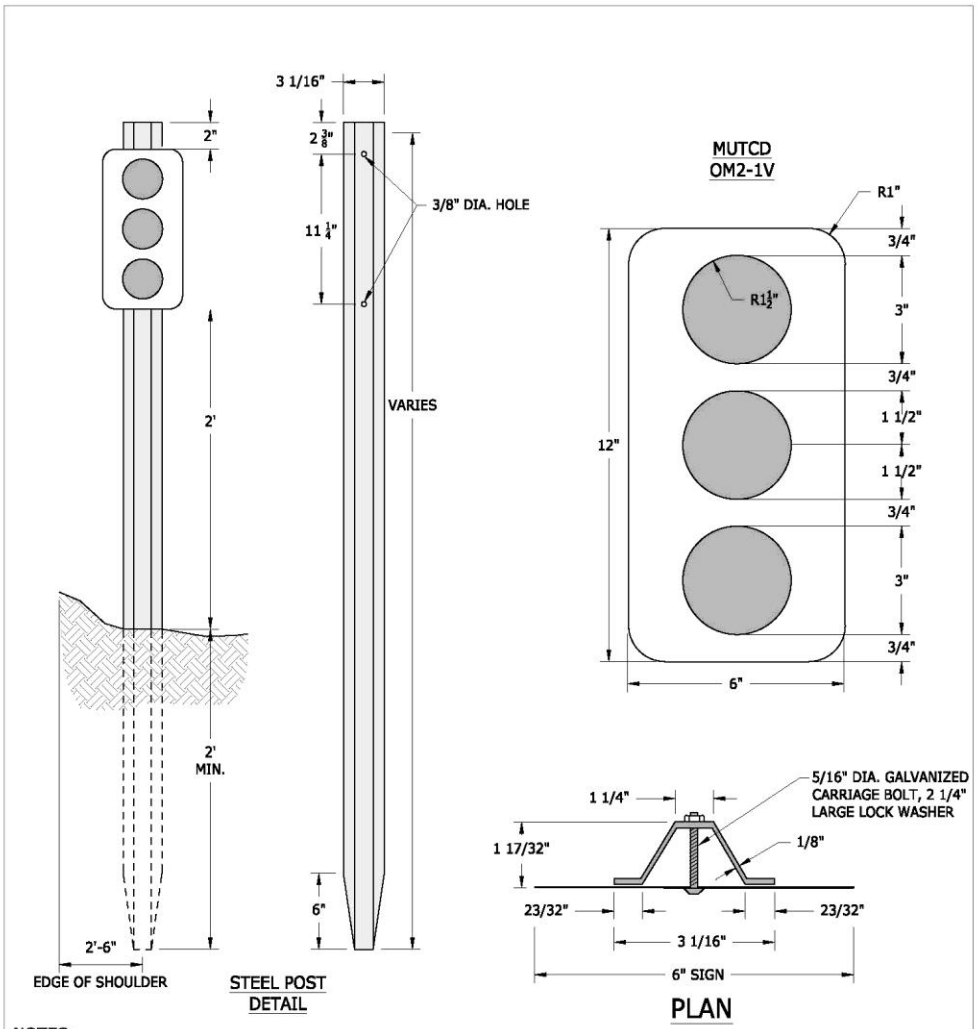
10-06-011: Standard Delineator

Section 57. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-06-011: Standard Delineator, delete existing standard drawing 10-06-011 and replace with standard drawing 10-06-011 below:





NOTES:

1. ROADSIDE DELINEATOR SHALL BE PLACED AT THE DIRECTION OF THE TRAFFIC ENGINEER OR IN ACCORDANCE WITH THE GUIDELINES PRESENTED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. ON DEAD END STREET, DELINEATORS SHALL BE PLACED AT THE END OF PAVING ON PAVED STREET AND AT THE END OF THE TRAVELED WAY ON UNPAVED STREETS. USE MAG STD 130 TYPE 'A' or 'B' ON TEMPORARY DEAD ENDS.

NTS

City of Flagstaff	STANDARD DELINEATOR		
ENGINEERING DETAIL	DETAIL NO. 10-06-011	REVISION DATE: 11/29/2023	1 / 1

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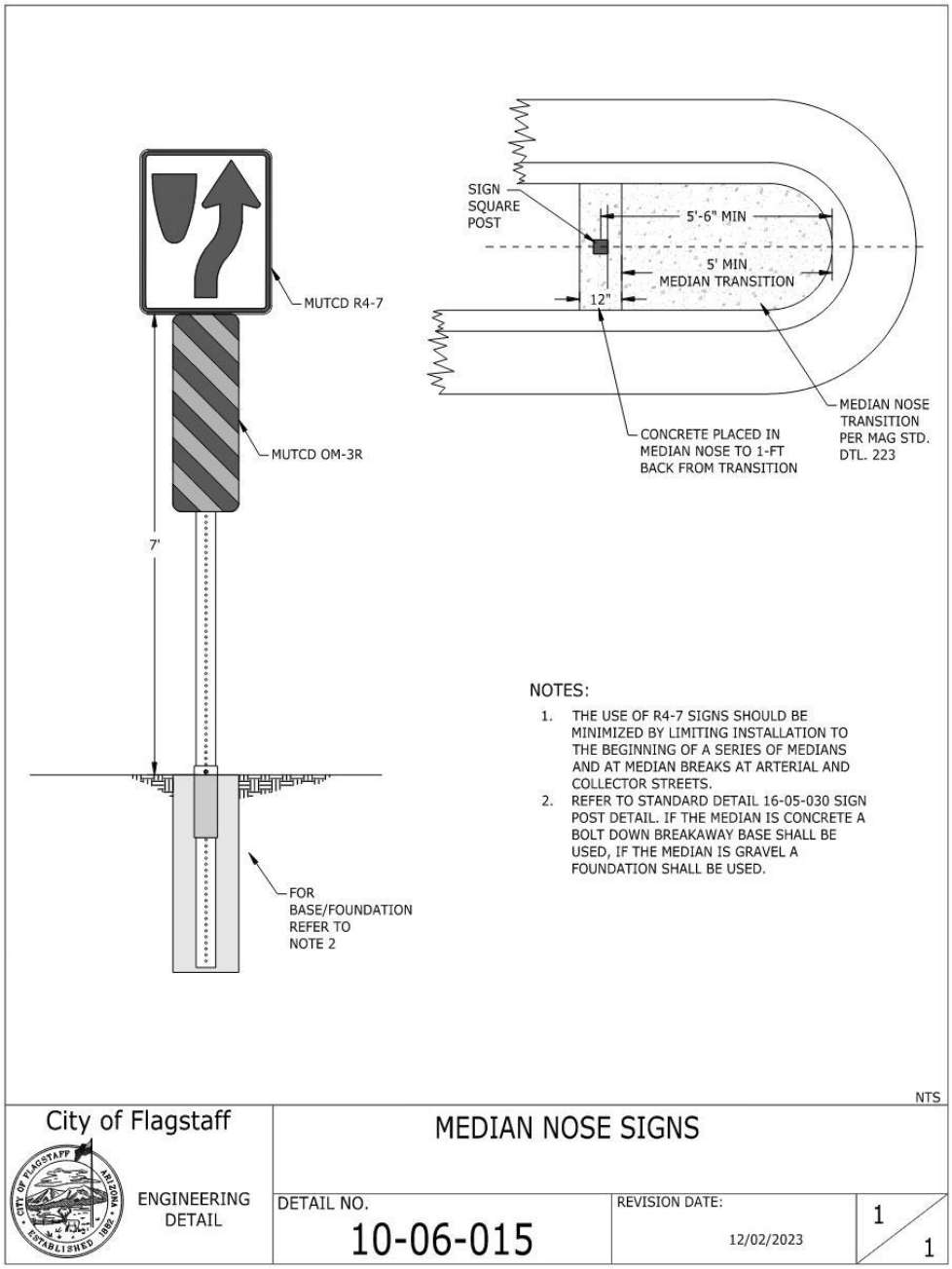
10-06-015: Median Nose Signs

Section 58. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-06-015: Median Nose Signs, to read as follows:



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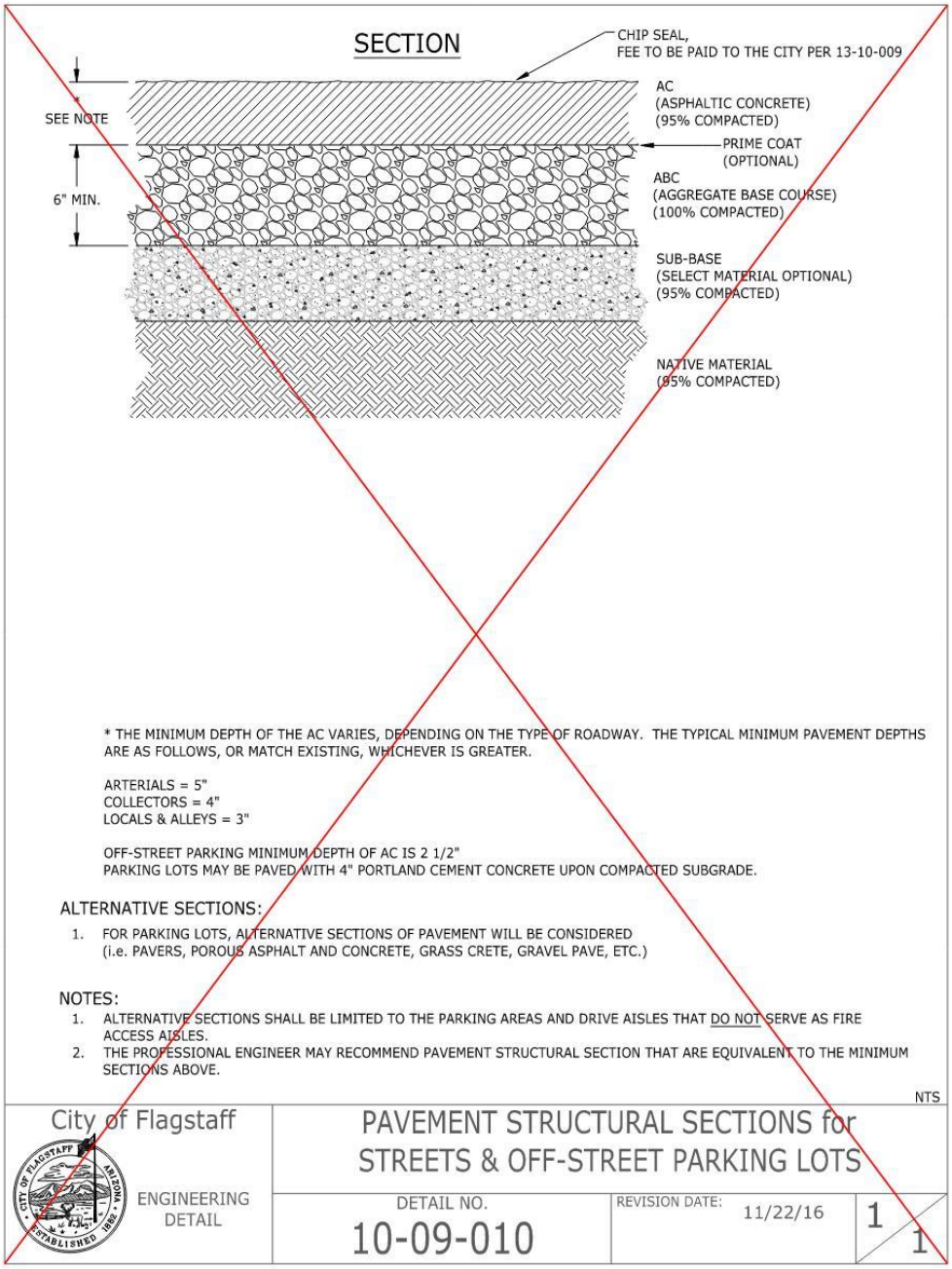
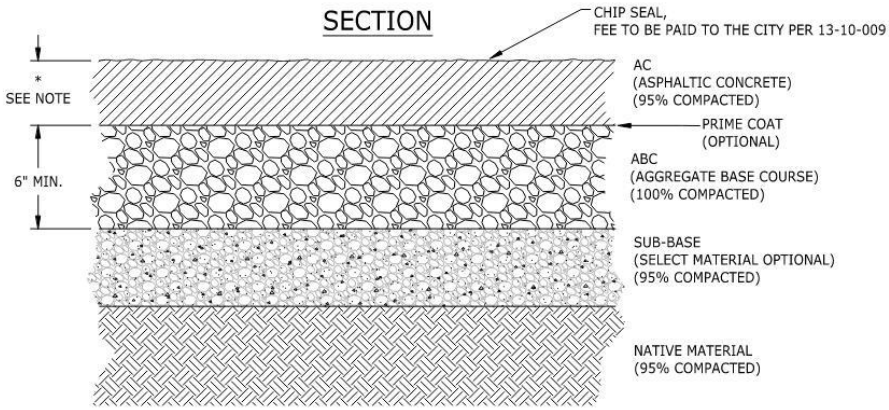
10-09-010: Pavement Structural Section for Streets and Off-Street Parking Lots

Section 59. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-09-010: Pavement Structural Section for Streets and Off-Street Parking Lots, delete existing standard drawing 10-09-010 and replace with standard drawing 10-09-010 below:





* A PAVEMENT DESIGN PREPARED BY A REGISTERED ENGINEER IS REQUIRED IN ACCORDANCE WITH THE CITY OF FLAGSTAFF PAVEMENT DESIGN MANUAL. HOWEVER, UNDER NO CIRCUMSTANCES SHALL THE PAVEMENT THICKNESS BE LOWER THAN THAT INDICATED BELOW.

ARTERIALS = 5"
COLLECTORS = 4"
LOCALS & ALLEYS = 3"

NTS

City of Flagstaff ENGINEERING DETAIL	PAVEMENT STRUCTURAL SECTIONS FOR PUBLIC STREETS AND PRIVATE STREETS WITHIN SUBDIVISIONS		
	DETAIL NO. 10-09-010	REVISION DATE: 11/18/2023	1 1

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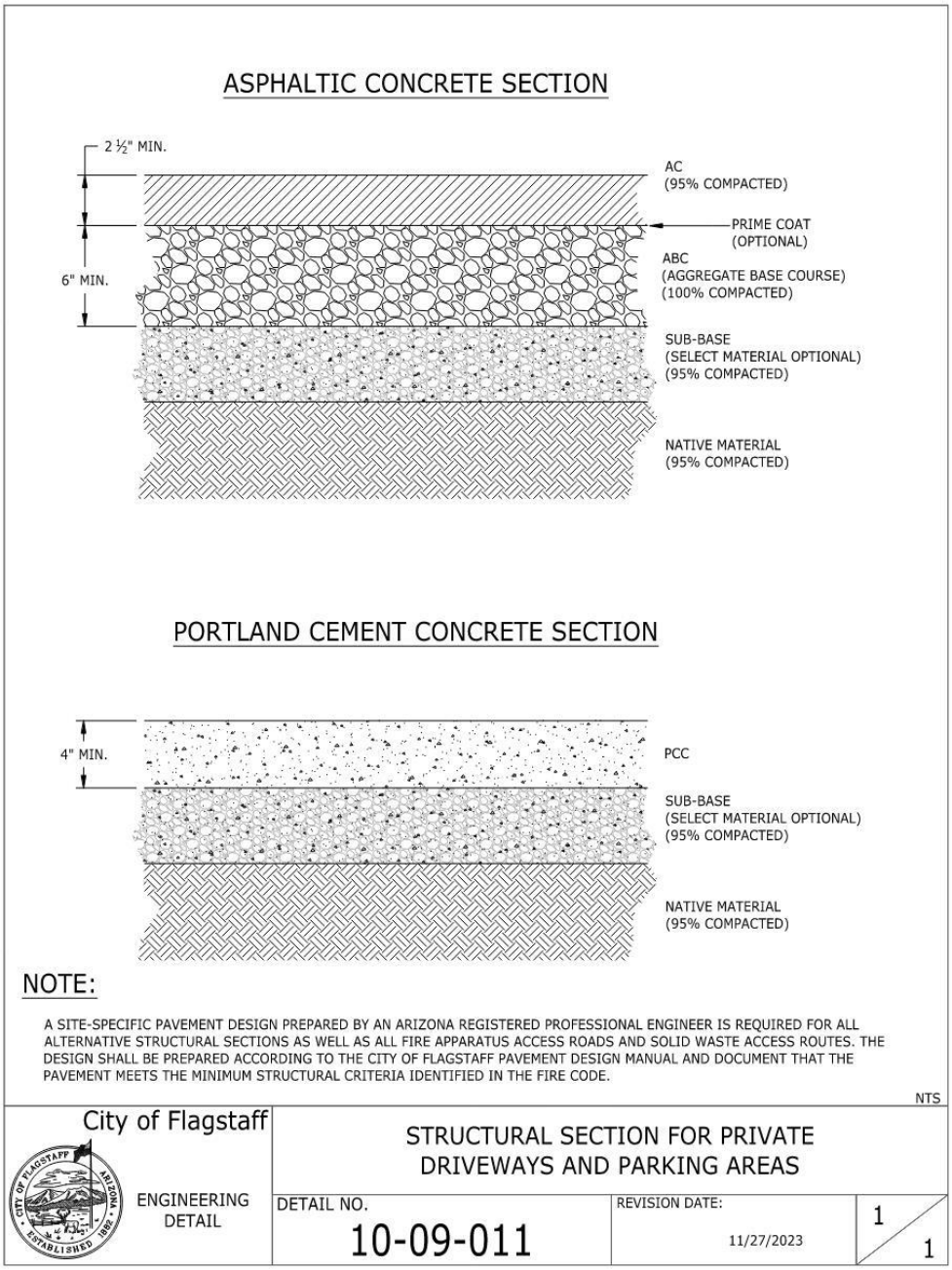
10-09-011: Structural Section for Private Driveways and Parking Areas

Section 60. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-09-011: Structural Section for Private Driveways and Parking Areas, to read as follows:



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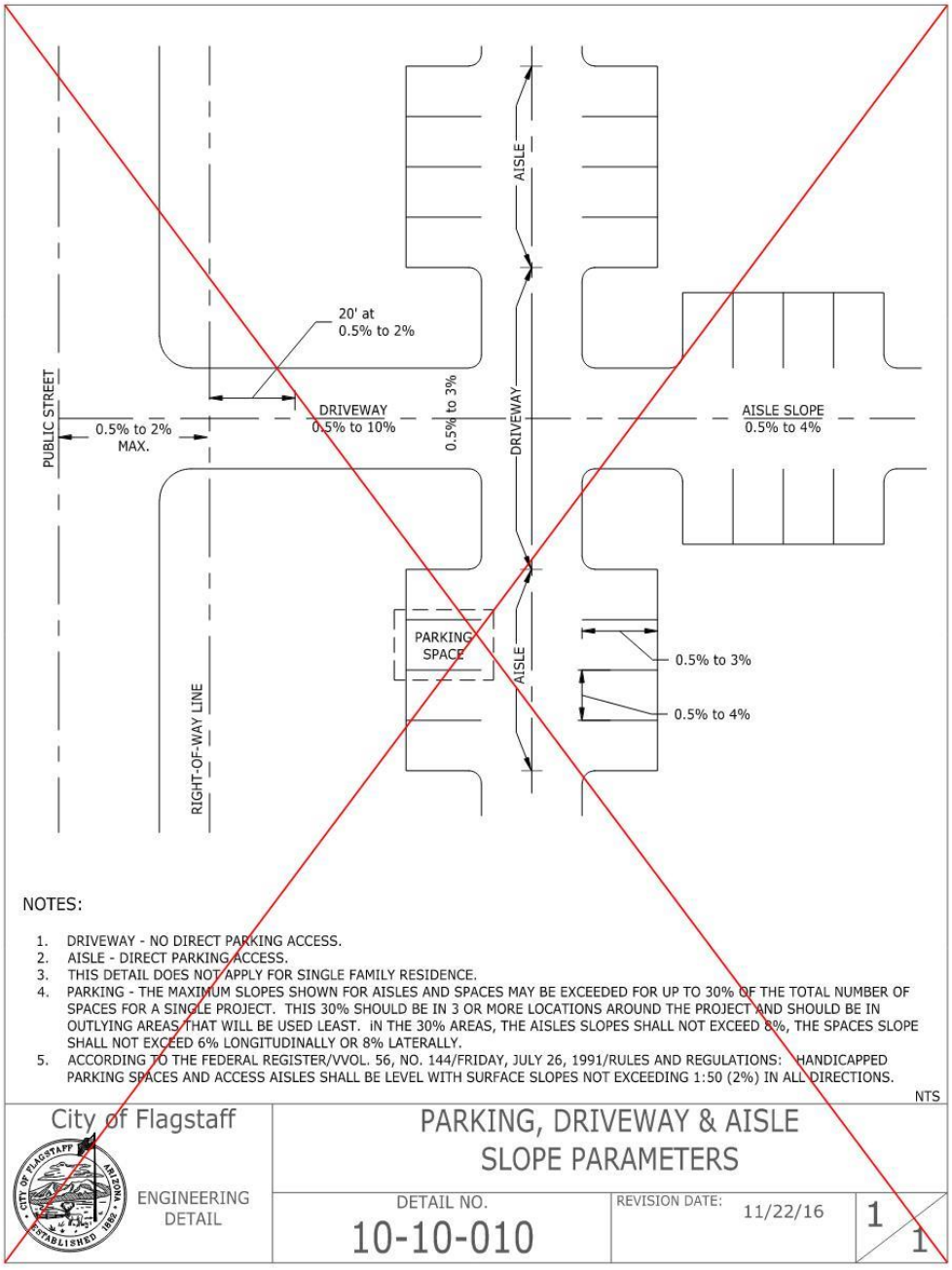
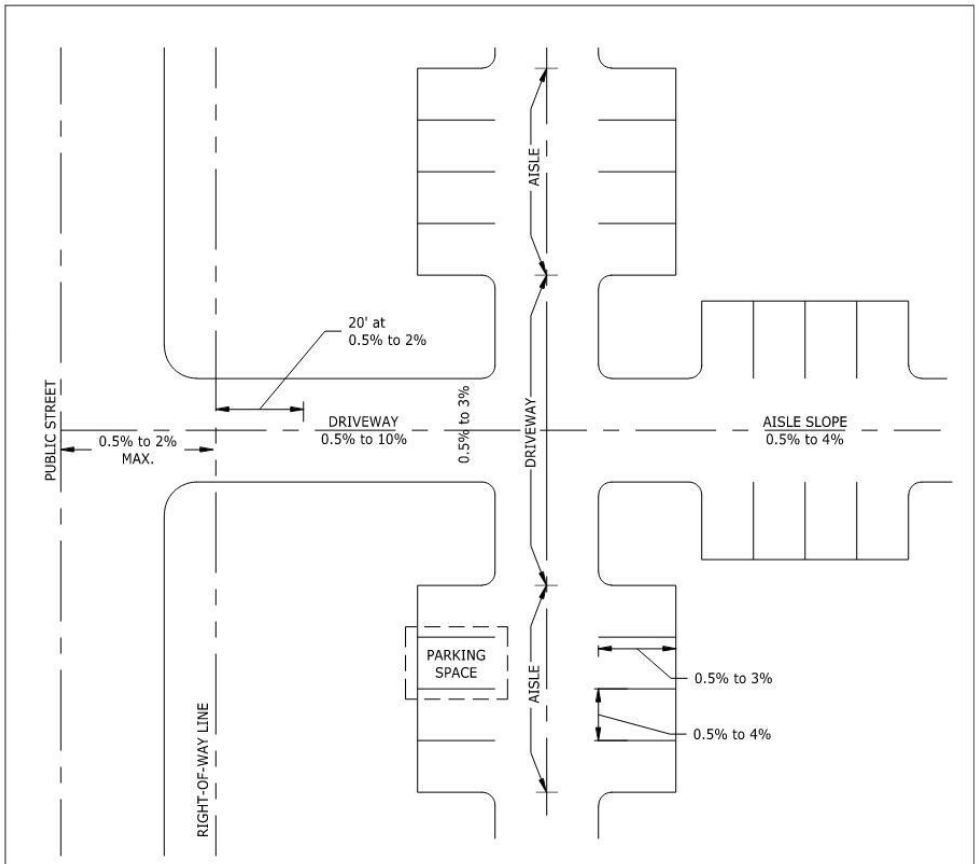
10-10-010: Parking, Driveway & Aisle Slope Parameters

Section 61. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-10-010: Parking, Driveway & Aisle Slope Parameters, delete existing standard drawing 10-10-010 and replace with standard drawing 10-10-010 below:





NOTES:

1. DRIVEWAY - NO DIRECT PARKING ACCESS.
2. AISLE - DIRECT PARKING ACCESS.
3. THIS DETAIL DOES NOT APPLY FOR SINGLE FAMILY RESIDENCE.
4. PARKING - THE MAXIMUM SLOPES SHOWN FOR AISLES AND SPACES MAY BE EXCEEDED FOR UP TO 30% OF THE TOTAL NUMBER OF SPACES FOR A SINGLE PROJECT. THIS 30% SHOULD BE IN 3 OR MORE LOCATIONS AROUND THE PROJECT AND SHOULD BE IN OUTLYING AREAS THAT WILL BE USED LEAST. IN THE 30% AREAS, THE AISLES SLOPES SHALL NOT EXCEED 8%, THE SPACES SLOPE SHALL NOT EXCEED 6% LONGITUDINALLY OR 8% LATERALLY.
5. TO COMPLY WITH 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN, HANDICAPPED PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 1:50 (2%) IN ALL DIRECTIONS.
6. ALL DRIVEWAY AND AISLE DESIGN SHALL MEET SOLID WASTE VEHICLE ACCESS REQUIREMENTS INDICATED IN PW-50-001.

NTS

City of Flagstaff	PARKING, DRIVEWAY & AISLE SLOPE PARAMETERS		
ENGINEERING DETAIL	DETAIL NO. 10-10-010	REVISION DATE: 07/11/2023	1 / 1

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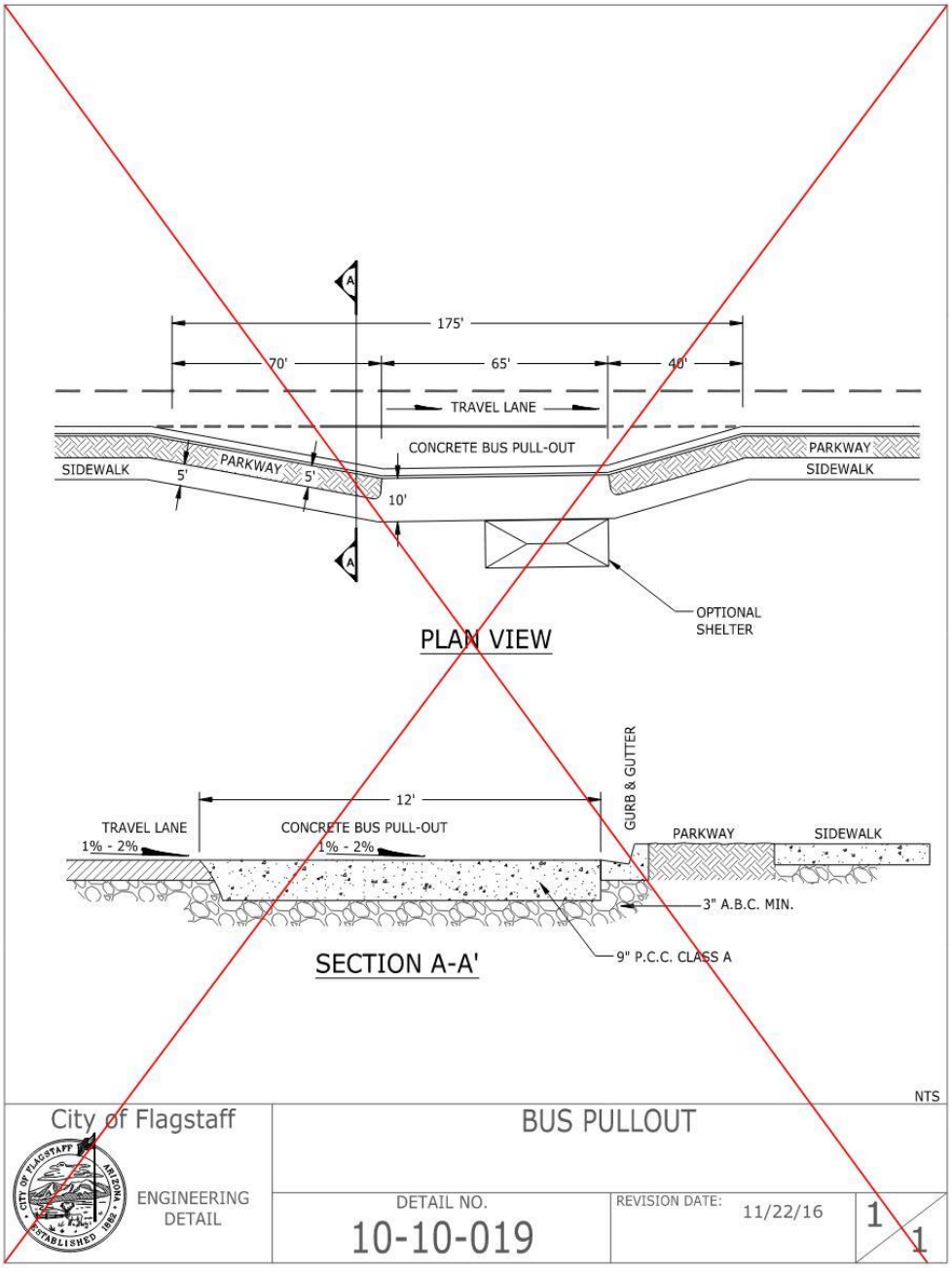
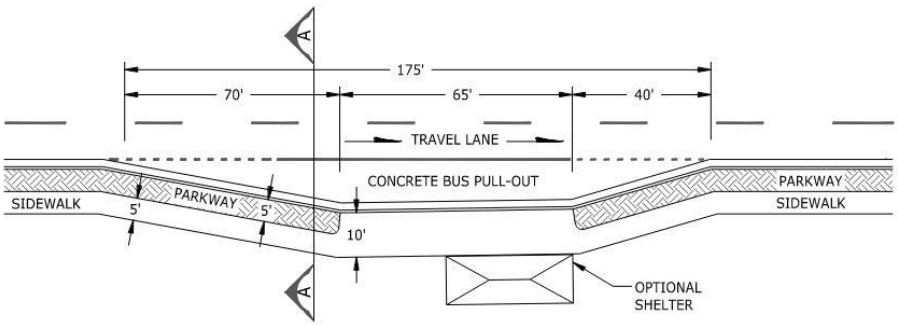
10-10-019: Bus Pullout

Section 62. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-10-019: Bus Pullout, delete existing standard drawing 10-10-019 and replace with standard drawing 10-10-019 below:

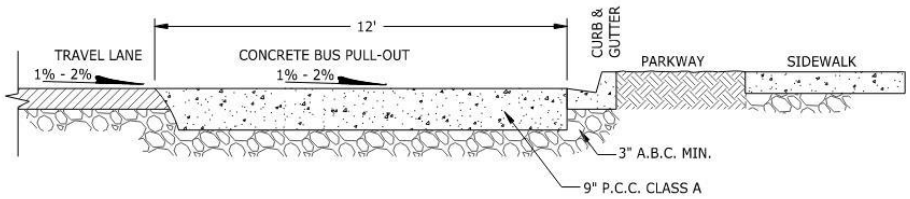




PLAN VIEW

NOTE:

1. WHEN THE SHELTER/BUS STOP IS ADJACENT TO A FUTS, THE FUTS SHALL BE ALIGNED BEHIND THE SHELTER/BUS STOP.



SECTION A-A

NTS

City of Flagstaff ENGINEERING DETAIL	BUS PULLOUT		
	DETAIL NO. 10-10-019	REVISION DATE: 02/17/2024	1 / 1

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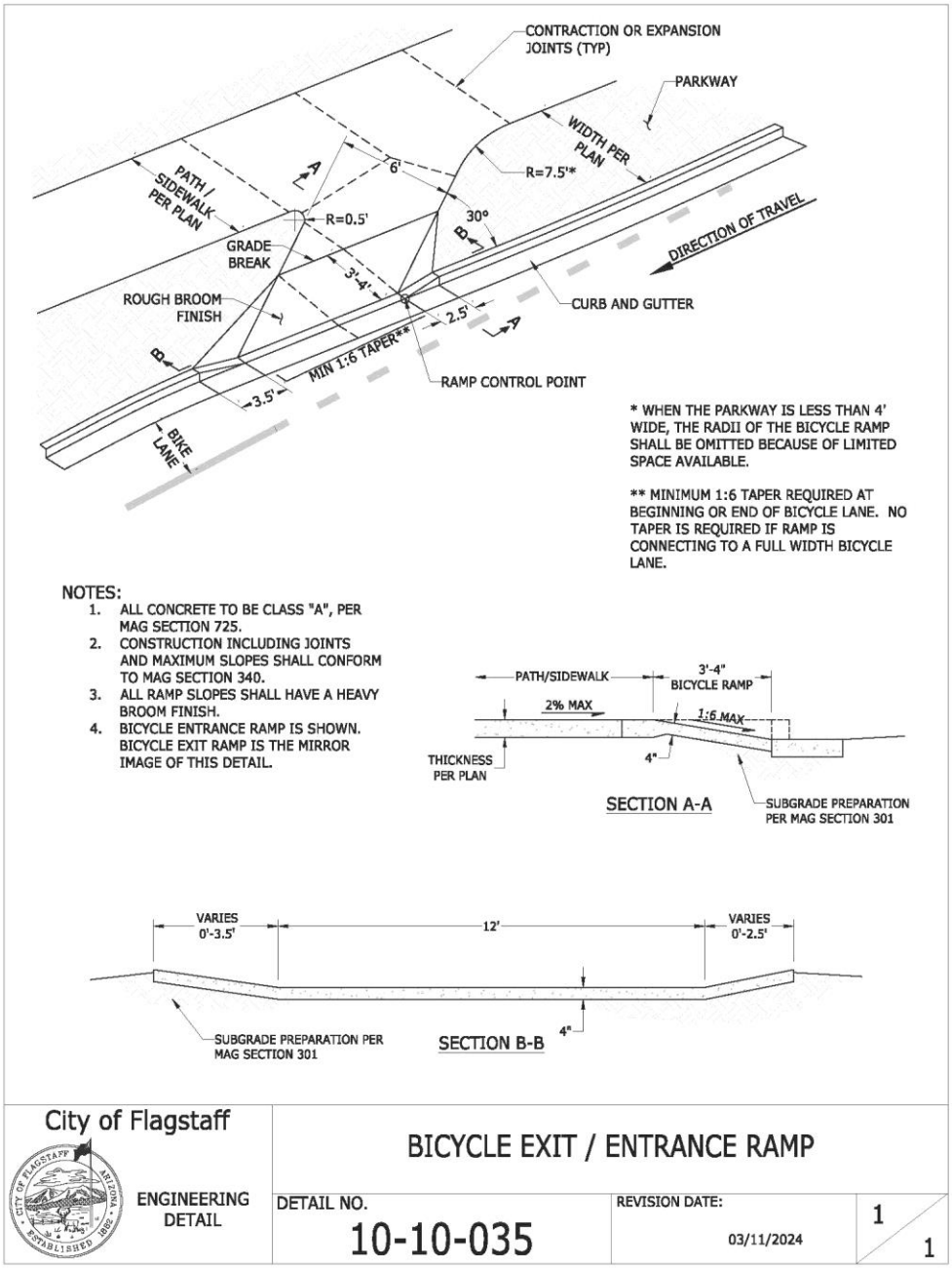
10-10-035: Bicycle Exit / Entrance Ramp

Section 63. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-10-035: Bicycle Exit / Entrance Ramp, to read as follows:



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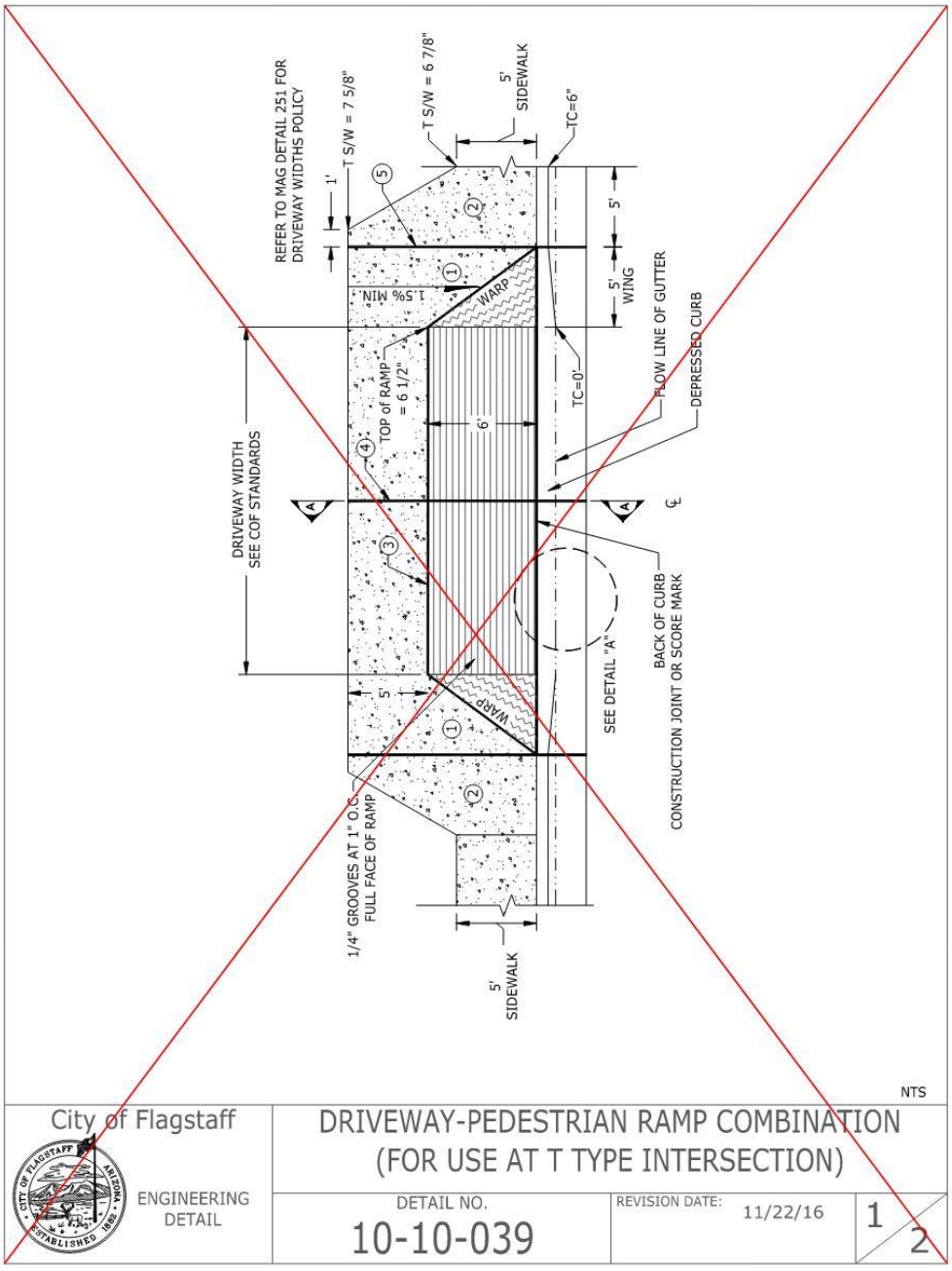
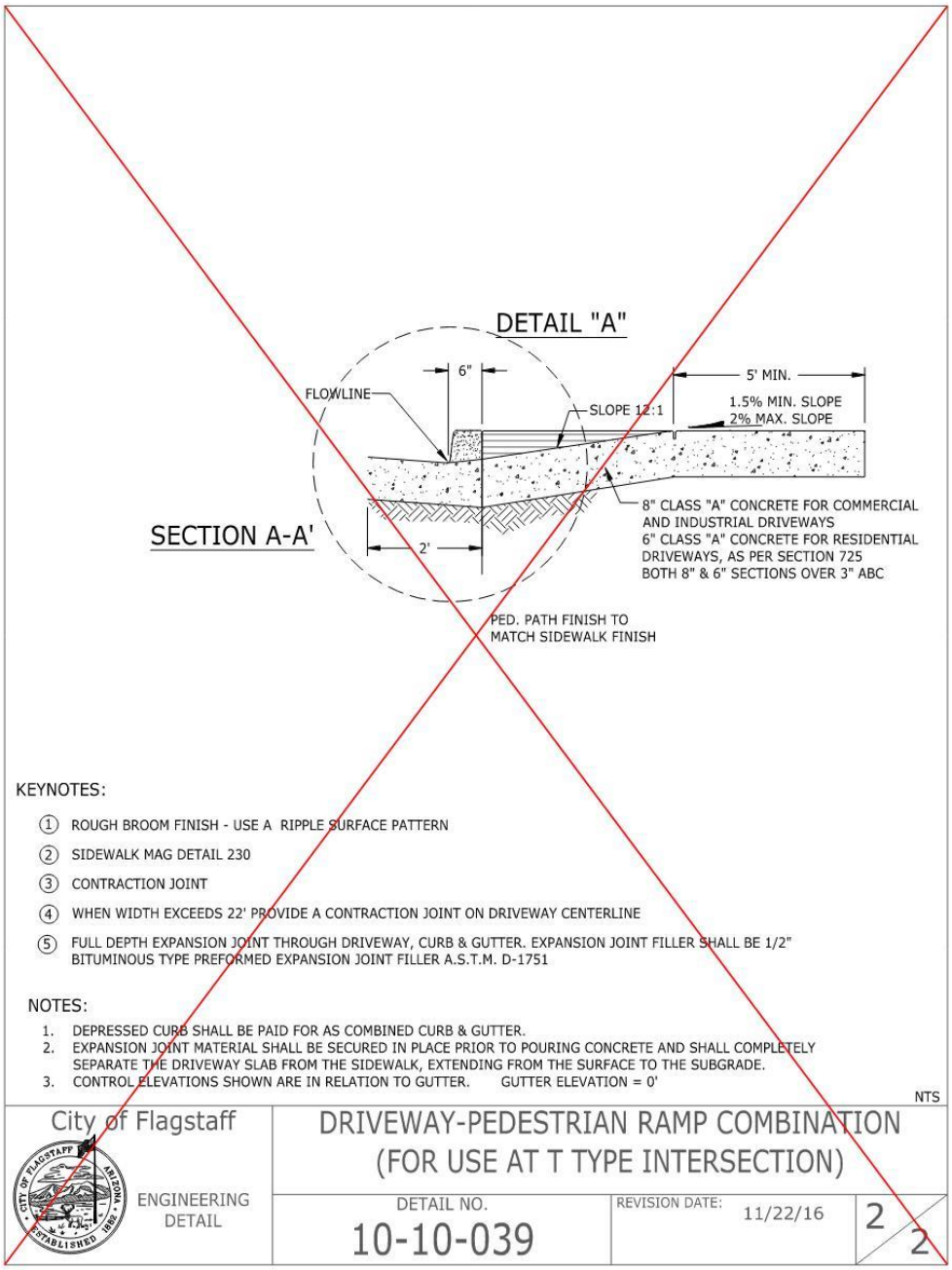
10-10-039: Driveway-Pedestrian Ramp Combination (For Use at T-Type Intersection)

Section 64. Delete Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-10-039: Driveway-Pedestrian Ramp Combination (For Use at T-Type Intersection)




DETAIL "A"
6"
FLOWLINE
SLOPE 12:1
5' MIN.
1.5% MIN. SLOPE
2% MAX. SLOPE
SECTION A-A'
2'
8" CLASS "A" CONCRETE FOR COMMERCIAL AND INDUSTRIAL DRIVEWAYS
6" CLASS "A" CONCRETE FOR RESIDENTIAL DRIVEWAYS, AS PER SECTION 725
BOTH 8" & 6" SECTIONS OVER 3" ABC
PED. PATH FINISH TO MATCH SIDEWALK FINISH
KEYNOTES:
1 ROUGH BROOM FINISH - USE A RIPPLE SURFACE PATTERN
2 SIDEWALK MAG DETAIL 230
3 CONTRACTION JOINT
4 WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON DRIVEWAY CENTERLINE
5 FULL DEPTH EXPANSION JOINT THROUGH DRIVEWAY, CURB & GUTTER. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751
NOTES:
1. DEPRESSED CURB SHALL BE PAID FOR AS COMBINED CURB & GUTTER.
2. EXPANSION JOINT MATERIAL SHALL BE SECURED IN PLACE PRIOR TO POURING CONCRETE AND SHALL COMPLETELY SEPARATE THE DRIVEWAY SLAB FROM THE SIDEWALK, EXTENDING FROM THE SURFACE TO THE SUBGRADE.
3. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO GUTTER. GUTTER ELEVATION = 0'
NTS
City of Flagstaff
ENGINEERING DETAIL
DRIVEWAY-PEDESTRIAN RAMP COMBINATION (FOR USE AT T TYPE INTERSECTION)
DETAIL NO.
10-10-039
REVISION DATE:
11/22/16
2
2

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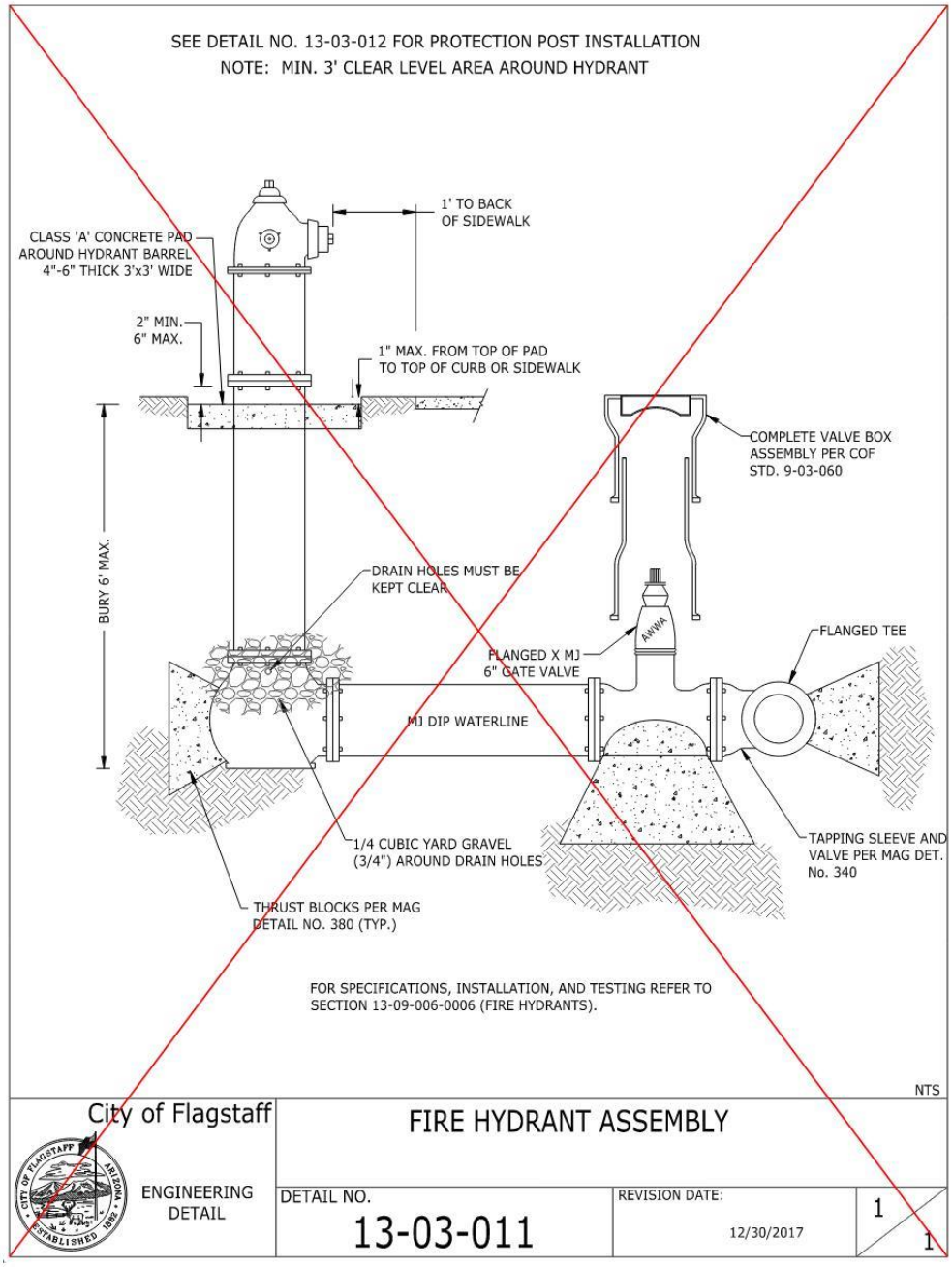
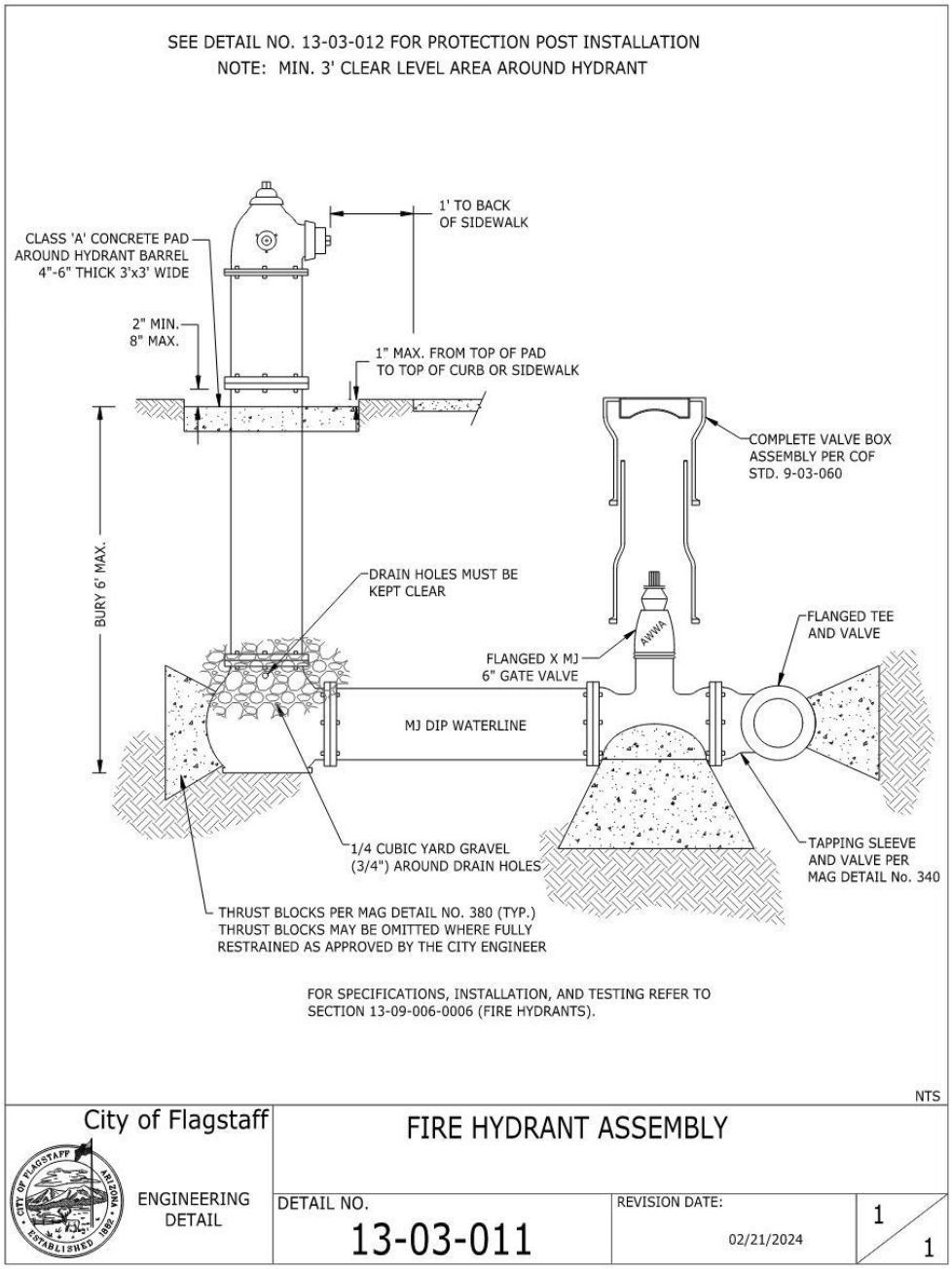
13-03-011: Fire Hydrant Assembly

Section 65. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 13-03-011: Fire Hydrant Assembly, delete existing standard drawing 13-03-011 and replace with standard drawing 13-03-011 below:




SEE DETAIL NO. 13-03-012 FOR PROTECTION POST INSTALLATION
NOTE: MIN. 3' CLEAR LEVEL AREA AROUND HYDRANT
1' TO BACK OF SIDEWALK
CLASS 'A' CONCRETE PAD AROUND HYDRANT BARREL 4"-6" THICK 3'x3' WIDE
2" MIN. 8" MAX.
1" MAX. FROM TOP OF PAD TO TOP OF CURB OR SIDEWALK
BURY 6' MAX.
COMPLETE VALVE BOX ASSEMBLY PER COF STD. 9-03-060
DRAIN HOLES MUST BE KEPT CLEAR
FLANGED TEE AND VALVE
AWWA
FLANGED X MJ 6" GATE VALVE
MJ DIP WATERLINE
1/4 CUBIC YARD GRAVEL (3/4") AROUND DRAIN HOLES
TAPPING SLEEVE AND VALVE PER MAG DETAIL No. 340
THRUST BLOCKS PER MAG DETAIL NO. 380 (TYP.) THRUST BLOCKS MAY BE OMITTED WHERE FULLY RESTRAINED AS APPROVED BY THE CITY ENGINEER
FOR SPECIFICATIONS, INSTALLATION, AND TESTING REFER TO SECTION 13-09-006-0006 (FIRE HYDRANTS).
NTS
City of Flagstaff
ENGINEERING DETAIL
FIRE HYDRANT ASSEMBLY
DETAIL NO.
13-03-011
REVISION DATE:
02/21/2024
1
1

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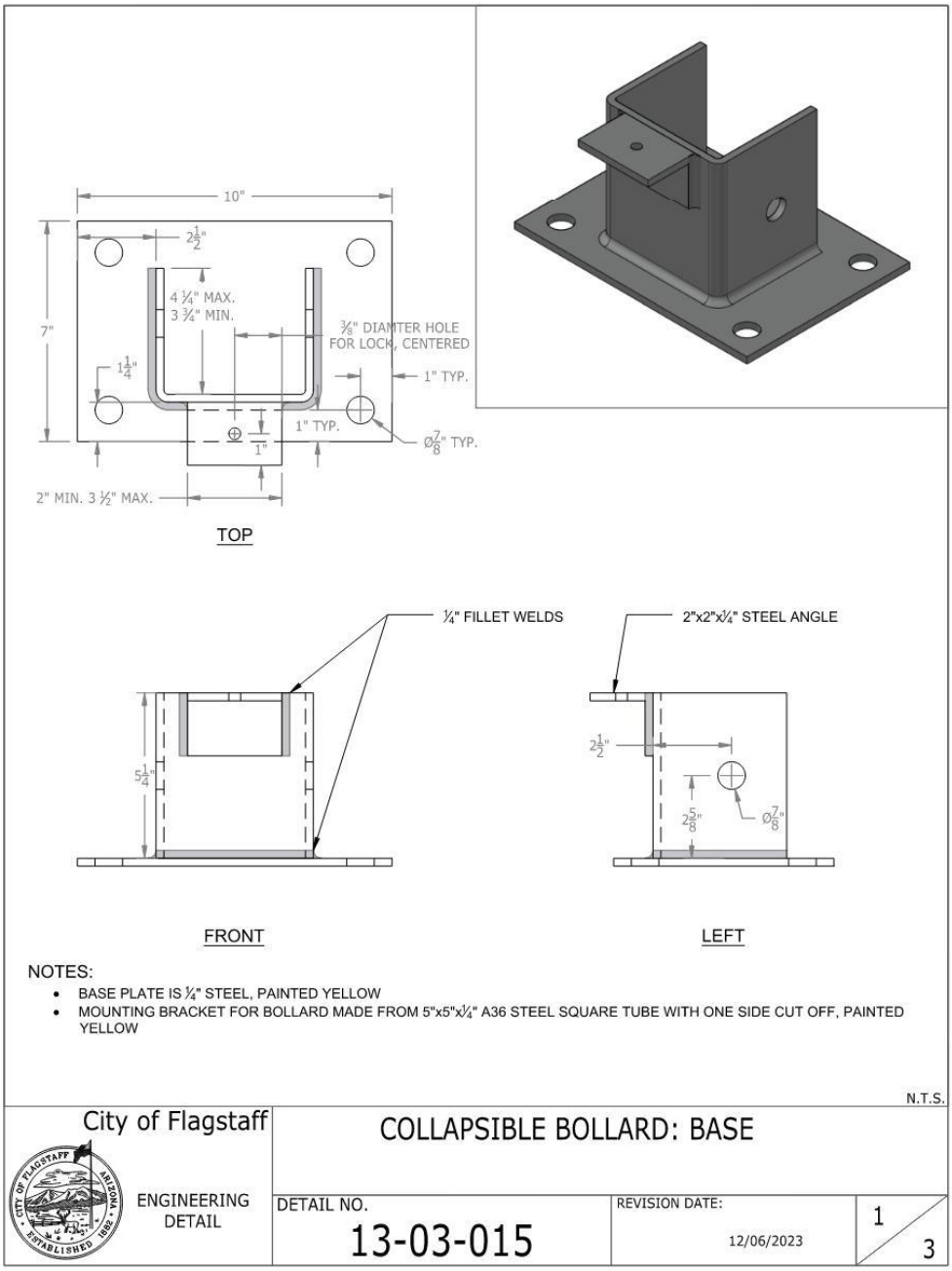
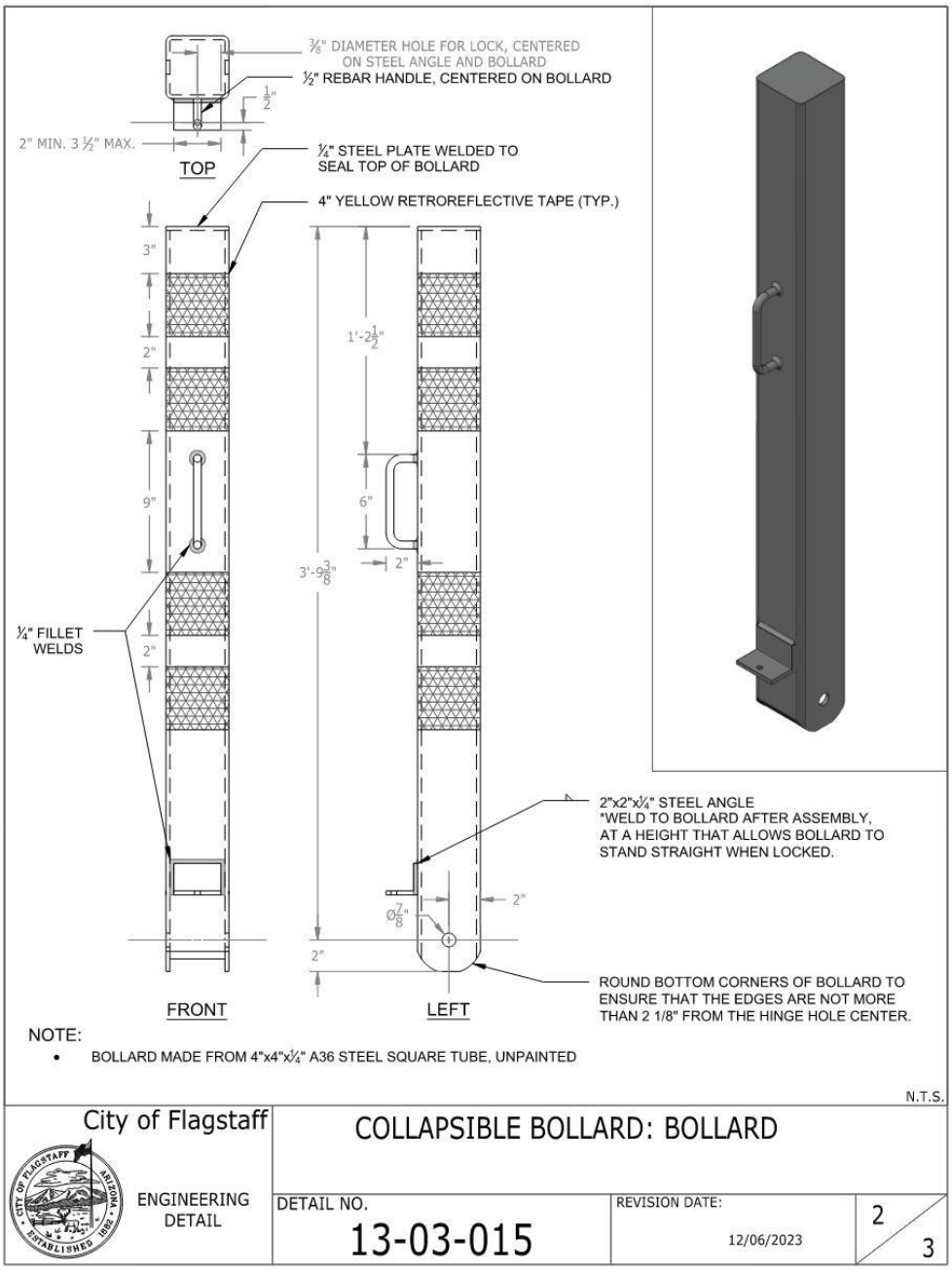
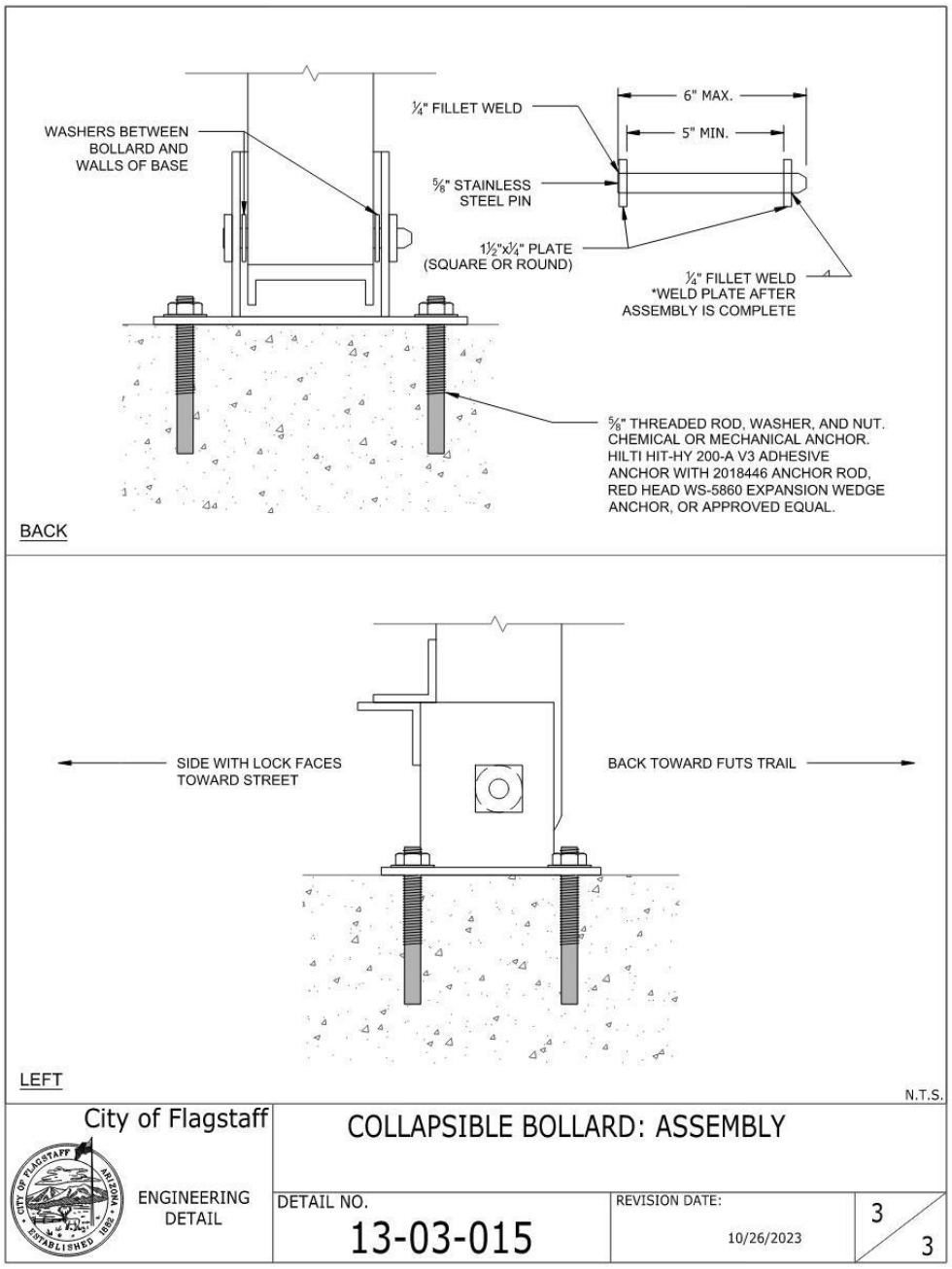
13-03-015: Collapsible Bollard

Section 66. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 13-03-015: Collapsible Bollard, to read as follows:




⅜" DIAMETER HOLE FOR LOCK, CENTERED ON STEEL ANGLE AND BOLLARD
½" REBAR HANDLE, CENTERED ON BOLLARD
½"
2" MIN. 3 ½" MAX.
TOP
¼" STEEL PLATE WELDED TO SEAL TOP OF BOLLARD
4" YELLOW RETROREFLECTIVE TAPE (TYP.)
3"
2"
9"
2"
¼" FILLET WELDS
1'-2½"
6"
2"
3'-9⅜"
2"
2"
Ø⅞"
2"
FRONT
LEFT
2"x2"x¼" STEEL ANGLE
*WELD TO BOLLARD AFTER ASSEMBLY, AT A HEIGHT THAT ALLOWS BOLLARD TO STAND STRAIGHT WHEN LOCKED.
ROUND BOTTOM CORNERS OF BOLLARD TO ENSURE THAT THE EDGES ARE NOT MORE THAN 2 1/8" FROM THE HINGE HOLE CENTER.
NOTE:
• BOLLARD MADE FROM 4"x4"x¼" A36 STEEL SQUARE TUBE, UNPAINTED
N.T.S.
City of Flagstaff
ENGINEERING DETAIL
COLLAPSIBLE BOLLARD: BOLLARD
DETAIL NO.
13-03-015
REVISION DATE:
12/06/2023
2
3


WASHERS BETWEEN BOLLARD AND WALLS OF BASE
¼" FILLET WELD
6" MAX.
5" MIN.
⅝" STAINLESS STEEL PIN
1½"x¼" PLATE (SQUARE OR ROUND)
¼" FILLET WELD *WELD PLATE AFTER ASSEMBLY IS COMPLETE
⅝" THREADED ROD, WASHER, AND NUT. CHEMICAL OR MECHANICAL ANCHOR. HILTI HIT-HY 200-A V3 ADHESIVE ANCHOR WITH 2018446 ANCHOR ROD, RED HEAD WS-5860 EXPANSION WEDGE ANCHOR, OR APPROVED EQUAL.
BACK
SIDE WITH LOCK FACES TOWARD STREET
BACK TOWARD FUTS TRAIL
LEFT
N.T.S.
City of Flagstaff
ENGINEERING DETAIL
COLLAPSIBLE BOLLARD: ASSEMBLY
DETAIL NO.
13-03-015
REVISION DATE:
10/26/2023
3
3

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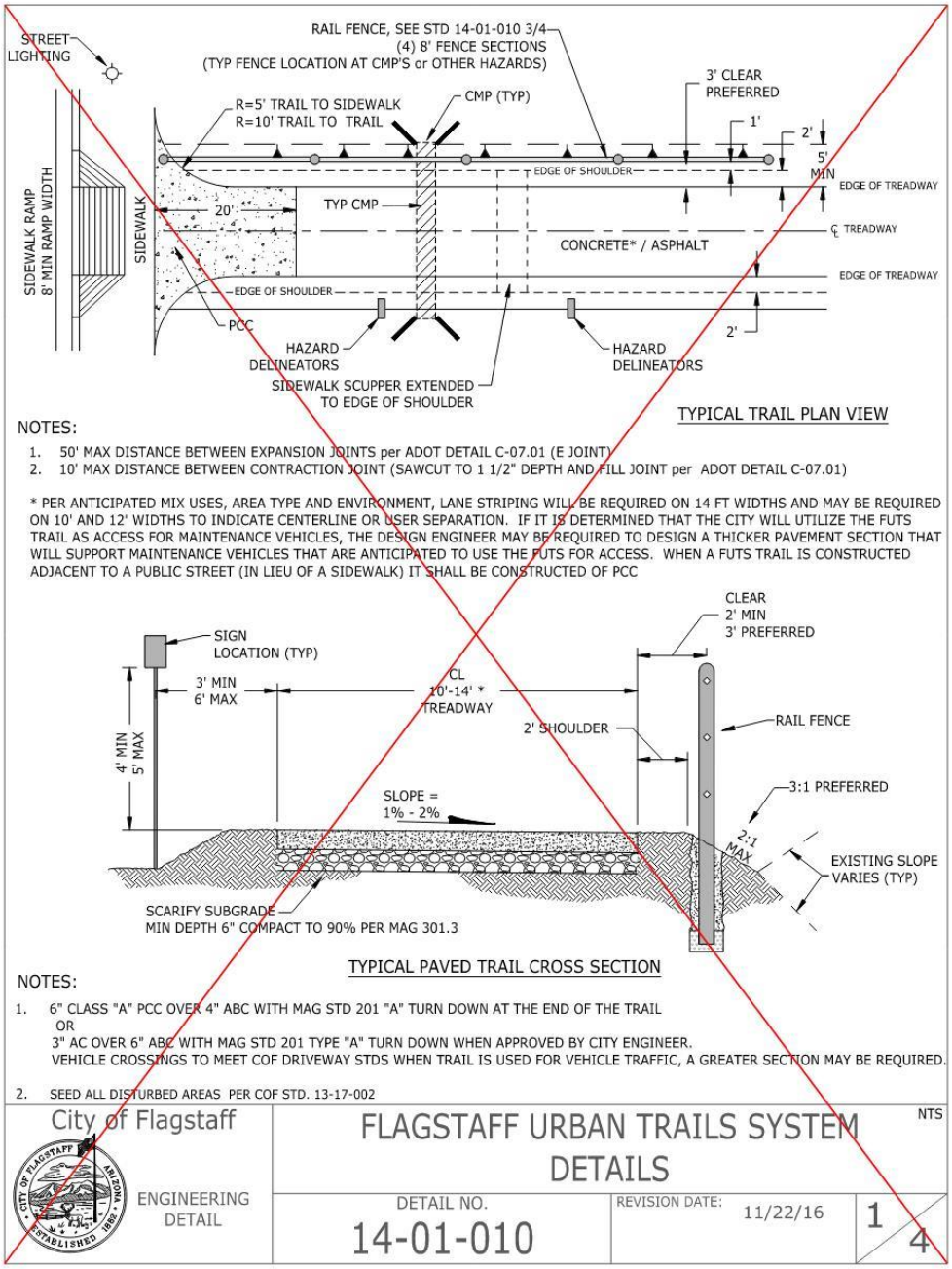
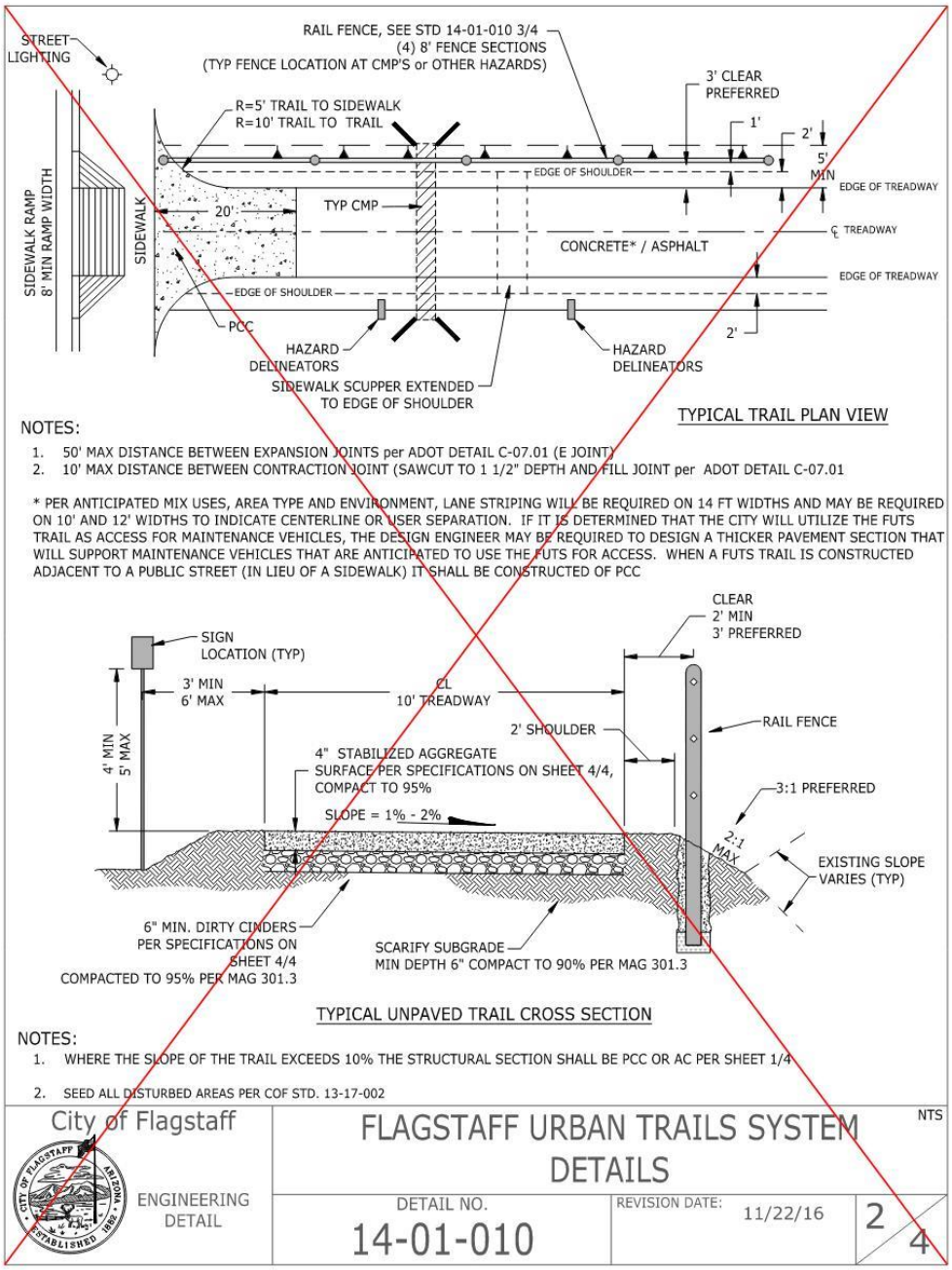
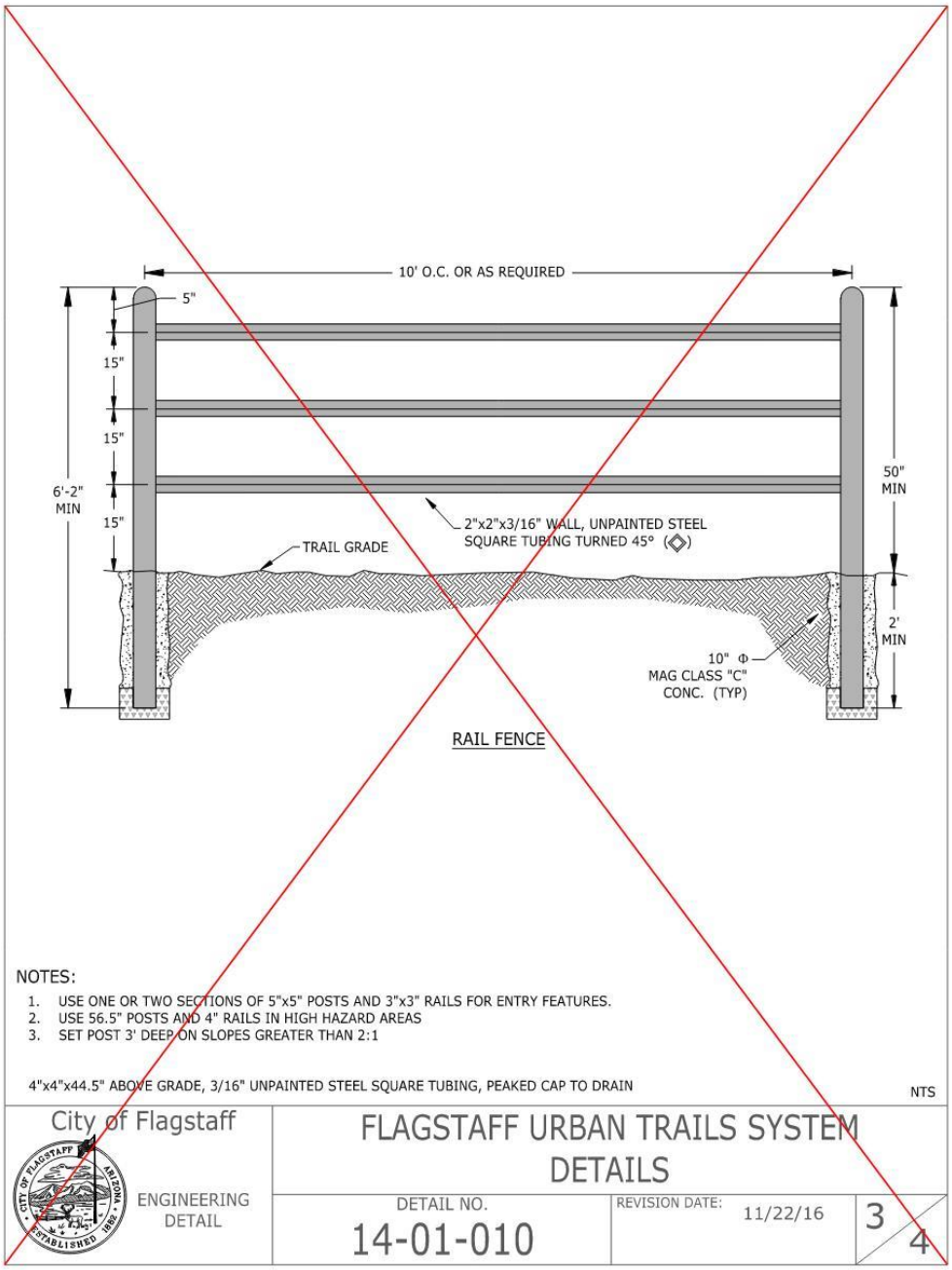
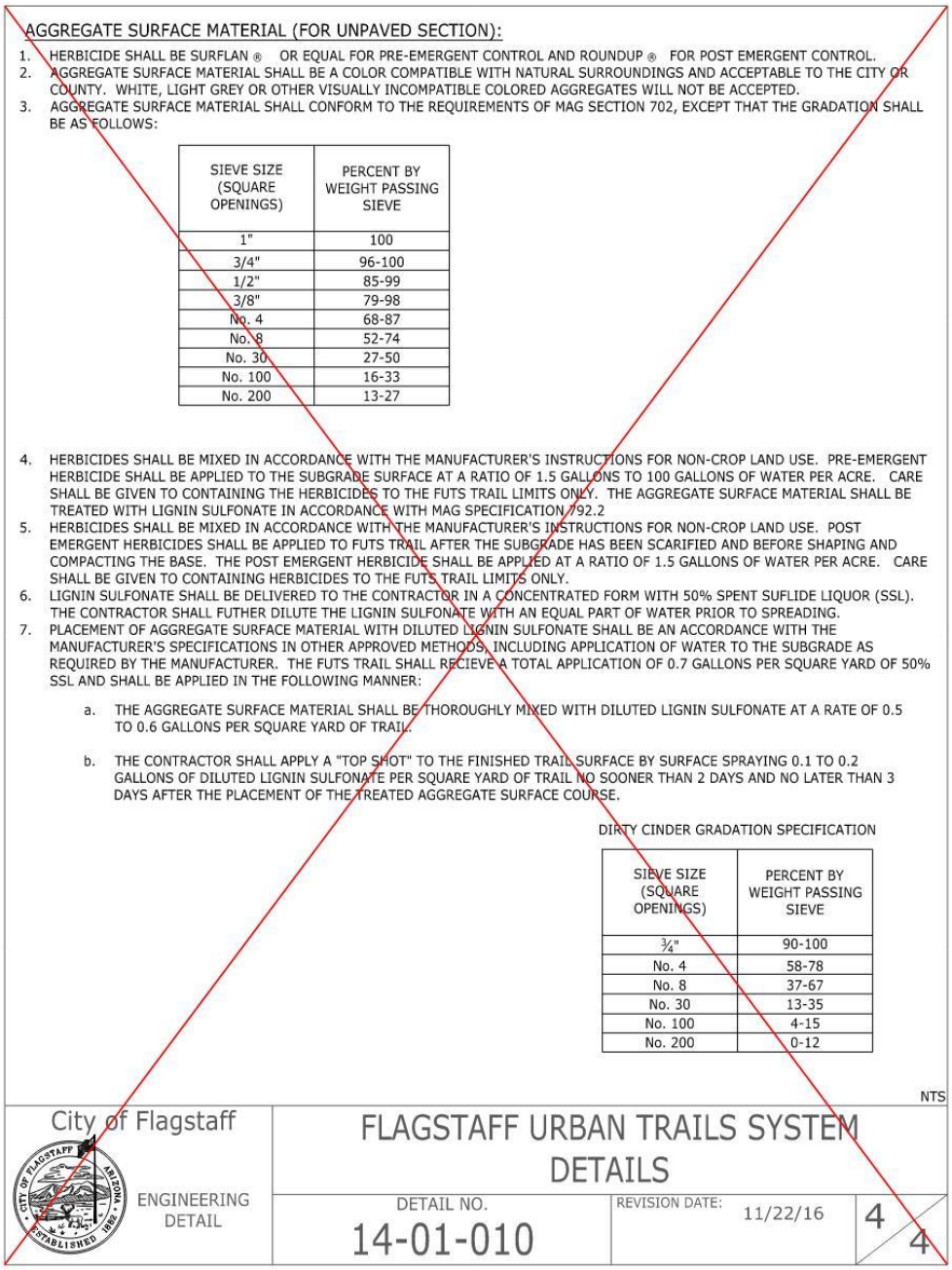
14-01-010: Flagstaff Urban Trails System Details

Section 67. Delete Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-01-010: Flagstaff Urban Trails System Details




STREET LIGHTING
RAIL FENCE, SEE STD 14-01-010 3/4
(4) 8' FENCE SECTIONS
(TYP FENCE LOCATION AT CMP'S or OTHER HAZARDS)
3' CLEAR PREFERRED
R=5' TRAIL TO SIDEWALK
R=10' TRAIL TO TRAIL
1'
2'
5' MIN
EDGE OF SHOULDER
EDGE OF TREADWAY
SIDEWALK RAMP
8' MIN RAMP WIDTH
SIDEWALK
20'
TYP CMP
℄ TREADWAY
CONCRETE* / ASPHALT
EDGE OF TREADWAY
EDGE OF SHOULDER
PCC
2'
HAZARD DELINEATORS
HAZARD DELINEATORS
SIDEWALK SCUPPER EXTENDED TO EDGE OF SHOULDER
TYPICAL TRAIL PLAN VIEW
NOTES:
1. 50' MAX DISTANCE BETWEEN EXPANSION JOINTS per ADOT DETAIL C-07.01 (E JOINT)
2. 10' MAX DISTANCE BETWEEN CONTRACTION JOINT (SAWCUT TO 1 1/2" DEPTH AND FILL JOINT per ADOT DETAIL C-07.01
* PER ANTICIPATED MIX USES, AREA TYPE AND ENVIRONMENT, LANE STRIPING WILL BE REQUIRED ON 14 FT WIDTHS AND MAY BE REQUIRED ON 10' AND 12' WIDTHS TO INDICATE CENTERLINE OR USER SEPARATION. IF IT IS DETERMINED THAT THE CITY WILL UTILIZE THE FUTS TRAIL AS ACCESS FOR MAINTENANCE VEHICLES, THE DESIGN ENGINEER MAY BE REQUIRED TO DESIGN A THICKER PAVEMENT SECTION THAT WILL SUPPORT MAINTENANCE VEHICLES THAT ARE ANTICIPATED TO USE THE FUTS FOR ACCESS. WHEN A FUTS TRAIL IS CONSTRUCTED ADJACENT TO A PUBLIC STREET (IN LIEU OF A SIDEWALK) IT SHALL BE CONSTRUCTED OF PCC
SIGN LOCATION (TYP)
CLEAR 2' MIN 3' PREFERRED
3' MIN 6' MAX
CL 10' TREADWAY
2' SHOULDER
RAIL FENCE
4' MIN 5' MAX
4" STABILIZED AGGREGATE SURFACE PER SPECIFICATIONS ON SHEET 4/4, COMPACT TO 95%
3:1 PREFERRED
SLOPE = 1% - 2%
2:1 MAX
EXISTING SLOPE VARIES (TYP)
6" MIN. DIRTY CINDERS PER SPECIFICATIONS ON SHEET 4/4
COMPACTED TO 95% PER MAG 301.3
SCARIFY SUBGRADE
MIN DEPTH 6" COMPACT TO 90% PER MAG 301.3
TYPICAL UNPAVED TRAIL CROSS SECTION
NOTES:
1. WHERE THE SLOPE OF THE TRAIL EXCEEDS 10% THE STRUCTURAL SECTION SHALL BE PCC OR AC PER SHEET 1/4
2. SEED ALL DISTURBED AREAS PER COF STD. 13-17-002
City of Flagstaff
ENGINEERING DETAIL
FLAGSTAFF URBAN TRAILS SYSTEM DETAILS
NTS
DETAIL NO.
14-01-010
REVISION DATE:
11/22/16
2
4


10' O.C. OR AS REQUIRED
5"
15"
15"
15"
6'-2" MIN
50" MIN
2"x2"x3/16" WALL, UNPAINTED STEEL SQUARE TUBING TURNED 45°
TRAIL GRADE
2' MIN
10" Φ MAG CLASS "C" CONC. (TYP)
RAIL FENCE
NOTES:
1. USE ONE OR TWO SECTIONS OF 5"x5" POSTS AND 3"x3" RAILS FOR ENTRY FEATURES.
2. USE 56.5" POSTS AND 4" RAILS IN HIGH HAZARD AREAS
3. SET POST 3' DEEP ON SLOPES GREATER THAN 2:1
4"x4"x44.5" ABOVE GRADE, 3/16" UNPAINTED STEEL SQUARE TUBING, PEAKED CAP TO DRAIN
NTS
City of Flagstaff
ENGINEERING DETAIL
FLAGSTAFF URBAN TRAILS SYSTEM DETAILS
DETAIL NO.
14-01-010
REVISION DATE:
11/22/16
3
4



AGGREGATE SURFACE MATERIAL (FOR UNPAVED SECTION):

1. HERBICIDE SHALL BE SURFLAN ® OR EQUAL FOR PRE-EMERGENT CONTROL AND ROUNDUP ® FOR POST EMERGENT CONTROL.
2. AGGREGATE SURFACE MATERIAL SHALL BE A COLOR COMPATIBLE WITH NATURAL SURROUNDINGS AND ACCEPTABLE TO THE CITY OR COUNTY. WHITE, LIGHT GREY OR OTHER VISUALLY INCOMPATIBLE COLORED AGGREGATES WILL NOT BE ACCEPTED.
3. AGGREGATE SURFACE MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF MAG SECTION 702, EXCEPT THAT THE GRADATION SHALL BE AS FOLLOWS:

SIEVE SIZE (SQUARE OPENINGS)	PERCENT BY WEIGHT PASSING SIEVE
1"	100
3/4"	96-100
1/2"	85-99
3/8"	79-98
No. 4	68-87
No. 8	52-74
No. 30	27-50
No. 100	16-33
No. 200	13-27

4. HERBICIDES SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR NON-CROP LAND USE. PRE-EMERGENT HERBICIDE SHALL BE APPLIED TO THE SUBGRADE SURFACE AT A RATIO OF 1.5 GALLONS TO 100 GALLONS OF WATER PER ACRE. CARE SHALL BE GIVEN TO CONTAINING THE HERBICIDES TO THE FUTS TRAIL LIMITS ONLY. THE AGGREGATE SURFACE MATERIAL SHALL BE TREATED WITH LIGNIN SULFONATE IN ACCORDANCE WITH MAG SPECIFICATION 792.2
5. HERBICIDES SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR NON-CROP LAND USE. POST EMERGENT HERBICIDES SHALL BE APPLIED TO FUTS TRAIL AFTER THE SUBGRADE HAS BEEN SCARIFIED AND BEFORE SHAPING AND COMPACTING THE BASE. THE POST EMERGENT HERBICIDE SHALL BE APPLIED AT A RATIO OF 1.5 GALLONS OF WATER PER ACRE. CARE SHALL BE GIVEN TO CONTAINING HERBICIDES TO THE FUTS TRAIL LIMITS ONLY.
6. LIGNIN SULFONATE SHALL BE DELIVERED TO THE CONTRACTOR IN A CONCENTRATED FORM WITH 50% SPENT SUFLIDE LIQUOR (SSL). THE CONTRACTOR SHALL FUTHER DILUTE THE LIGNIN SULFONATE WITH AN EQUAL PART OF WATER PRIOR TO SPREADING.
7. PLACEMENT OF AGGREGATE SURFACE MATERIAL WITH DILUTED LIGNIN SULFONATE SHALL BE AN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS IN OTHER APPROVED METHODS, INCLUDING APPLICATION OF WATER TO THE SUBGRADE AS REQUIRED BY THE MANUFACTURER. THE FUTS TRAIL SHALL RECIEVE A TOTAL APPLICATION OF 0.7 GALLONS PER SQUARE YARD OF 50% SSL AND SHALL BE APPLIED IN THE FOLLOWING MANNER:

   a. THE AGGREGATE SURFACE MATERIAL SHALL BE THOROUGHLY MIXED WITH DILUTED LIGNIN SULFONATE AT A RATE OF 0.5 TO 0.6 GALLONS PER SQUARE YARD OF TRAIL.

   b. THE CONTRACTOR SHALL APPLY A "TOP SHOT" TO THE FINISHED TRAIL SURFACE BY SURFACE SPRAYING 0.1 TO 0.2 GALLONS OF DILUTED LIGNIN SULFONATE PER SQUARE YARD OF TRAIL NO SOONER THAN 2 DAYS AND NO LATER THAN 3 DAYS AFTER THE PLACEMENT OF THE TREATED AGGREGATE SURFACE COURSE.

DIRTY CINDER GRADATION SPECIFICATION

SIEVE SIZE (SQUARE OPENINGS)	PERCENT BY WEIGHT PASSING SIEVE
¾"	90-100
No. 4	58-78
No. 8	37-67
No. 30	13-35
No. 100	4-15
No. 200	0-12

NTS

City of Flagstaff

ENGINEERING DETAIL

FLAGSTAFF URBAN TRAILS SYSTEM DETAILS

DETAIL NO. 14-01-010

REVISION DATE: 11/22/16

4 / 4

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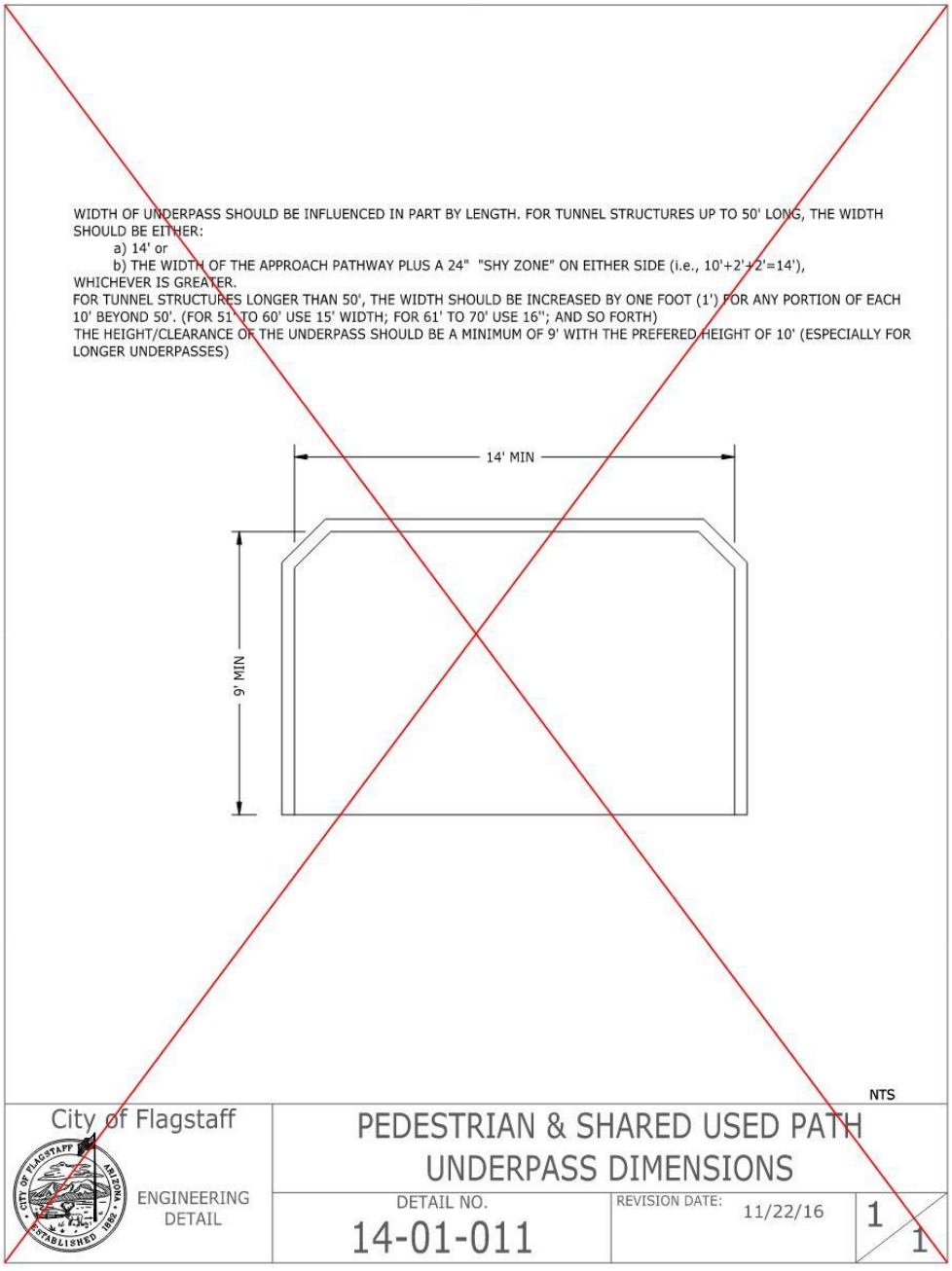
14-01-011: Pedestrian and Shared Use Path Underpass Dimensions

Section 68. Delete Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-01-011: Pedestrian and Shared Use Path Underpass Dimensions



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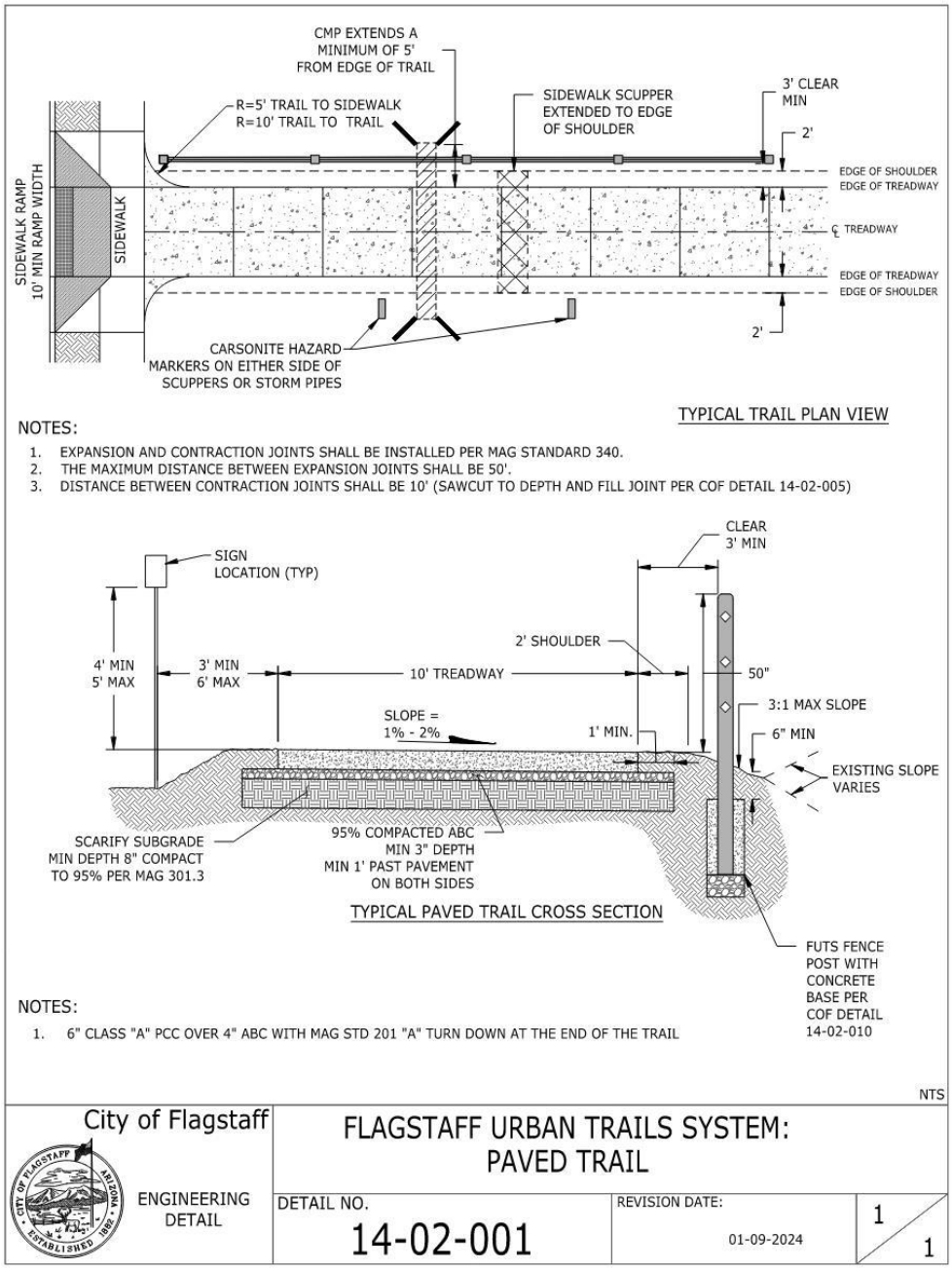
14-02-001: Flagstaff Urban Trails System: Paved Trail

Section 69. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-02-001: Flagstaff Urban Trails System: Paved Trail, to read as follows:



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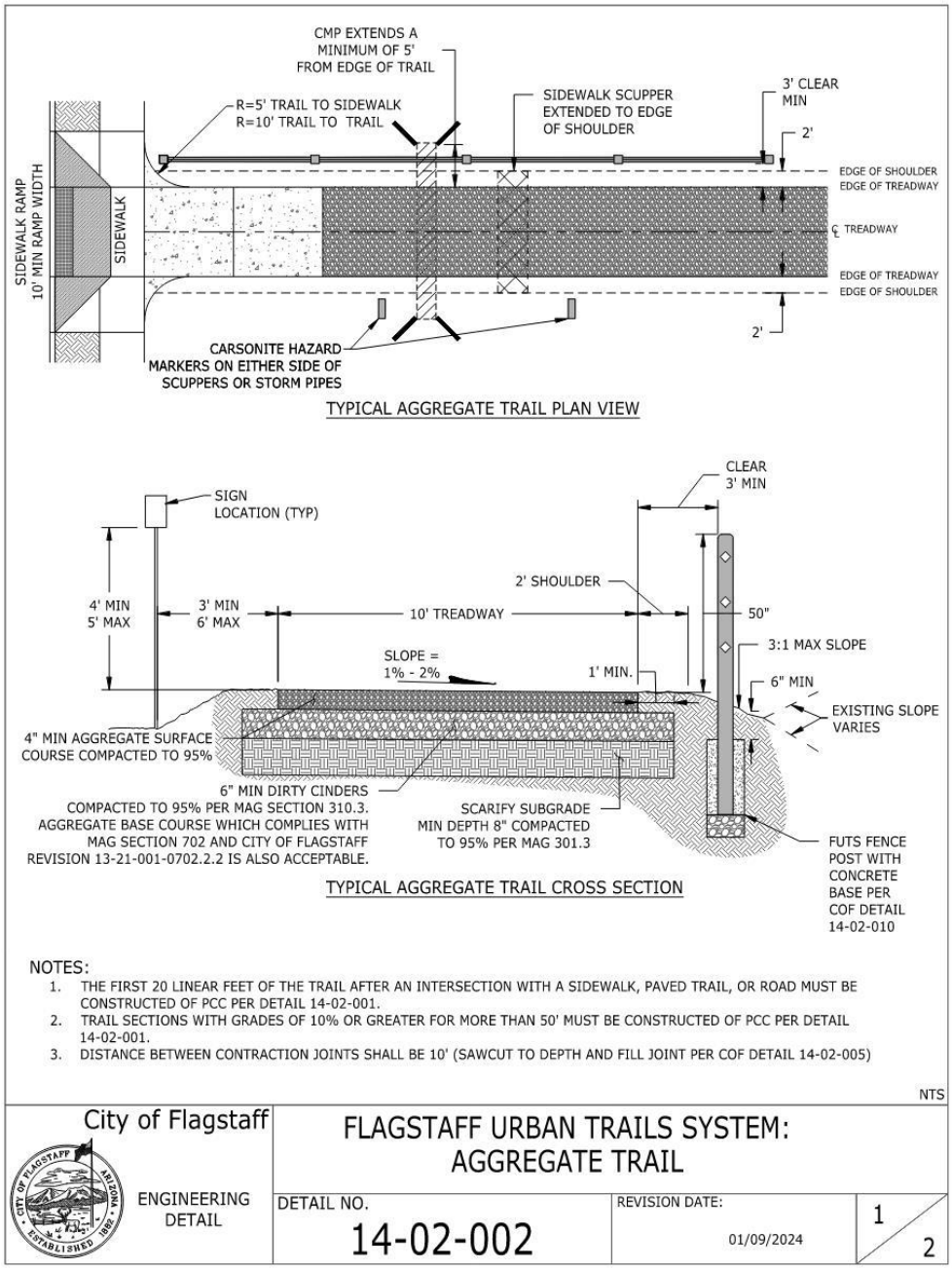
14-02-002: Flagstaff Urban Trails System: Aggregate Trail

Section 70. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-02-002: Flagstaff Urban Trails System: Aggregate Trail, to read as follows:



AGGREGATE SURFACE MATERIAL (FOR UNPAVED SECTION):

1. AGGREGATE SURFACE MATERIAL SHALL BE A COLOR COMPATIBLE WITH NATURAL SURROUNDINGS AND ACCEPTABLE TO THE CITY OR COUNTY. WHITE, LIGHT GREY OR OTHER VISUALLY INCOMPATIBLE COLORED AGGREGATES WILL NOT BE ACCEPTED.
2. AGGREGATE SURFACE MATERIAL SHALL HAVE A PLASTICITY INDEX OF 5-12, AND THE GRADATION SHALL BE AS FOLLOWS:

SIEVE SIZE (SQUARE OPENINGS)	PERCENT BY WEIGHT PASSING SIEVE
1/4"	100
No. 4	90 - 100
No. 8	65 - 95
No. 10	60 - 80
No. 16	45 - 75
No. 30	35 - 60
No. 40	30 - 40
No. 50	25 - 40
No. 100	20 - 30
No. 200	12 - 23

3. DIRTY CINDERS SHALL COMPLY WITH MAG SECTION 702 AND CITY OF FLAGSTAFF MODIFICATION 13-21-001-0702.2.2, EXCEPT THAT THE LOS ANGELES ABRASION REQUIREMENT IS WAIVED.
4. HERBICIDE SHALL BE SURFLAN ® OR APPROVED EQUAL FOR PRE-EMERGENT CONTROL AND ORGANIC, NON-GLYPHOSATE PRODUCT FOR POST-EMERGENT CONTROL.
5. HERBICIDES SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR NON-CROP LAND USE. PRE-EMERGENT HERBICIDE SHALL BE APPLIED TO THE SUBGRADE SURFACE AT A RATIO OF 1.5 GALLONS TO 100 GALLONS OF WATER PER ACRE. CARE SHALL BE GIVEN TO CONTAINING THE HERBICIDES TO THE FUTS TRAIL LIMITS ONLY.
6. HERBICIDES SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR NON-CROP LAND USE. POST EMERGENT HERBICIDES SHALL BE APPLIED TO FUTS TRAIL AFTER THE SUBGRADE HAS BEEN SCARIFIED AND BEFORE SHAPING AND COMPACTING THE BASE. THE POST EMERGENT HERBICIDE SHALL BE APPLIED AT A RATIO OF 1.5 GALLONS OF WATER PER ACRE. CARE SHALL BE GIVEN TO CONTAINING HERBICIDES TO THE FUTS TRAIL LIMITS ONLY.

NTS

City of Flagstaff	FLAGSTAFF URBAN TRAILS SYSTEM: AGGREGATE TRAIL SURFACE MATERIAL		
ENGINEERING DETAIL	DETAIL NO. 14-02-002	REVISION DATE: 01/09/2024	2 / 2

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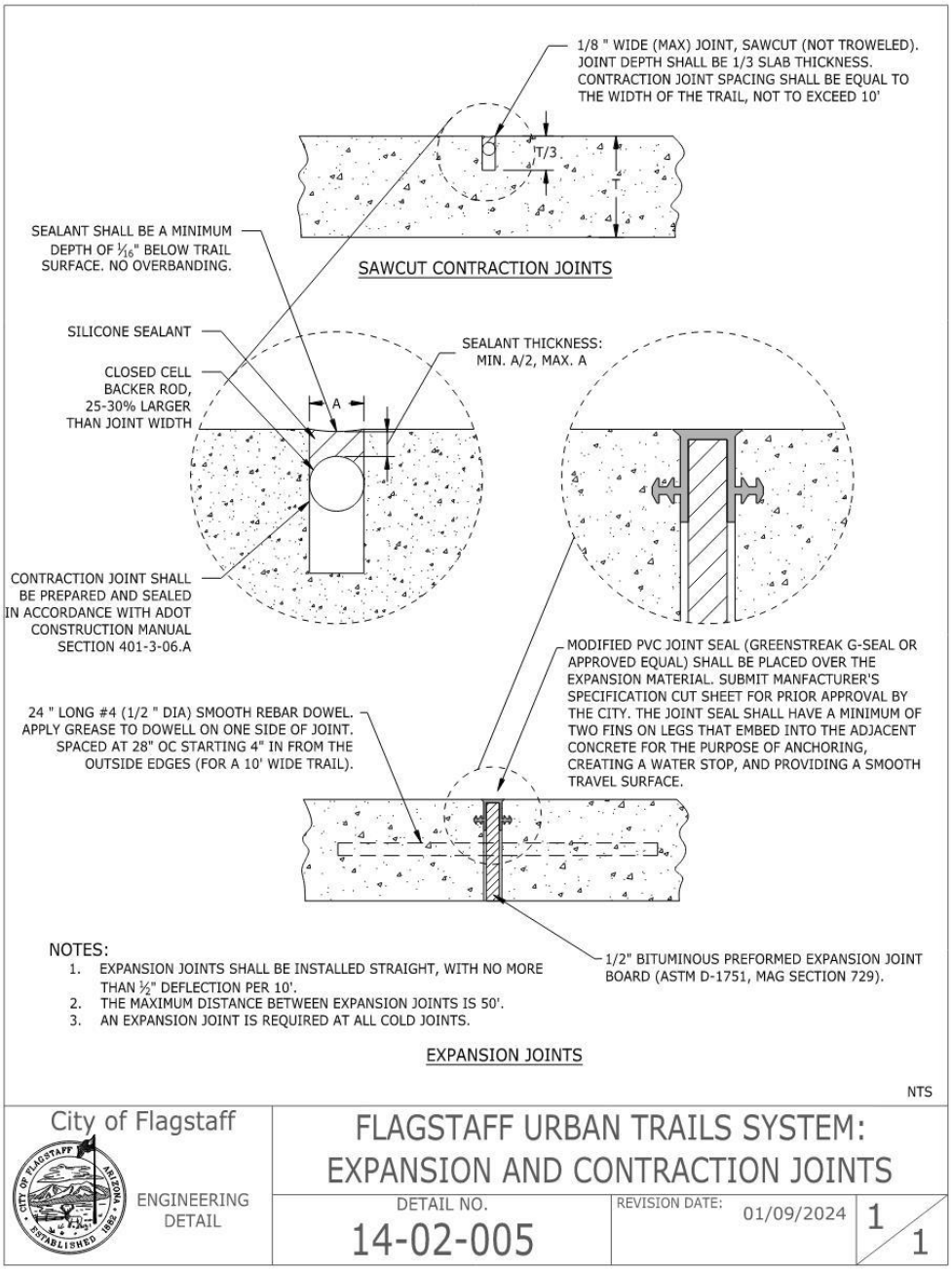
14-02-005: Flagstaff Urban Trails System: Expansion and Contraction Joints

Section 71. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-02-005: Flagstaff Urban Trails System: Expansion and Contraction Joints, to read as follows:



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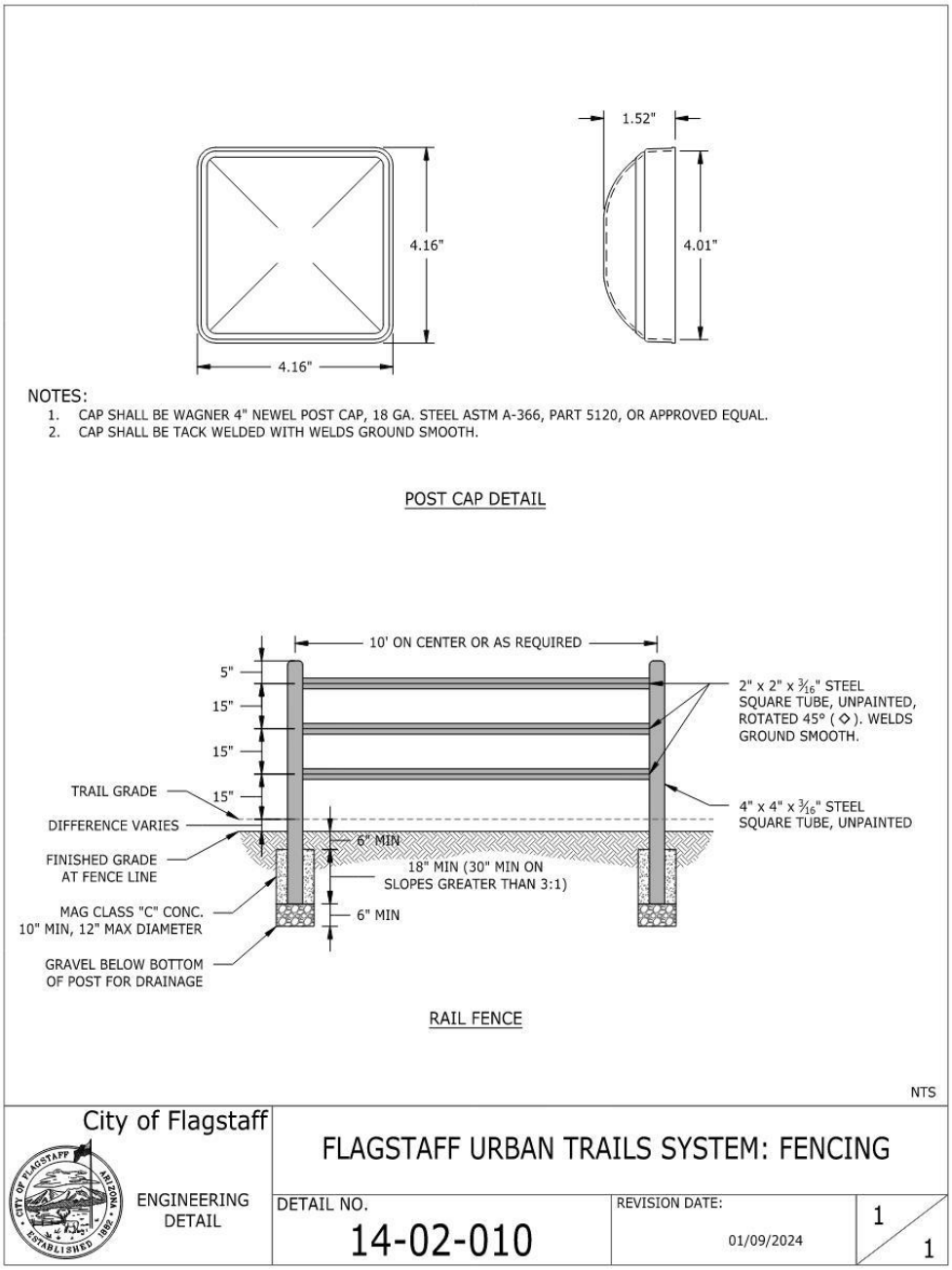
14-02-010: Flagstaff Urban Trails System: Fencing

Section 72. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-02-010: Flagstaff Urban Trails System: Fencing, to read as follows:



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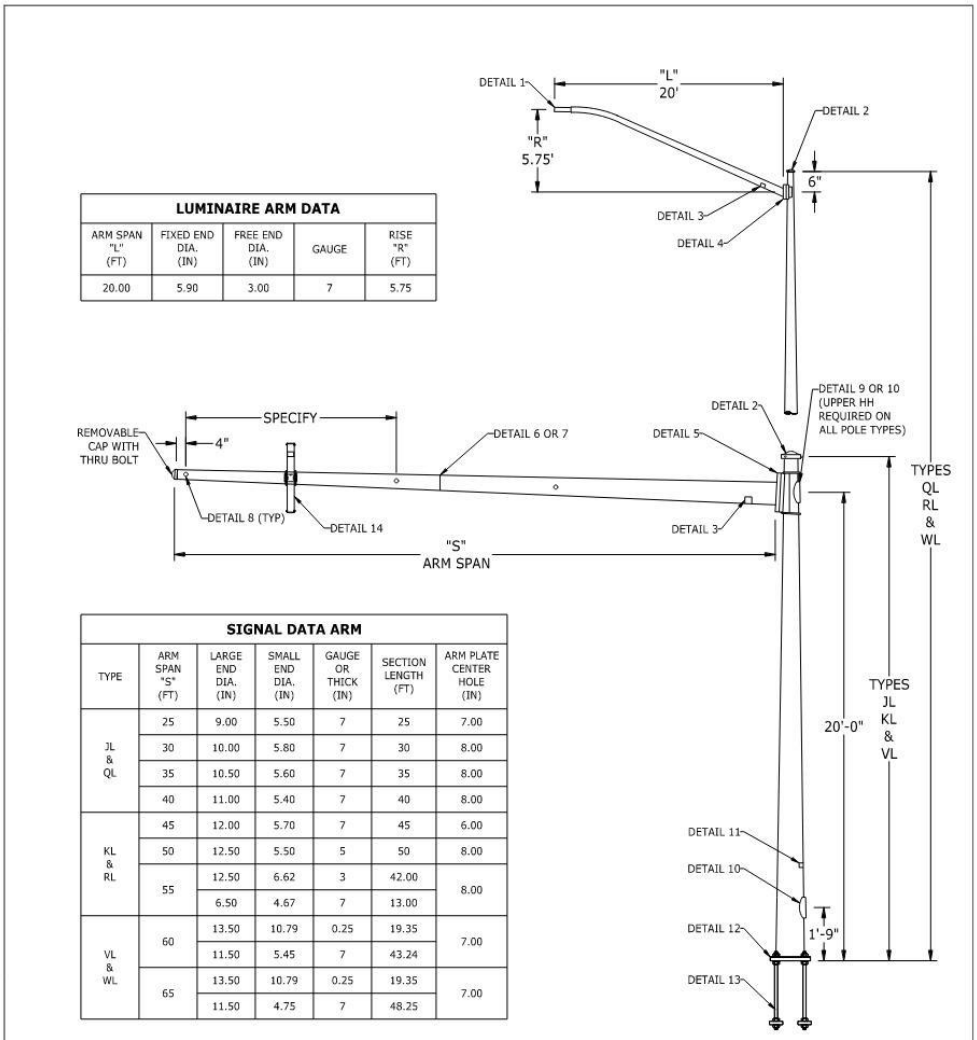
16-02-010: Traffic Signal Pole Design

Section 73. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-02-010: Traffic Signal Pole Design, to read as follows:



LUMINAIRE ARM DATA

ARM SPAN "L" (FT)	FIXED END DIA. (IN)	FREE END DIA. (IN)	GAUGE	RISE "R" (FT)
20.00	5.90	3.00	7	5.75

SIGNAL DATA ARM

TYPE	ARM SPAN "S" (FT)	LARGE END DIA. (IN)	SMALL END DIA. (IN)	GAUGE OR THICK (IN)	SECTION LENGTH (FT)	ARM PLATE CENTER HOLE (IN)
JL & QL	25	9.00	5.50	7	25	7.00
	30	10.00	5.80	7	30	8.00
	35	10.50	5.60	7	35	8.00
	40	11.00	5.40	7	40	8.00
KL & RL	45	12.00	5.70	7	45	6.00
	50	12.50	5.50	5	50	8.00
	55	12.50	6.62	3	42.00	8.00
		6.50	4.67	7	13.00	
VL & WL	60	13.50	10.79	0.25	19.35	7.00
		11.50	5.45	7	43.24	
	65	13.50	10.79	0.25	19.35	7.00
		11.50	4.75	7	48.25	

City of Flagstaff

ENGINEERING DETAIL

TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS

DETAIL NO. 16-02-010

REVISION DATE: 01/04/2024

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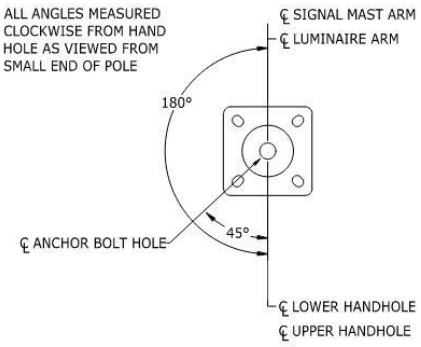
MATERIAL DATA		
COMPONENT	ASTM DEGINATION	MIN. YIELD (KSI)
TAPERED TUBES	A595 GR. A OR A572	55
BASE PLATE	A36	36
ARM SIMPLEX PLATES	A36	36
SIGNAL ARM CONNECTING BOLTS	F3125 GR.A325	
LUMINAIRE ARM CONNECTION BOLTS	F3125 GR.A325	
ANCHOR BOLTS	F1554 GR.55	55
ANCHOR BOLT NUTS	A563 GR. DH	
ANCHOR BOLT WASHERS	F436	
GALVANIZING-HARDWARE	F2329	

POLE, BASE PLATE, ANCHOR BOLT DATA												
POLE TYPE	POLE TUBE				POLE BASE					ANCHOR BOLT		
	LENGTH (FT)	BASE DIA. (IN)	TOP DIA. (IN)	WALL GA/THK	SQUARE "B" (IN)	BOLT CENTER "C" (IN)	CENTER HOLE DIA. (IN)	THK. "D" (IN)	SLOT/HOLE SIZE "Z" (IN)	DIA. (IN)	LENGTH (IN)	PLATE SIZE "e" X "f" X "g" (IN)
JL	21.25	12.50	9.53	3	18.50	18.00	10.00	2.00	2.25 X 2.75	2.00	70.00	1.50 X 5.50 X 5.50
KL	21.25	13.50	10.53	0.313	18.50	18.00	10.00	2.00	2.25 X 2.75	2.00	70.00	1.50 X 5.50 X 5.50
QL	30.00	12.50	8.30	3	18.50	18.00	10.00	2.00	2.25 X 2.75	2.00	70.00	1.50 X 5.50 X 5.50
RL	30.00	13.50	9.30	0.313	18.50	18.00	10.00	2.00	2.25 X 2.75	2.00	70.00	1.50 X 5.50 X 5.50
VL	21.25	16.00	13.03	0.250	23.00	22.00	11.50	2.00	2.25	2.00	70.00	1.50 X 5.50 X 5.50
WL	30.00	16.00	11.80	0.250	23.00	22.00	11.50	2.00	2.25	2.00	70.00	1.50 X 5.50 X 5.50

THE MAST ARM TRAFFIC STRUCTURES SHOWN ON THIS DRAWING HAVE BEEN DESIGNED IN ACCORDANCE WITH THE LOADING AND THE ALLOWABLE STRESS REQUIREMENTS OF THE 2013 AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", SIXTH EDITION, LTS-6 WITH 2015 INTERIM REVISIONS. THE WIND LOADS WERE CALCULATED FROM A BASIC WIND VELOCITY OF 90 MPH WITH A RECURRENCE INTERVAL OF 50 YEARS, AND A FATIGUE CATEGORY OF 2. THE FATIGUE LOADS WERE CALCULATED ON THE REQUIREMENTS OF SECTION 11 OF THE CODE, AND THE FOLLOWING DESIGN CONDITIONS:

1. STRUCTURES ARE DESIGNED TO RESIST NATURAL WIND GUSTS BASED ON THE YEARLY MEAN WIND VELOCITY OF 11.2 MPH.
2. STRUCTURES ARE NOT DESIGNED TO RESIST GALLOPING-INDUCED CYCLIS LOADS.
3. STRUCTURES ARE DESIGNED FOR TRUCK-INDUCED GUST LOADS, AS REQUIRED BY THE OWNER OF THE STRUCTURES.

AASHTO 2013 SPECIFICATIONS



RADIAL INDEX

City of Flagstaff

ENGINEERING DETAIL

TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS

DETAIL NO. 16-02-010

REVISION DATE: 01/04/2024

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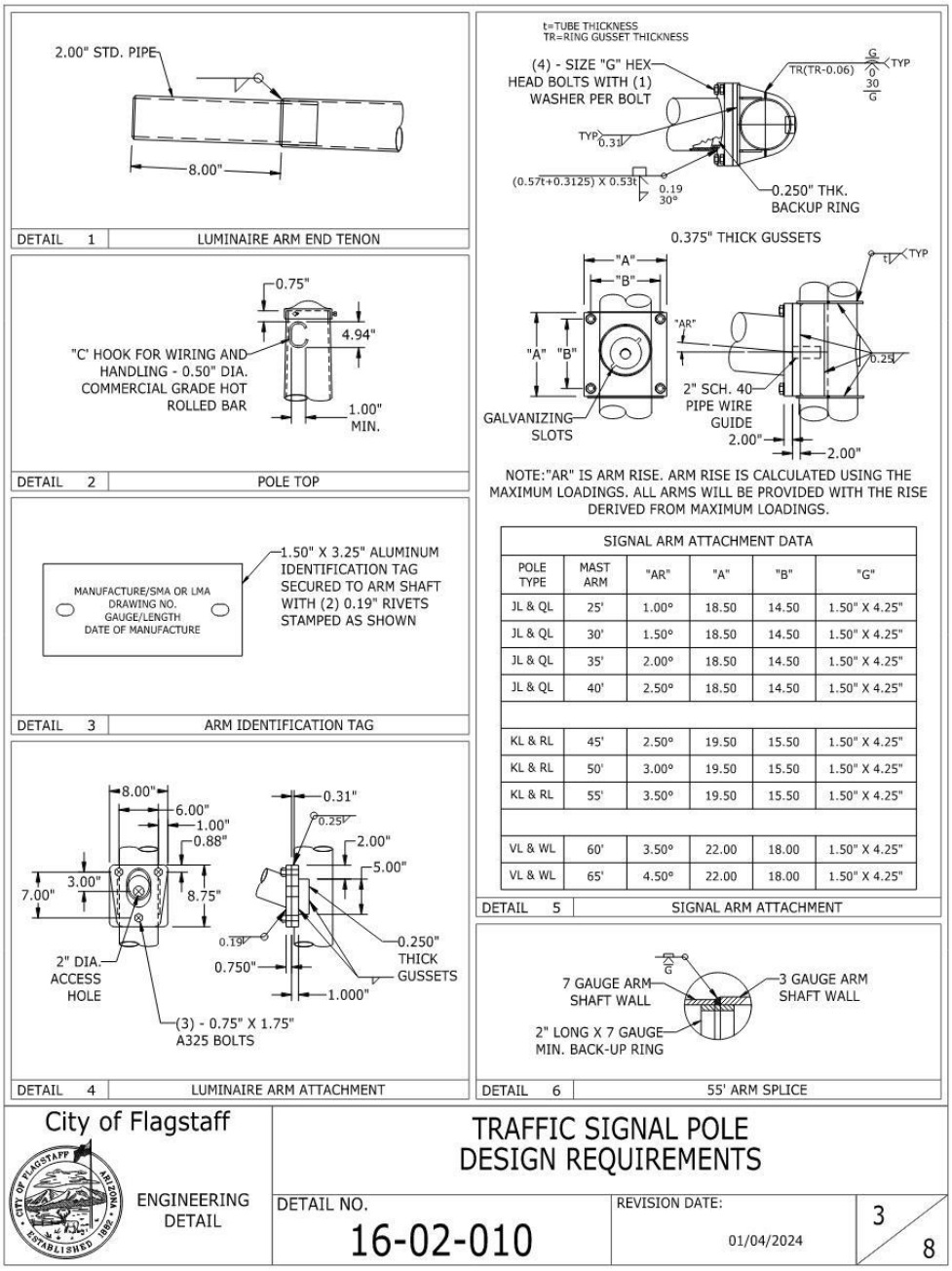
2.00" STD. PIPE
8.00"
DETAIL 1
LUMINAIRE ARM END TENON
t=TUBE THICKNESS
TR=RING GUSSET THICKNESS
(4) - SIZE "G" HEX HEAD BOLTS WITH (1) WASHER PER BOLT
TR(TR-0.06)
TYP
0.31
(0.57t+0.3125) X 0.53t
0.19
30°
0.250" THK. BACKUP RING
0.375" THICK GUSSETS
"A"
"B"
"AR"
0.25t
2" SCH. 40 PIPE WIRE GUIDE
GALVANIZING SLOTS
2.00"
NOTE:"AR" IS ARM RISE. ARM RISE IS CALCULATED USING THE MAXIMUM LOADINGS. ALL ARMS WILL BE PROVIDED WITH THE RISE DERIVED FROM MAXIMUM LOADINGS.
SIGNAL ARM ATTACHMENT DATA
POLE TYPE | MAST ARM | "AR" | "A" | "B" | "G"
JL & QL | 25' | 1.00° | 18.50 | 14.50 | 1.50" X 4.25"
JL & QL | 30' | 1.50° | 18.50 | 14.50 | 1.50" X 4.25"
JL & QL | 35' | 2.00° | 18.50 | 14.50 | 1.50" X 4.25"
JL & QL | 40' | 2.50° | 18.50 | 14.50 | 1.50" X 4.25"
KL & RL | 45' | 2.50° | 19.50 | 15.50 | 1.50" X 4.25"
KL & RL | 50' | 3.00° | 19.50 | 15.50 | 1.50" X 4.25"
KL & RL | 55' | 3.50° | 19.50 | 15.50 | 1.50" X 4.25"
VL & WL | 60' | 3.50° | 22.00 | 18.00 | 1.50" X 4.25"
VL & WL | 65' | 4.50° | 22.00 | 18.00 | 1.50" X 4.25"
DETAIL 5
SIGNAL ARM ATTACHMENT
0.75"
4.94"
"C' HOOK FOR WIRING AND HANDLING - 0.50" DIA. COMMERCIAL GRADE HOT ROLLED BAR
1.00" MIN.
DETAIL 2
POLE TOP
1.50" X 3.25" ALUMINUM IDENTIFICATION TAG SECURED TO ARM SHAFT WITH (2) 0.19" RIVETS STAMPED AS SHOWN
MANUFACTURE/SMA OR LMA
DRAWING NO.
GAUGE/LENGTH
DATE OF MANUFACTURE
DETAIL 3
ARM IDENTIFICATION TAG
8.00"
6.00"
1.00"
0.88"
3.00"
7.00"
8.75"
2" DIA. ACCESS HOLE
(3) - 0.75" X 1.75" A325 BOLTS
0.31"
0.25"
2.00"
5.00"
0.19"
0.750"
0.250" THICK GUSSETS
1.000"
DETAIL 4
LUMINAIRE ARM ATTACHMENT
7 GAUGE ARM SHAFT WALL
3 GAUGE ARM SHAFT WALL
2" LONG X 7 GAUGE MIN. BACK-UP RING
DETAIL 6
55' ARM SPLICE
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
3
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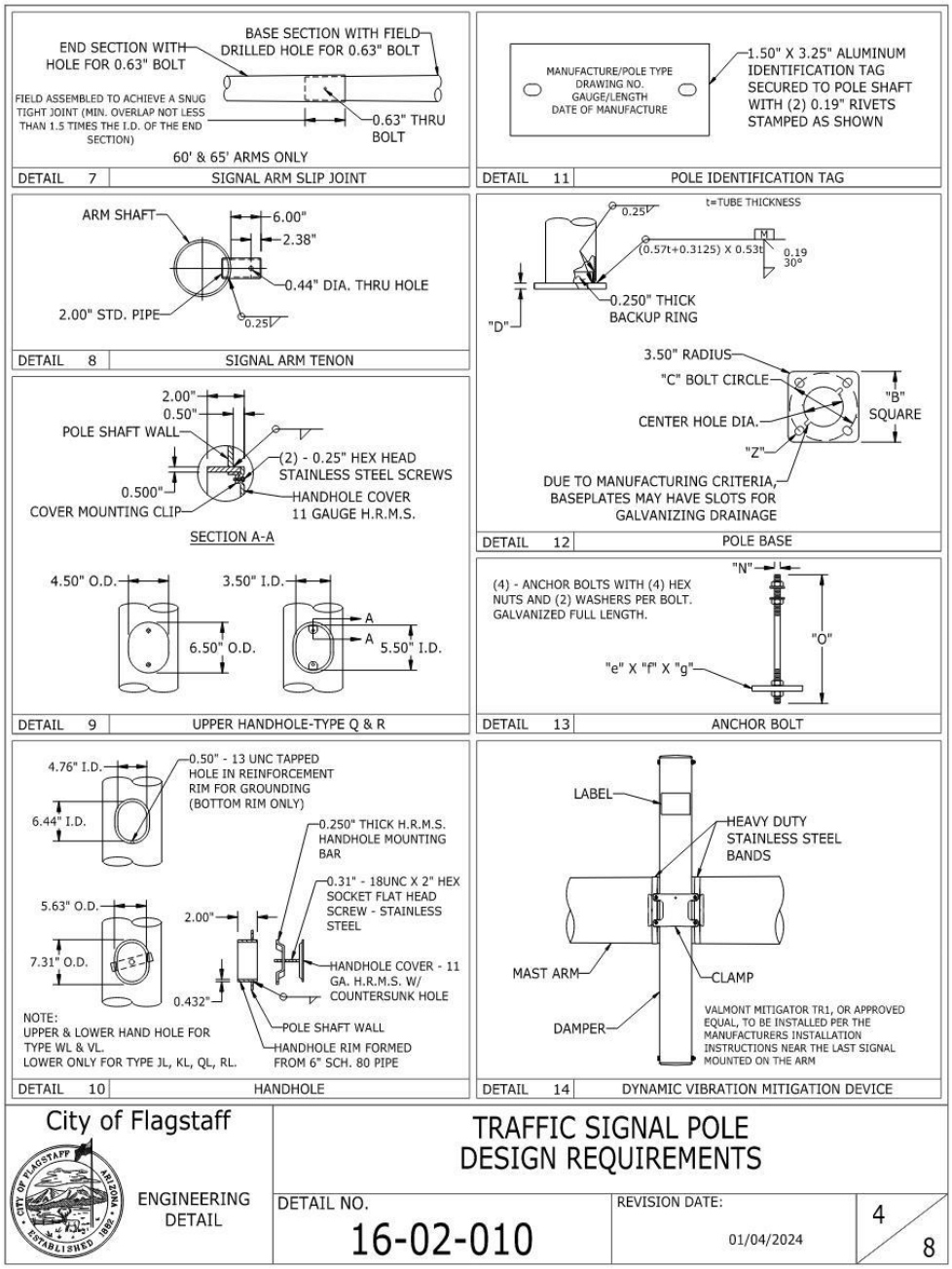
END SECTION WITH HOLE FOR 0.63" BOLT
BASE SECTION WITH FIELD DRILLED HOLE FOR 0.63" BOLT
FIELD ASSEMBLED TO ACHIEVE A SNUG TIGHT JOINT (MIN. OVERLAP NOT LESS THAN 1.5 TIMES THE I.D. OF THE END SECTION)
0.63" THRU BOLT
60' & 65' ARMS ONLY
DETAIL 7 SIGNAL ARM SLIP JOINT
MANUFACTURE/POLE TYPE
DRAWING NO.
GAUGE/LENGTH
DATE OF MANUFACTURE
1.50" X 3.25" ALUMINUM IDENTIFICATION TAG SECURED TO POLE SHAFT WITH (2) 0.19" RIVETS STAMPED AS SHOWN
DETAIL 11 POLE IDENTIFICATION TAG
ARM SHAFT
6.00"
2.38"
0.44" DIA. THRU HOLE
2.00" STD. PIPE
0.25
DETAIL 8 SIGNAL ARM TENON
t=TUBE THICKNESS
0.25
(0.57t+0.3125) X 0.53t
0.19
30°
0.250" THICK BACKUP RING
"D"
3.50" RADIUS
"C" BOLT CIRCLE
CENTER HOLE DIA.
"Z"
"B" SQUARE
DUE TO MANUFACTURING CRITERIA, BASEPLATES MAY HAVE SLOTS FOR GALVANIZING DRAINAGE
DETAIL 12 POLE BASE
2.00"
0.50"
POLE SHAFT WALL
(2) - 0.25" HEX HEAD STAINLESS STEEL SCREWS
0.500"
COVER MOUNTING CLIP
HANDHOLE COVER 11 GAUGE H.R.M.S.
SECTION A-A
4.50" O.D.
3.50" I.D.
6.50" O.D.
A
A
5.50" I.D.
DETAIL 9 UPPER HANDHOLE-TYPE Q & R
(4) - ANCHOR BOLTS WITH (4) HEX NUTS AND (2) WASHERS PER BOLT. GALVANIZED FULL LENGTH.
"N"
"O"
"e" X "f" X "g"
DETAIL 13 ANCHOR BOLT
4.76" I.D.
6.44" I.D.
0.50" - 13 UNC TAPPED HOLE IN REINFORCEMENT RIM FOR GROUNDING (BOTTOM RIM ONLY)
0.250" THICK H.R.M.S. HANDHOLE MOUNTING BAR
0.31" - 18UNC X 2" HEX SOCKET FLAT HEAD SCREW - STAINLESS STEEL
5.63" O.D.
7.31" O.D.
2.00"
HANDHOLE COVER - 11 GA. H.R.M.S. W/ COUNTERSUNK HOLE
0.432"
POLE SHAFT WALL
HANDHOLE RIM FORMED FROM 6" SCH. 80 PIPE
NOTE:
UPPER & LOWER HAND HOLE FOR TYPE WL & VL.
LOWER ONLY FOR TYPE JL, KL, QL, RL.
DETAIL 10 HANDHOLE
LABEL
HEAVY DUTY STAINLESS STEEL BANDS
MAST ARM
CLAMP
DAMPER
VALMONT MITIGATOR TR1, OR APPROVED EQUAL, TO BE INSTALLED PER THE MANUFACTURERS INSTALLATION INSTRUCTIONS NEAR THE LAST SIGNAL MOUNTED ON THE ARM
DETAIL 14 DYNAMIC VIBRATION MITIGATION DEVICE
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
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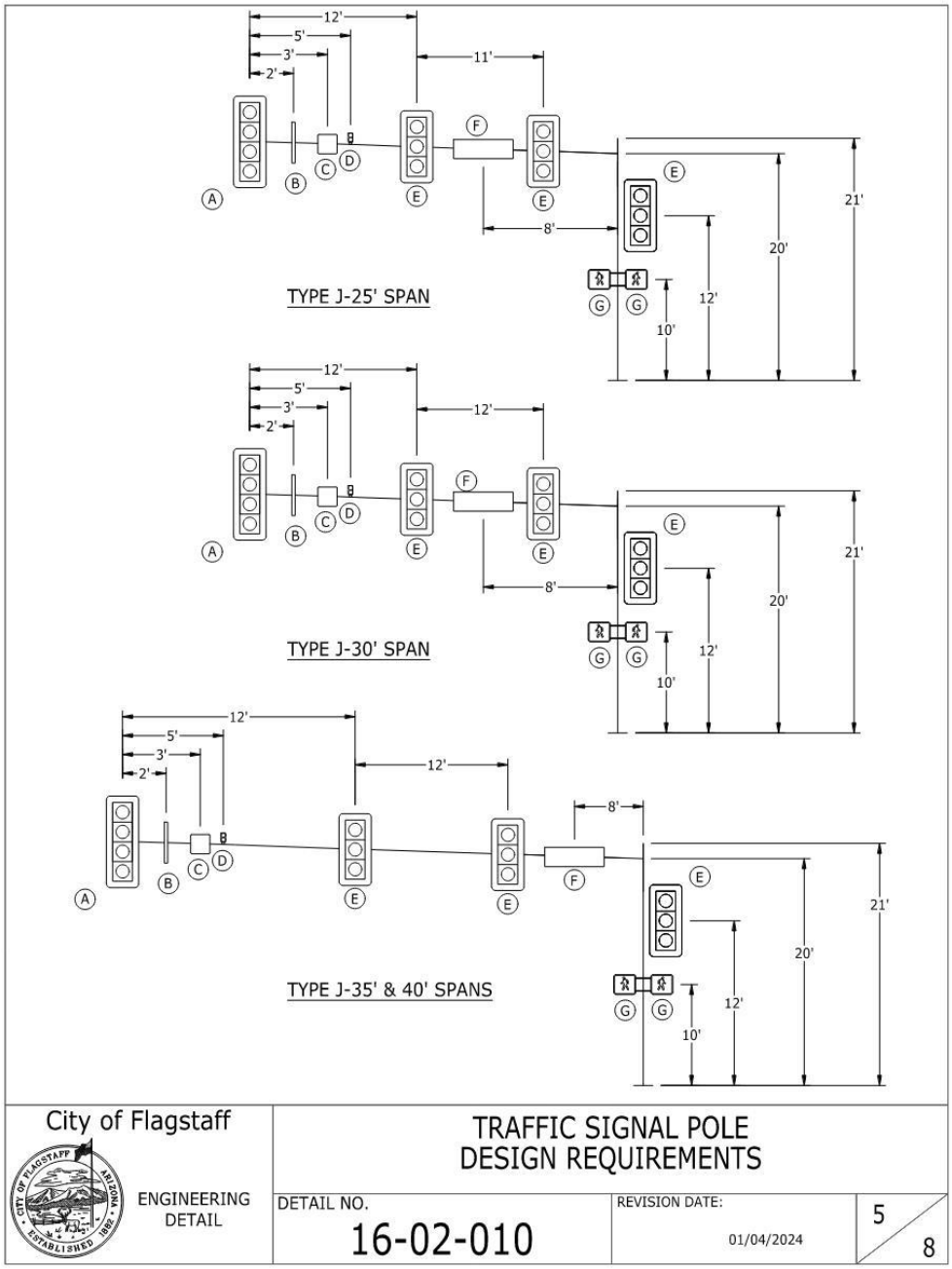
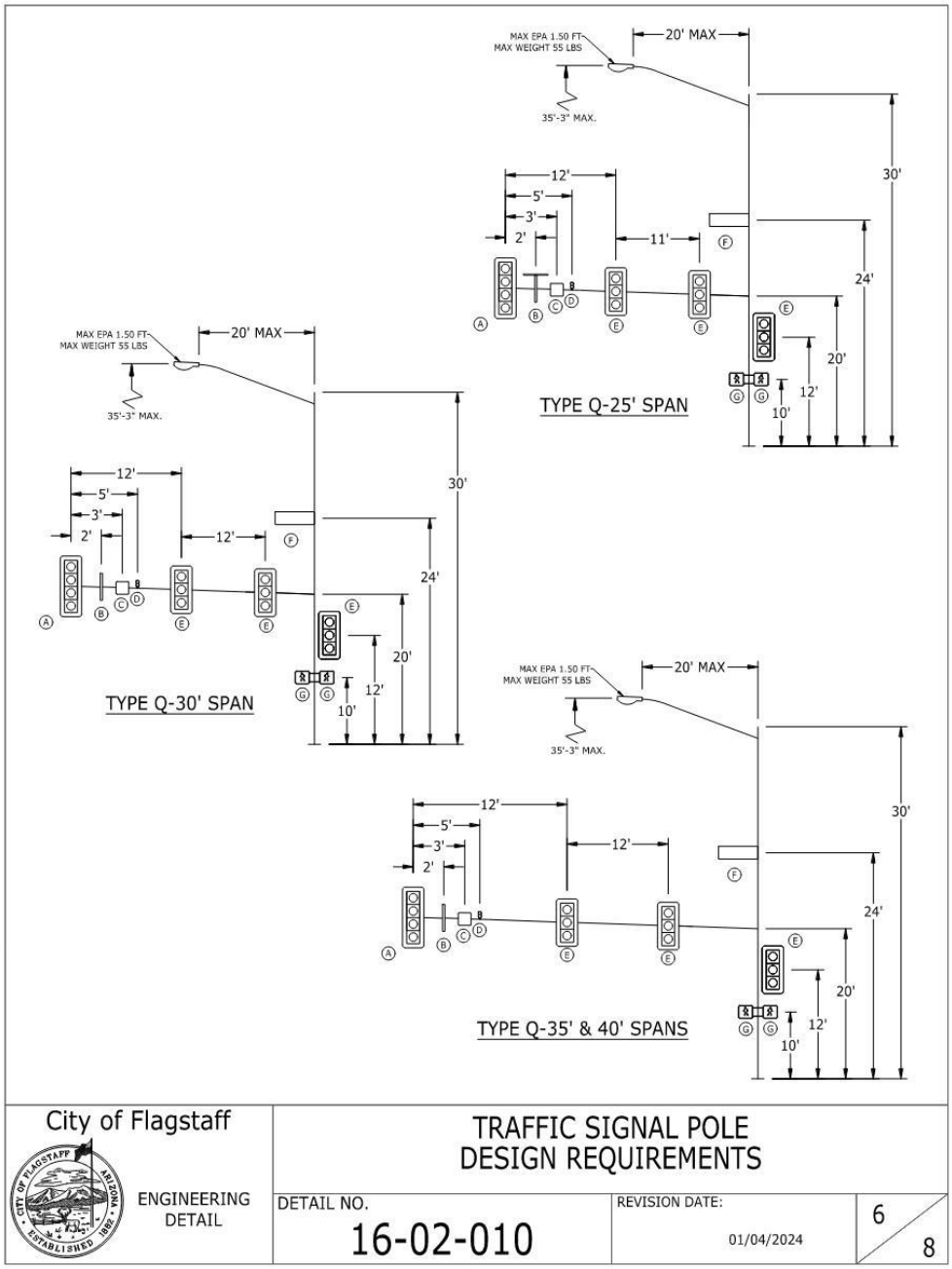


City of Flagstaff	TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS		
ENGINEERING DETAIL	DETAIL NO. 16-02-010	REVISION DATE: 01/04/2024	5 / 8


MAX EPA 1.50 FT-
MAX WEIGHT 55 LBS
20' MAX
35'-3" MAX.
12'
5'
3'
2'
11'
30'
24'
20'
12'
10'
TYPE Q-25' SPAN
12'
12'
TYPE Q-30' SPAN
TYPE Q-35' & 40' SPANS
City of Flagstaff
ENGINEERING
DETAIL
TRAFFIC SIGNAL POLE
DESIGN REQUIREMENTS
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
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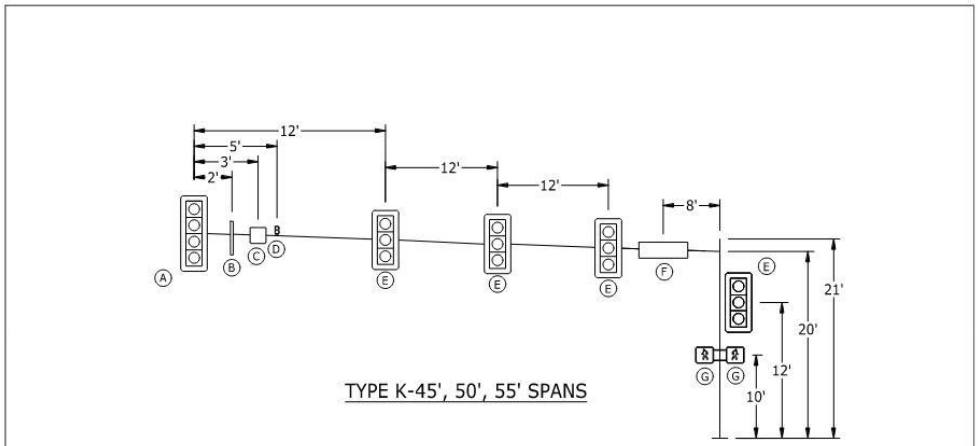
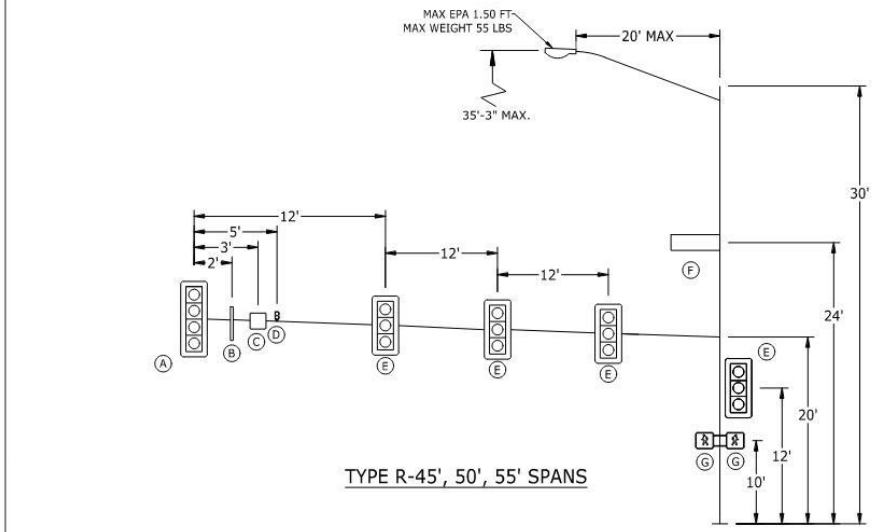
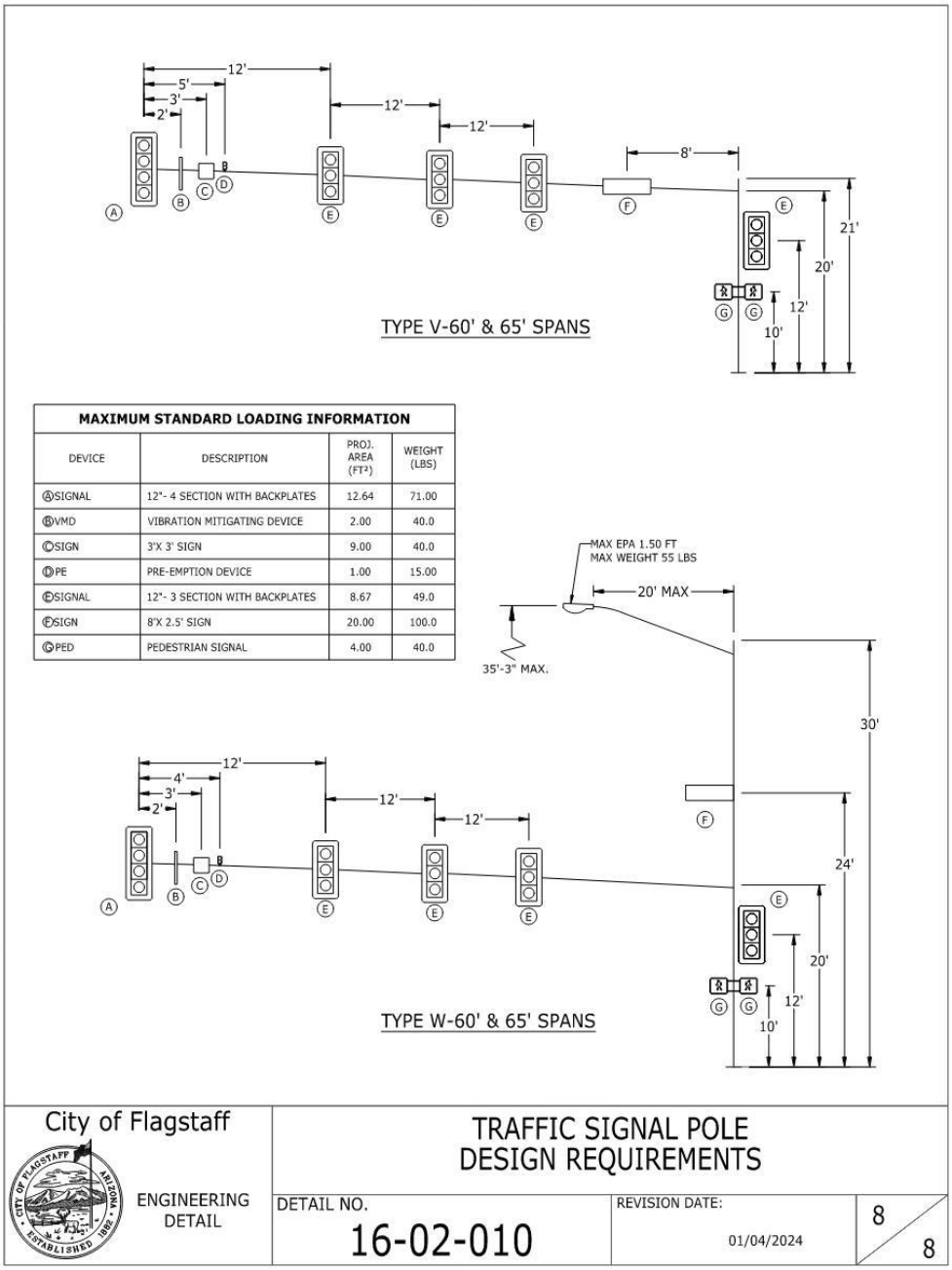


TYPE K-45', 50', 55' SPANS



TYPE R-45', 50', 55' SPANS

City of Flagstaff	TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS		
ENGINEERING DETAIL	DETAIL NO. 16-02-010	REVISION DATE: 01/04/2024	7 / 8


12'
5'
3'
2'
12'
12'
8'
21'
20'
12'
10'
TYPE V-60' & 65' SPANS
MAXIMUM STANDARD LOADING INFORMATION
DEVICE | DESCRIPTION | PROJ. AREA (FT²) | WEIGHT (LBS)
Ⓐ SIGNAL | 12"- 4 SECTION WITH BACKPLATES | 12.64 | 71.00
Ⓑ VMD | VIBRATION MITIGATING DEVICE | 2.00 | 40.0
Ⓒ SIGN | 3'X 3' SIGN | 9.00 | 40.0
Ⓓ PE | PRE-EMPTION DEVICE | 1.00 | 15.00
Ⓔ SIGNAL | 12"- 3 SECTION WITH BACKPLATES | 8.67 | 49.0
Ⓕ SIGN | 8'X 2.5' SIGN | 20.00 | 100.0
Ⓖ PED | PEDESTRIAN SIGNAL | 4.00 | 40.0
MAX EPA 1.50 FT
MAX WEIGHT 55 LBS
20' MAX
35'-3" MAX.
30'
12'
4'
3'
2'
12'
12'
24'
20'
12'
10'
TYPE W-60' & 65' SPANS
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
8
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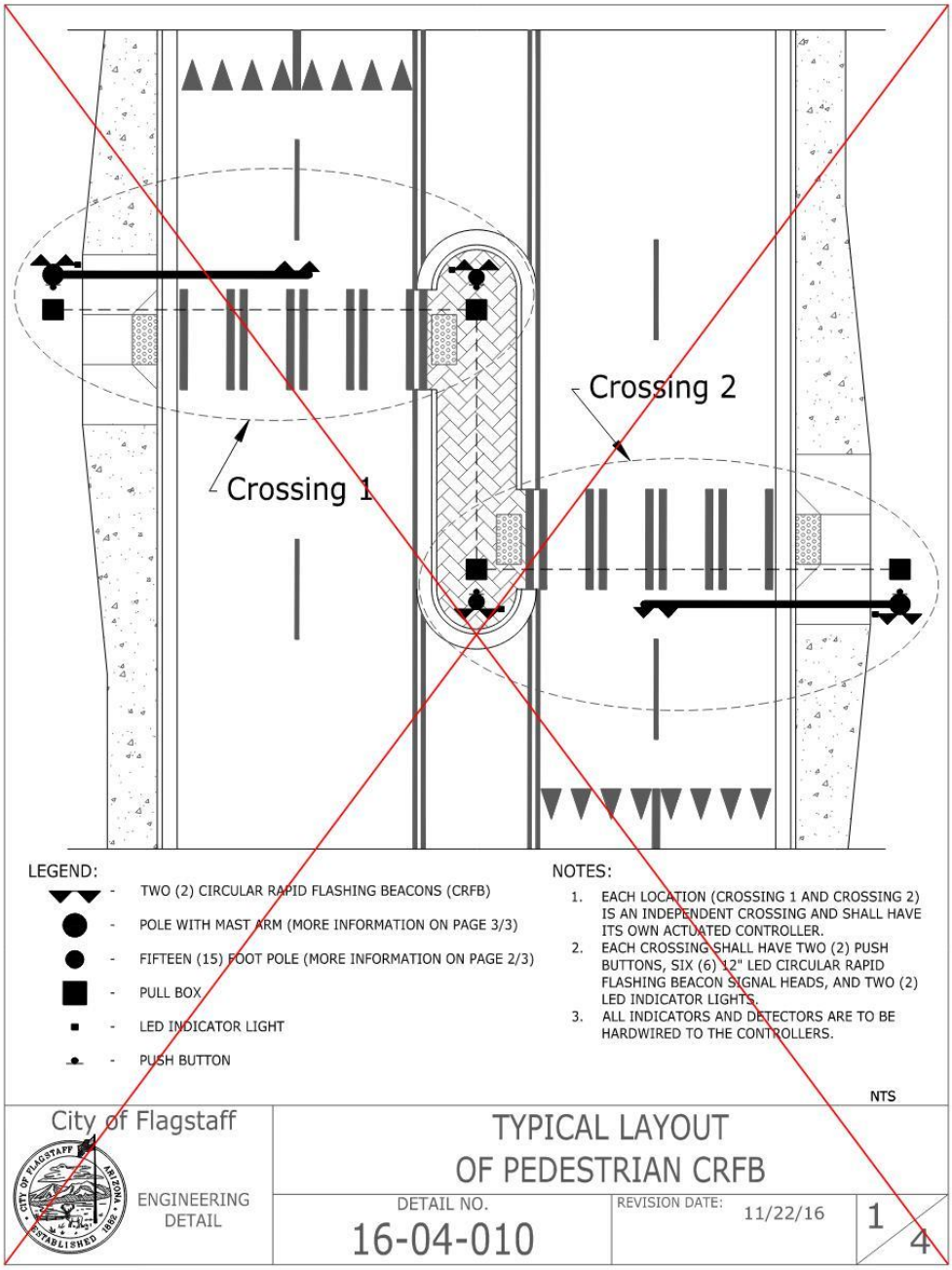
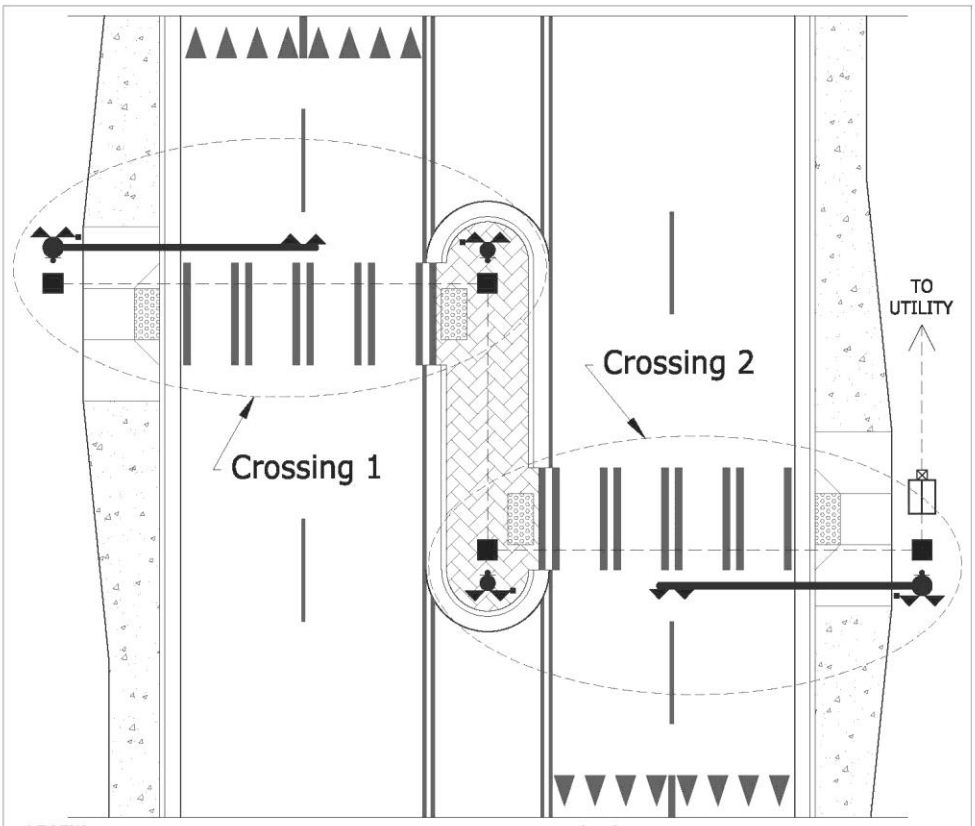
16-04-010: Pedestrian Rapid Flashing Beacon

Section 74. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-04-010: Typical Layout of Pedestrian CRFB, delete existing standard drawing 16-04-010 and replace with standard drawing 16-04-010 below:





LEGEND:

- TWO (2) CIRCULAR RAPID FLASHING BEACONS (CRFB)
- POLE WITH MAST ARM (MORE INFORMATION ON PAGE 3/5)
- FIFTEEN (15) FOOT POLE (MORE INFORMATION ON PAGE 2/5)
- PULL BOX
- LED INDICATOR LIGHT
- PUSH BUTTON
- ELECTRIC SERVICE
- SIGNAL CABINET / BBS

NOTES:

1. EACH LOCATION (CROSSING 1 AND CROSSING 2) IS AN INDEPENDENT CROSSING AND SHALL HAVE ITS OWN ACTUATED CONTROLLER.
2. EACH CROSSING SHALL HAVE TWO (2) PUSH BUTTONS, SIX (6) 12" LED CIRCULAR RAPID FLASHING BEACON SIGNAL HEADS, AND TWO (2) LED INDICATOR LIGHTS.
3. ALL INDICATORS AND DETECTORS ARE TO BE HARDWIRED TO THE CONTROLLERS.
4. WESTERN SYSTEMS, FLAGSTAFF STANDARD, PEDESTRIAN RAPID FLASHING BEACON CABINET WITH BATTERY BACKUP SYSTEM.
5. 100 AMP BOLT ON SERVICE ENCLOSURE WITH METER SOCKET AND CIRCUIT BREAKERS.

NTS

City of Flagstaff

ENGINEERING DETAIL

PEDESTRIAN RAPID FLASHING BEACON
TYPICAL LAYOUT

DETAIL NO. 16-04-010

REVISION DATE: 12/02/2023

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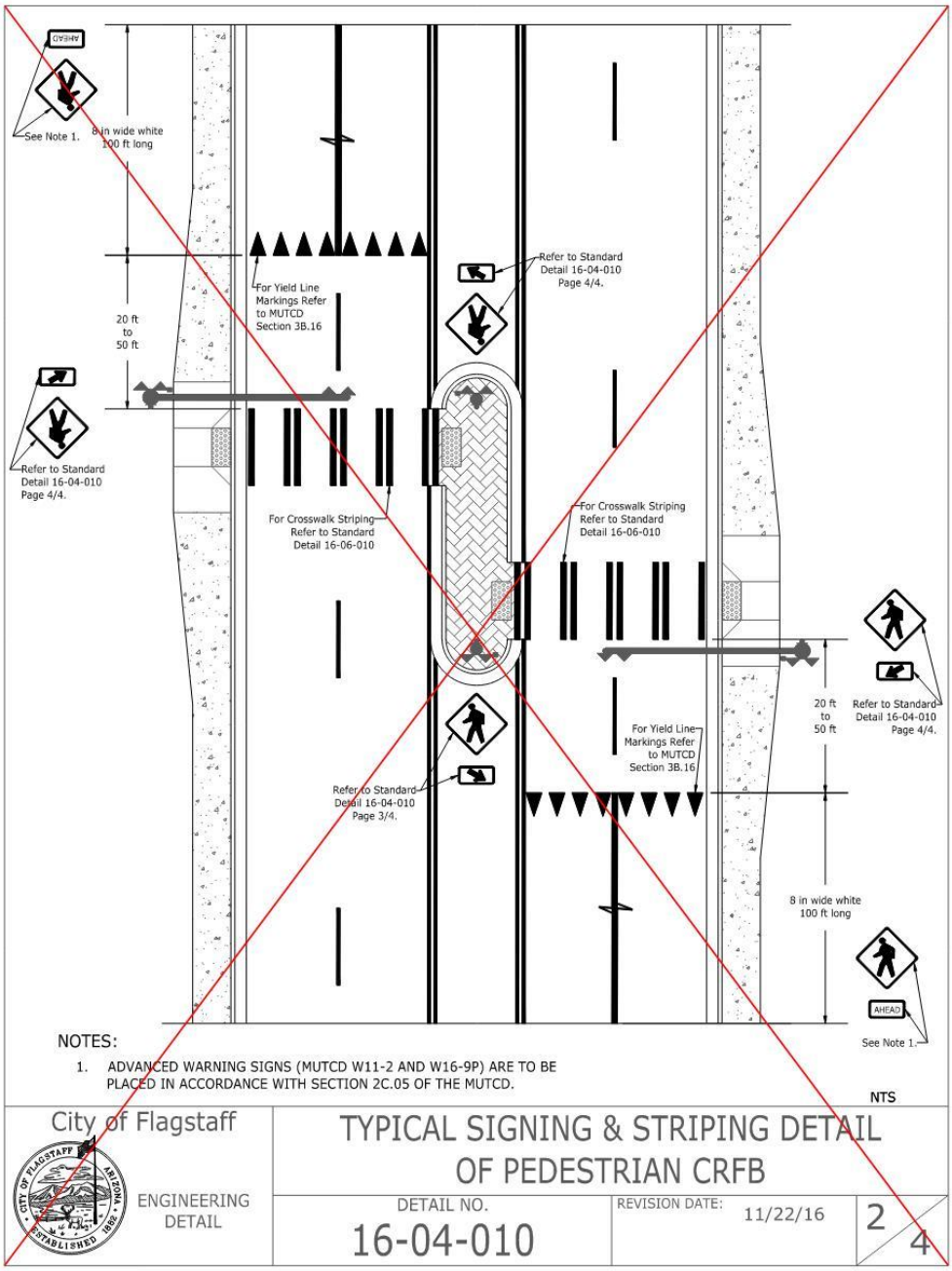
AHEAD
See Note 1.
8 in wide white 100 ft long
20 ft to 50 ft
For Yield Line Markings Refer to MUTCD Section 3B.16
Refer to Standard Detail 16-04-010 Page 4/4.
Refer to Standard Detail 16-04-010 Page 4/4.
For Crosswalk Striping Refer to Standard Detail 16-06-010
For Crosswalk Striping Refer to Standard Detail 16-06-010
Refer to Standard Detail 16-04-010 Page 3/4.
For Yield Line Markings Refer to MUTCD Section 3B.16
20 ft to 50 ft
Refer to Standard Detail 16-04-010 Page 4/4.
8 in wide white 100 ft long
AHEAD
See Note 1.
NOTES:
1. ADVANCED WARNING SIGNS (MUTCD W11-2 AND W16-9P) ARE TO BE PLACED IN ACCORDANCE WITH SECTION 2C.05 OF THE MUTCD.
NTS
City of Flagstaff
ENGINEERING DETAIL
TYPICAL SIGNING & STRIPING DETAIL OF PEDESTRIAN CRFB
DETAIL NO.
16-04-010
REVISION DATE:
11/22/16
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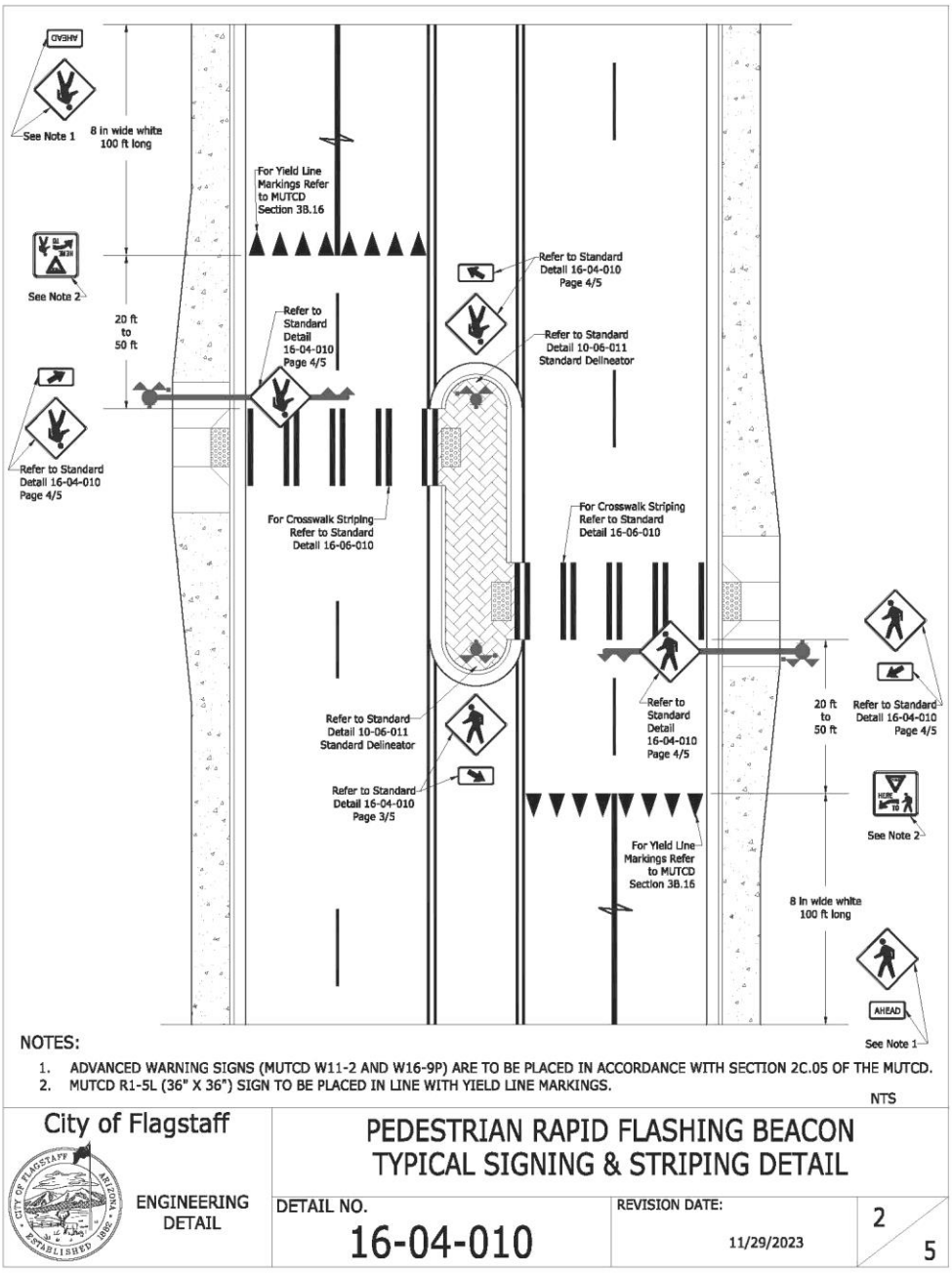
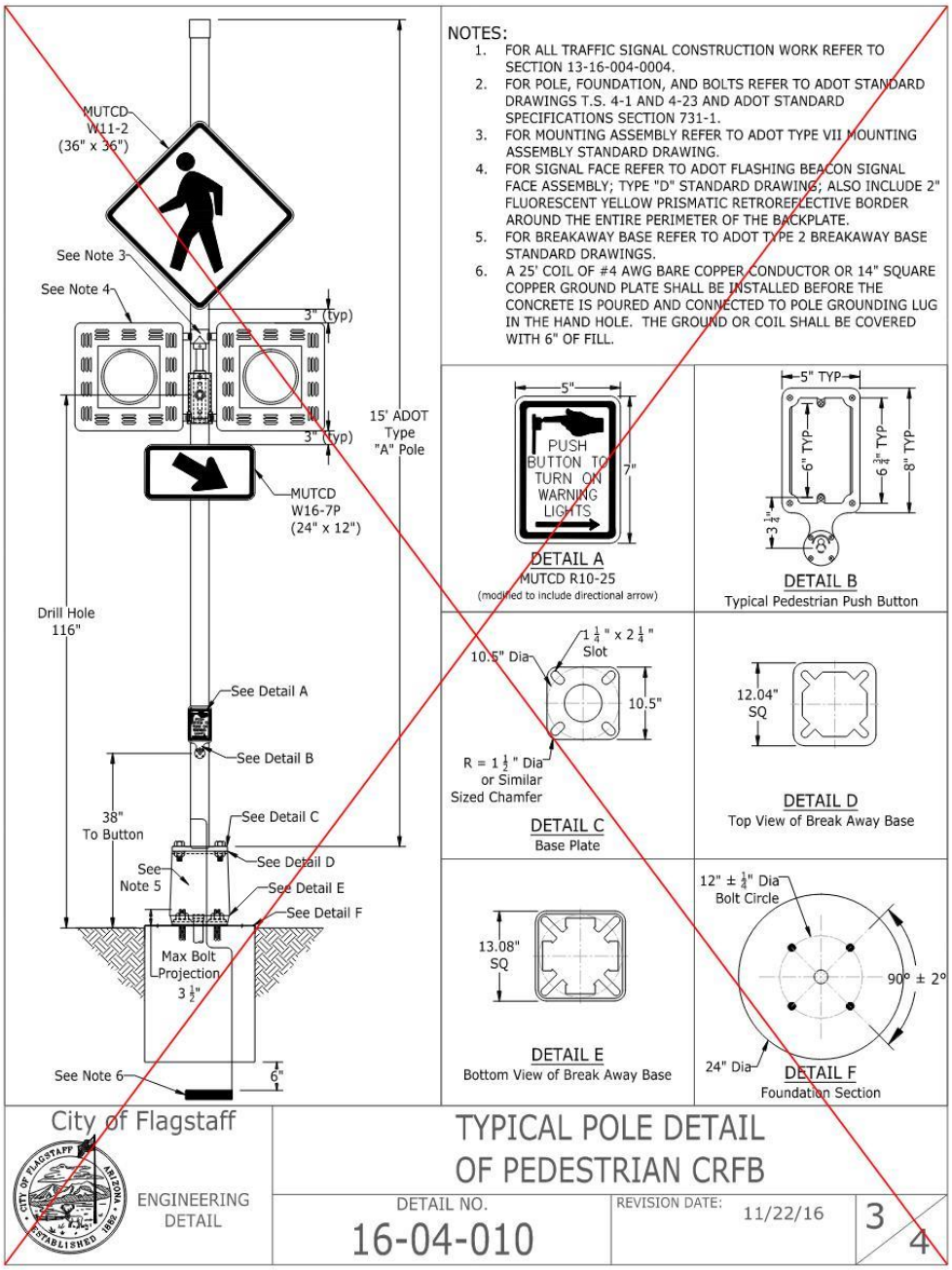


NOTES:

1. ADVANCED WARNING SIGNS (MUTCD W11-2 AND W16-9P) ARE TO BE PLACED IN ACCORDANCE WITH SECTION 2C.05 OF THE MUTCD.
2. MUTCD R1-5L (36" X 36") SIGN TO BE PLACED IN LINE WITH YIELD LINE MARKINGS.

NTS

City of Flagstaff	PEDESTRIAN RAPID FLASHING BEACON TYPICAL SIGNING & STRIPING DETAIL		
ENGINEERING DETAIL	DETAIL NO. 16-04-010	REVISION DATE: 11/29/2023	2 / 5


NOTES:
1. FOR ALL TRAFFIC SIGNAL CONSTRUCTION WORK REFER TO SECTION 13-16-004-0004.
2. FOR POLE, FOUNDATION, AND BOLTS REFER TO ADOT STANDARD DRAWINGS T.S. 4-1 AND 4-23 AND ADOT STANDARD SPECIFICATIONS SECTION 731-1.
3. FOR MOUNTING ASSEMBLY REFER TO ADOT TYPE VII MOUNTING ASSEMBLY STANDARD DRAWING.
4. FOR SIGNAL FACE REFER TO ADOT FLASHING BEACON SIGNAL FACE ASSEMBLY; TYPE "D" STANDARD DRAWING; ALSO INCLUDE 2" FLUORESCENT YELLOW PRISMATIC RETROREFLECTIVE BORDER AROUND THE ENTIRE PERIMETER OF THE BACKPLATE.
5. FOR BREAKAWAY BASE REFER TO ADOT TYPE 2 BREAKAWAY BASE STANDARD DRAWINGS.
6. A 25' COIL OF #4 AWG BARE COPPER CONDUCTOR OR 14" SQUARE COPPER GROUND PLATE SHALL BE INSTALLED BEFORE THE CONCRETE IS POURED AND CONNECTED TO POLE GROUNDING LUG IN THE HAND HOLE. THE GROUND OR COIL SHALL BE COVERED WITH 6" OF FILL.
MUTCD W11-2 (36" x 36")
See Note 3
See Note 4
3" (typ)
3" (typ)
15' ADOT Type "A" Pole
MUTCD W16-7P (24" x 12")
Drill Hole 116"
See Detail A
See Detail B
38" To Button
See Detail C
See Note 5
See Detail D
See Detail E
See Detail F
Max Bolt Projection 3 1/2"
See Note 6
6"
5"
PUSH BUTTON TO TURN ON WARNING LIGHTS
7"
DETAIL A
MUTCD R10-25
(modified to include directional arrow)
5" TYP
6" TYP
6 3/4" TYP
8" TYP
3 1/4"
DETAIL B
Typical Pedestrian Push Button
1 1/4" x 2 1/4" Slot
10.5" Dia
10.5"
R = 1 1/2" Dia or Similar Sized Chamfer
DETAIL C
Base Plate
12.04" SQ
DETAIL D
Top View of Break Away Base
13.08" SQ
DETAIL E
Bottom View of Break Away Base
12" ± 1/4" Dia Bolt Circle
90° ± 2°
24" Dia
DETAIL F
Foundation Section
City of Flagstaff
ENGINEERING DETAIL
TYPICAL POLE DETAIL OF PEDESTRIAN CRFB
DETAIL NO.
16-04-010
REVISION DATE:
11/22/16
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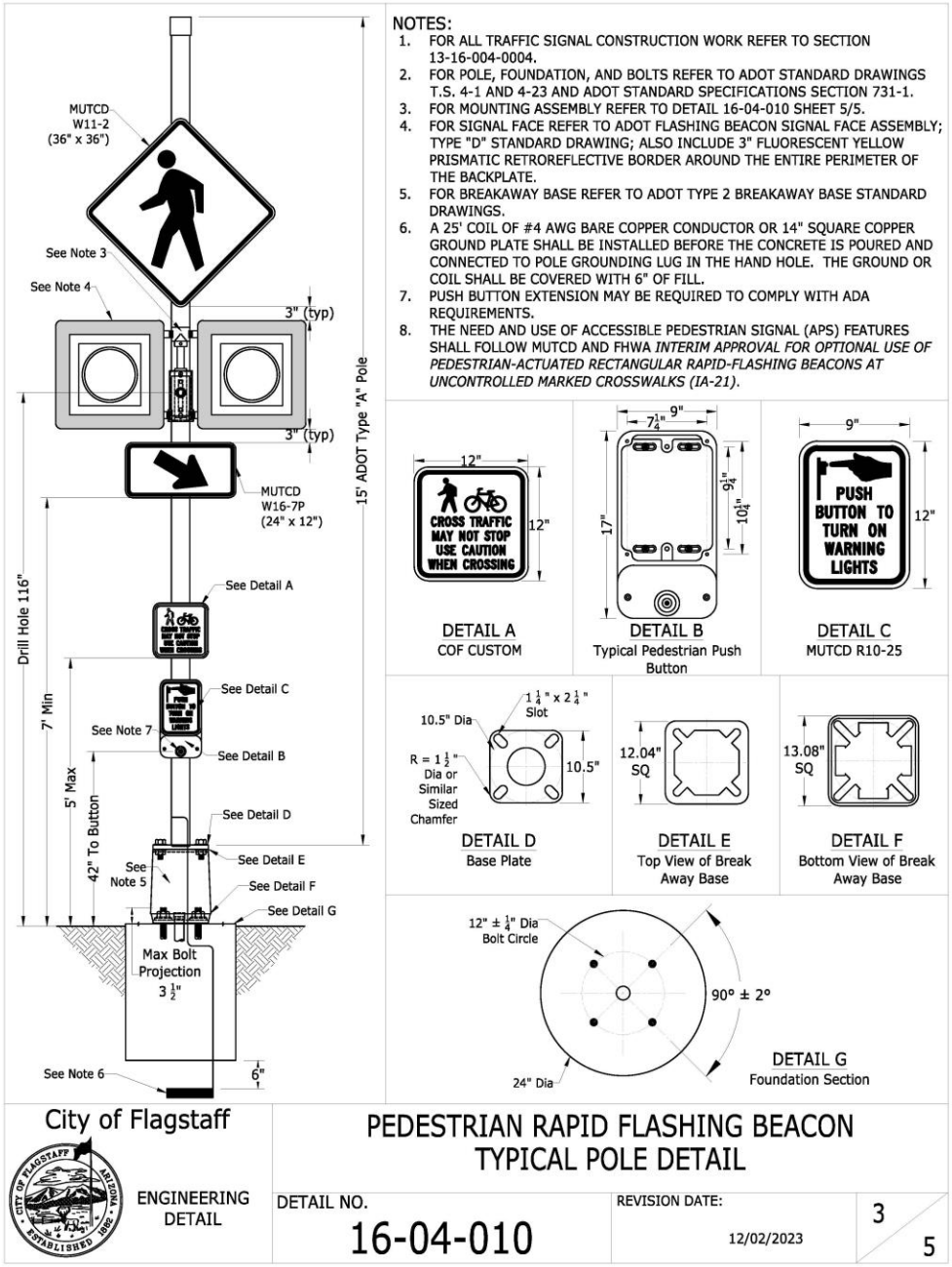
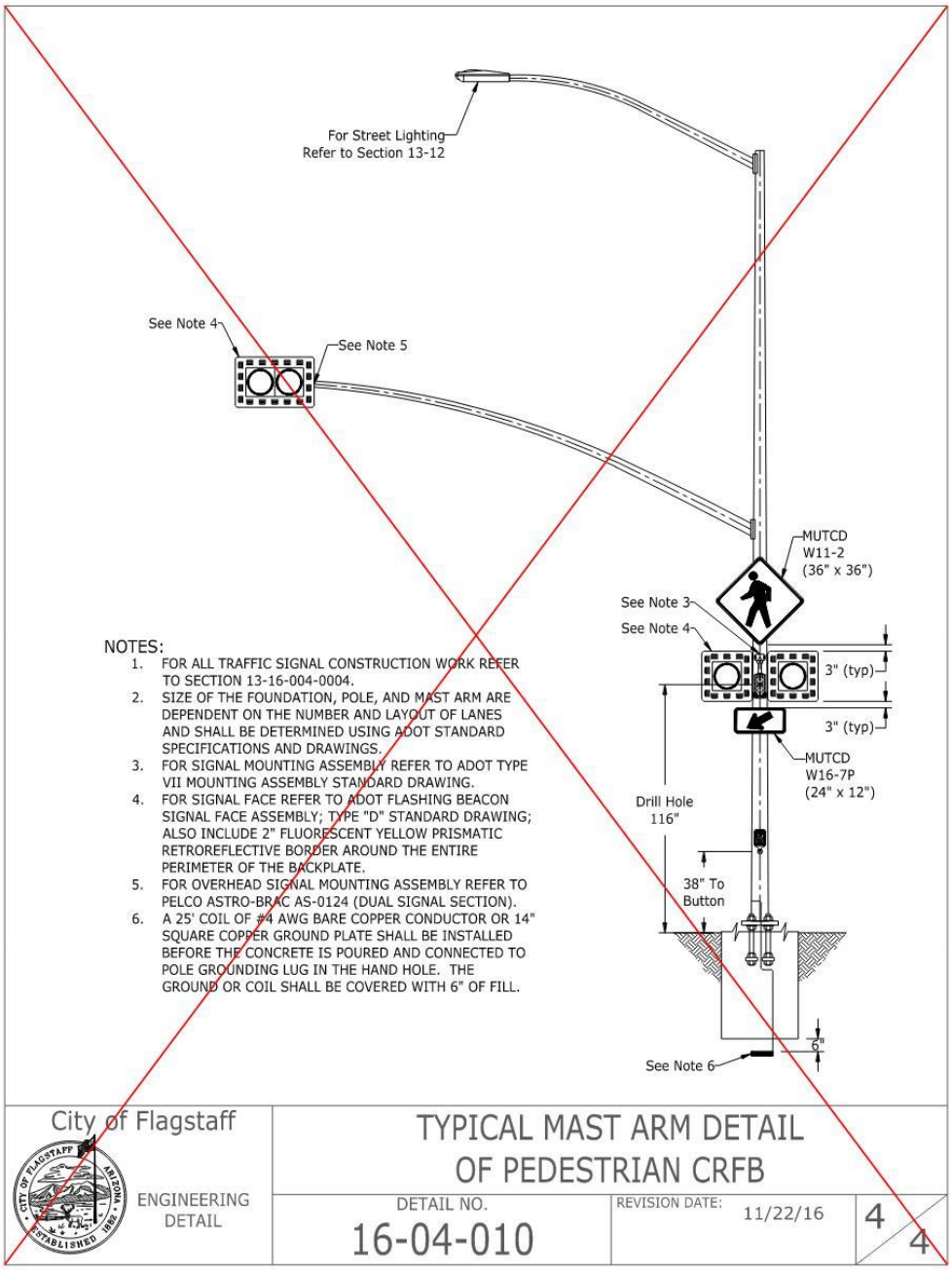
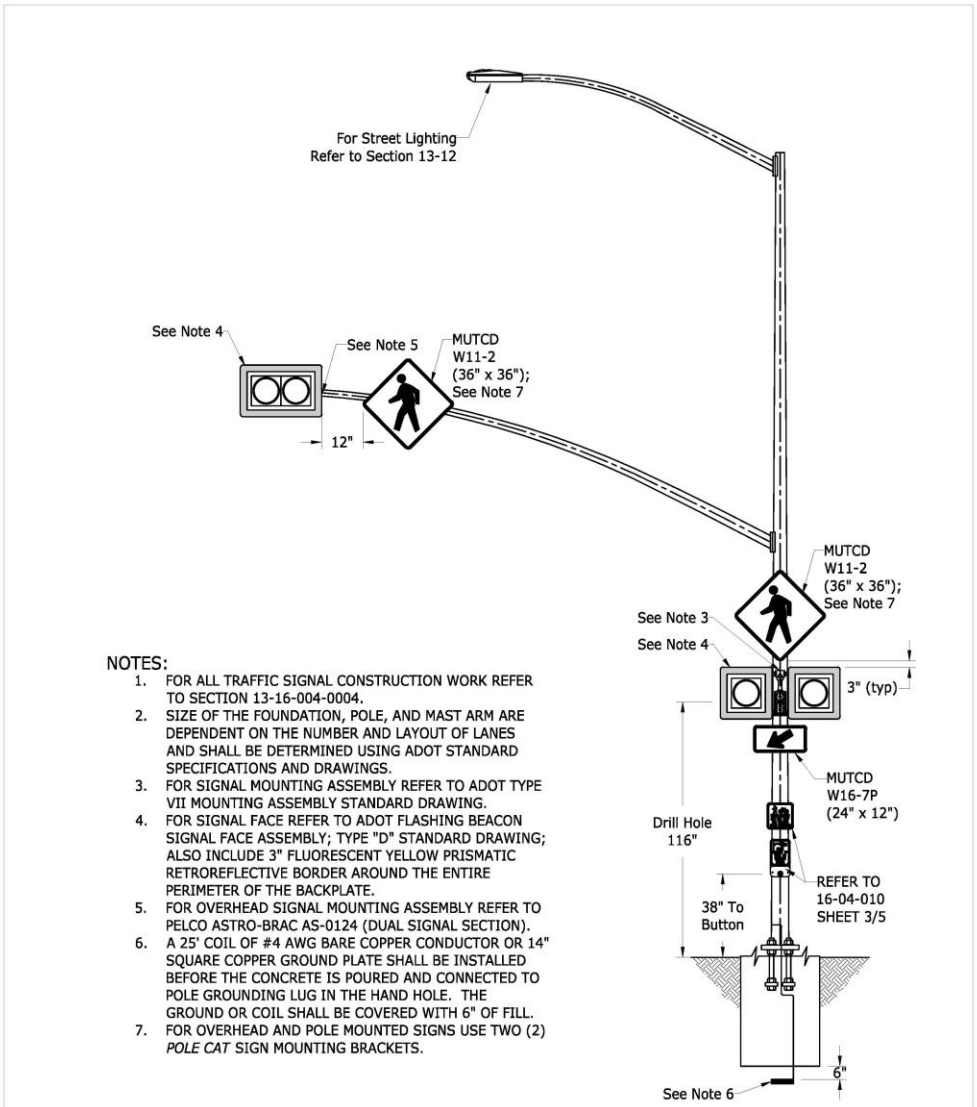
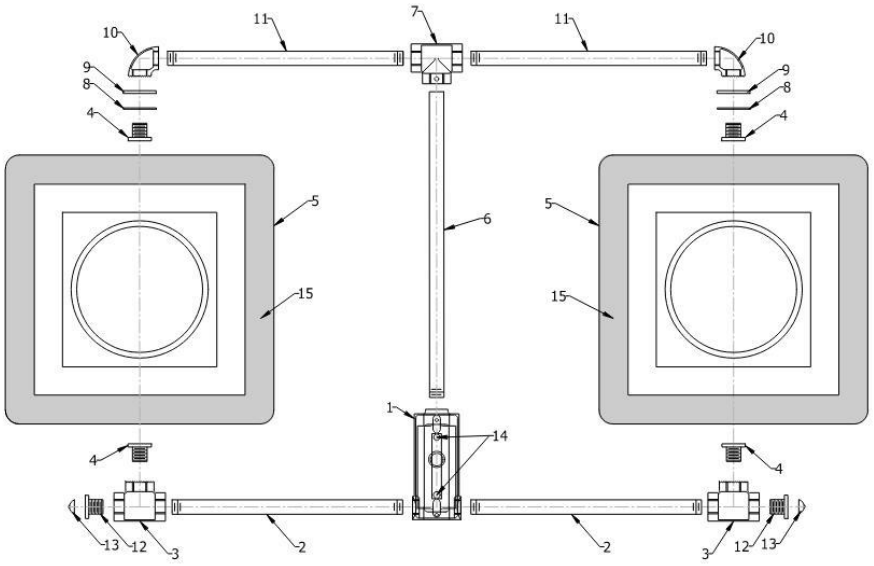

MUTCD W11-2 (36" x 36")
See Note 3
See Note 4
3" (typ)
3" (typ)
MUTCD W16-7P (24" x 12")
15' ADOT Type "A" Pole
Drill Hole 116"
7' Min
5' Max
42" To Button
See Detail A
See Detail C
See Note 7
See Detail B
See Detail D
See Note 5
See Detail E
See Detail F
See Detail G
Max Bolt Projection 3 1/2"
See Note 6
6"
NOTES:
1. FOR ALL TRAFFIC SIGNAL CONSTRUCTION WORK REFER TO SECTION 13-16-004-0004.
2. FOR POLE, FOUNDATION, AND BOLTS REFER TO ADOT STANDARD DRAWINGS T.S. 4-1 AND 4-23 AND ADOT STANDARD SPECIFICATIONS SECTION 731-1.
3. FOR MOUNTING ASSEMBLY REFER TO DETAIL 16-04-010 SHEET 5/5.
4. FOR SIGNAL FACE REFER TO ADOT FLASHING BEACON SIGNAL FACE ASSEMBLY; TYPE "D" STANDARD DRAWING; ALSO INCLUDE 3" FLUORESCENT YELLOW PRISMATIC RETROREFLECTIVE BORDER AROUND THE ENTIRE PERIMETER OF THE BACKPLATE.
5. FOR BREAKAWAY BASE REFER TO ADOT TYPE 2 BREAKAWAY BASE STANDARD DRAWINGS.
6. A 25' COIL OF #4 AWG BARE COPPER CONDUCTOR OR 14" SQUARE COPPER GROUND PLATE SHALL BE INSTALLED BEFORE THE CONCRETE IS POURED AND CONNECTED TO POLE GROUNDING LUG IN THE HAND HOLE. THE GROUND OR COIL SHALL BE COVERED WITH 6" OF FILL.
7. PUSH BUTTON EXTENSION MAY BE REQUIRED TO COMPLY WITH ADA REQUIREMENTS.
8. THE NEED AND USE OF ACCESSIBLE PEDESTRIAN SIGNAL (APS) FEATURES SHALL FOLLOW MUTCD AND FHWA *INTERIM APPROVAL FOR OPTIONAL USE OF PEDESTRIAN-ACTUATED RECTANGULAR RAPID-FLASHING BEACONS AT UNCONTROLLED MARKED CROSSWALKS (IA-21).*
12"
CROSS TRAFFIC MAY NOT STOP USE CAUTION WHEN CROSSING
12"
DETAIL A
COF CUSTOM
9"
7 1/4"
17"
9 1/4"
10 1/4"
DETAIL B
Typical Pedestrian Push Button
9"
PUSH BUTTON TO TURN ON WARNING LIGHTS
12"
DETAIL C
MUTCD R10-25
10.5" Dia
1 1/4" x 2 1/4" Slot
R = 1 1/2" Dia or Similar Sized Chamfer
10.5"
DETAIL D
Base Plate
12.04" SQ
DETAIL E
Top View of Break Away Base
13.08" SQ
DETAIL F
Bottom View of Break Away Base
12" ± 1/4" Dia Bolt Circle
90° ± 2°
24" Dia
DETAIL G
Foundation Section
City of Flagstaff
ENGINEERING DETAIL
PEDESTRIAN RAPID FLASHING BEACON
TYPICAL POLE DETAIL
DETAIL NO.
16-04-010
REVISION DATE:
12/02/2023
3
5


For Street Lighting
Refer to Section 13-12
See Note 4
See Note 5
MUTCD
W11-2
(36" x 36")
See Note 3
See Note 4
3" (typ)
3" (typ)
MUTCD
W16-7P
(24" x 12")
Drill Hole
116"
38" To
Button
6"
See Note 6
NOTES:
1. FOR ALL TRAFFIC SIGNAL CONSTRUCTION WORK REFER TO SECTION 13-16-004-0004.
2. SIZE OF THE FOUNDATION, POLE, AND MAST ARM ARE DEPENDENT ON THE NUMBER AND LAYOUT OF LANES AND SHALL BE DETERMINED USING ADOT STANDARD SPECIFICATIONS AND DRAWINGS.
3. FOR SIGNAL MOUNTING ASSEMBLY REFER TO ADOT TYPE VII MOUNTING ASSEMBLY STANDARD DRAWING.
4. FOR SIGNAL FACE REFER TO ADOT FLASHING BEACON SIGNAL FACE ASSEMBLY; TYPE "D" STANDARD DRAWING; ALSO INCLUDE 2" FLUORESCENT YELLOW PRISMATIC RETROREFLECTIVE BORDER AROUND THE ENTIRE PERIMETER OF THE BACKPLATE.
5. FOR OVERHEAD SIGNAL MOUNTING ASSEMBLY REFER TO PELCO ASTRO-BRAC AS-0124 (DUAL SIGNAL SECTION).
6. A 25' COIL OF #4 AWG BARE COPPER CONDUCTOR OR 14" SQUARE COPPER GROUND PLATE SHALL BE INSTALLED BEFORE THE CONCRETE IS POURED AND CONNECTED TO POLE GROUNDING LUG IN THE HAND HOLE. THE GROUND OR COIL SHALL BE COVERED WITH 6" OF FILL.
City of Flagstaff
ENGINEERING
DETAIL
TYPICAL MAST ARM DETAIL
OF PEDESTRIAN CRFB
DETAIL NO.
16-04-010
REVISION DATE:
11/22/16
4
4


For Street Lighting
Refer to Section 13-12
See Note 4
See Note 5
MUTCD
W11-2
(36" x 36");
See Note 7
12"
MUTCD
W11-2
(36" x 36");
See Note 7
See Note 3
See Note 4
3" (typ)
MUTCD
W16-7P
(24" x 12")
Drill Hole
116"
REFER TO
16-04-010
SHEET 3/5
38" To
Button
6"
See Note 6
NOTES:
1. FOR ALL TRAFFIC SIGNAL CONSTRUCTION WORK REFER TO SECTION 13-16-004-0004.
2. SIZE OF THE FOUNDATION, POLE, AND MAST ARM ARE DEPENDENT ON THE NUMBER AND LAYOUT OF LANES AND SHALL BE DETERMINED USING ADOT STANDARD SPECIFICATIONS AND DRAWINGS.
3. FOR SIGNAL MOUNTING ASSEMBLY REFER TO ADOT TYPE VII MOUNTING ASSEMBLY STANDARD DRAWING.
4. FOR SIGNAL FACE REFER TO ADOT FLASHING BEACON SIGNAL FACE ASSEMBLY; TYPE "D" STANDARD DRAWING; ALSO INCLUDE 3" FLUORESCENT YELLOW PRISMATIC RETROREFLECTIVE BORDER AROUND THE ENTIRE PERIMETER OF THE BACKPLATE.
5. FOR OVERHEAD SIGNAL MOUNTING ASSEMBLY REFER TO PELCO ASTRO-BRAC AS-0124 (DUAL SIGNAL SECTION).
6. A 25' COIL OF #4 AWG BARE COPPER CONDUCTOR OR 14" SQUARE COPPER GROUND PLATE SHALL BE INSTALLED BEFORE THE CONCRETE IS POURED AND CONNECTED TO POLE GROUNDING LUG IN THE HAND HOLE. THE GROUND OR COIL SHALL BE COVERED WITH 6" OF FILL.
7. FOR OVERHEAD AND POLE MOUNTED SIGNS USE TWO (2) *POLE CAT* SIGN MOUNTING BRACKETS.
City of Flagstaff
ENGINEERING DETAIL
PEDESTRIAN RAPID FLASHING BEACON
TYPICAL MAST ARM DETAIL
DETAIL NO.
16-04-010
REVISION DATE:
11/29/2023
4
5



LIST OF MATERIALS		
Itm	Qty	Description
1	1	Terminal compartment for side mounting (ADOT T.S. 10-4-1)
2	2	$1\frac{1}{2}$" pipe, length varies dependent on manufacturer
3	2	$1\frac{1}{2}$" Tee with locking serrations (ADOT T.S. 10-1-1)
4	4	$1\frac{1}{2}$" lock nipple, $1\frac{3}{4}$" long
5	2	Signal, Type D, see notes sheet 3/5
6	1	$1\frac{1}{2}$" Center pipe, threaded one end, length varies dependent on manufacturer
7	1	$1\frac{1}{2}$" Tee, drill & tap for setscrew

LIST OF MATERIALS		
Itm	Qty	Description
8	2	Neoprine washer or gasket
9	2	Flat washer
10	2	$1\frac{1}{2}$" 90° elbow with locking serrations (ADOT T.S. 10-1-2)
11	2	$1\frac{1}{2}$" pipe, length varies dependent on manufacturer
12	2	$1\frac{1}{2}$" PVC pipe cap (supplied by City)
13	2	LED indication (supplied by City)
14	2	$1\frac{1}{2}$" x 2" galvanized steel bolt 13 UNC with flat washer & lock washer
15	2	3" yellow retroreflective border

City of Flagstaff

ENGINEERING DETAIL

PEDESTRIAN RAPID FLASHING BEACON MOUNT DETAIL

DETAIL NO. 16-04-010

REVISION DATE: 11/29/2023

5 / 5

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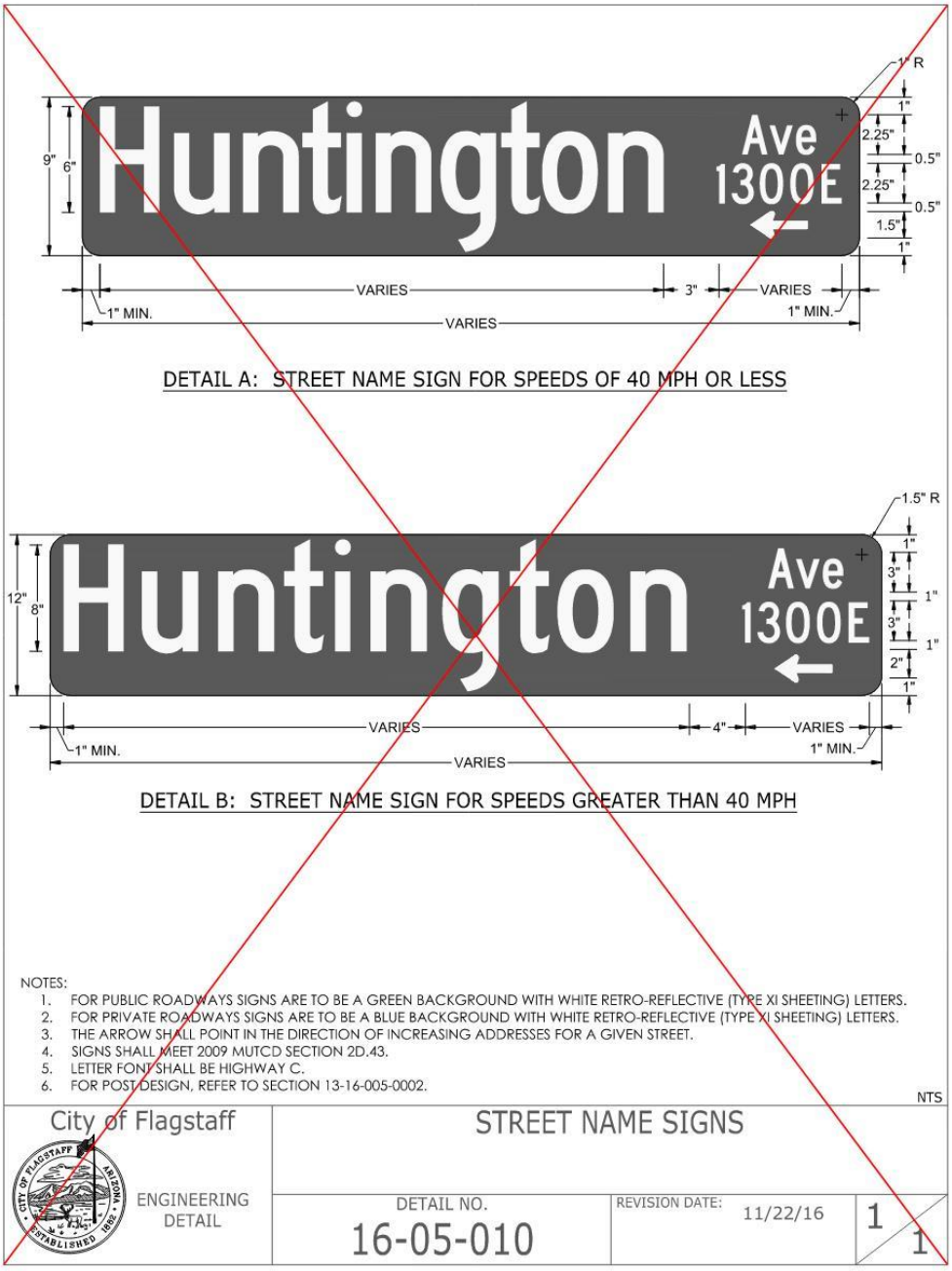
16-05-010: Street Name Signs

Section 75. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-05-010: Street Name Signs, delete existing standard drawing 16-05-010 and replace with standard drawing 16-05-010 below:



DETAIL A: STREET NAME SIGN FOR SPEEDS OF 40 MPH OR LESS

DETAIL B: STREET NAME SIGN FOR SPEEDS GREATER THAN 40 MPH

NOTES:
1. FOR PUBLIC ROADWAYS SIGNS ARE TO BE A GREEN BACKGROUND WITH WHITE RETRO-REFLECTIVE (TYPE XI SHEETING) LETTERS.
2. FOR PRIVATE ROADWAYS SIGNS ARE TO BE A BLUE BACKGROUND WITH WHITE RETRO-REFLECTIVE (TYPE XI SHEETING) LETTERS.
3. THE ARROW SHALL POINT IN THE DIRECTION OF INCREASING ADDRESSES FOR A GIVEN STREET.
4. SIGNS SHALL MEET 2009 MUTCD SECTION 2D.43.
5. LETTER FONT SHALL BE HIGHWAY C.
6. FOR POST DESIGN, REFER TO SECTION 13-16-005-0002.

NTS

City of Flagstaff ENGINEERING DETAIL	STREET NAME SIGNS		
	DETAIL NO. 16-05-010	REVISION DATE: 11/29/2023	1 / 1

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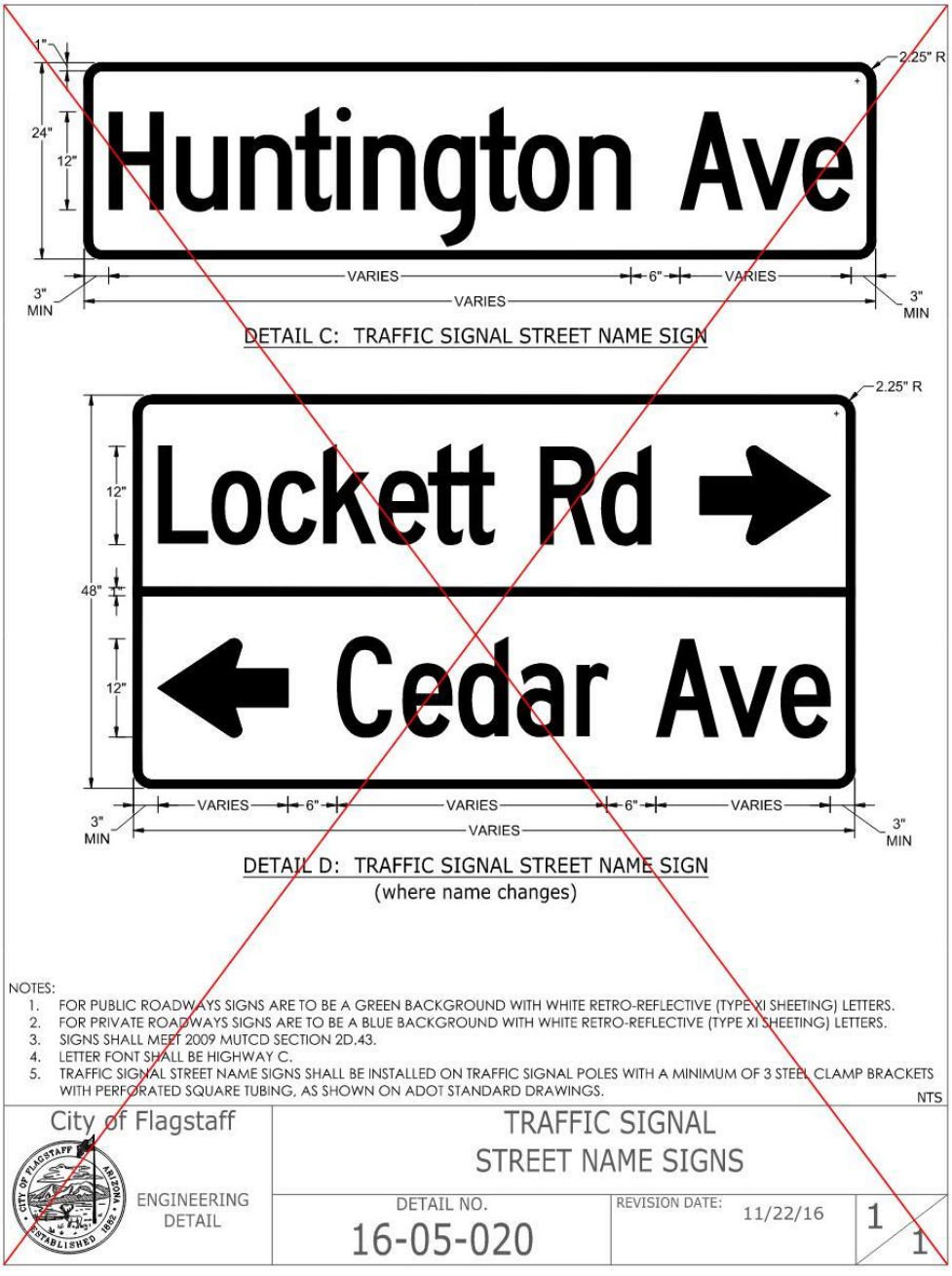
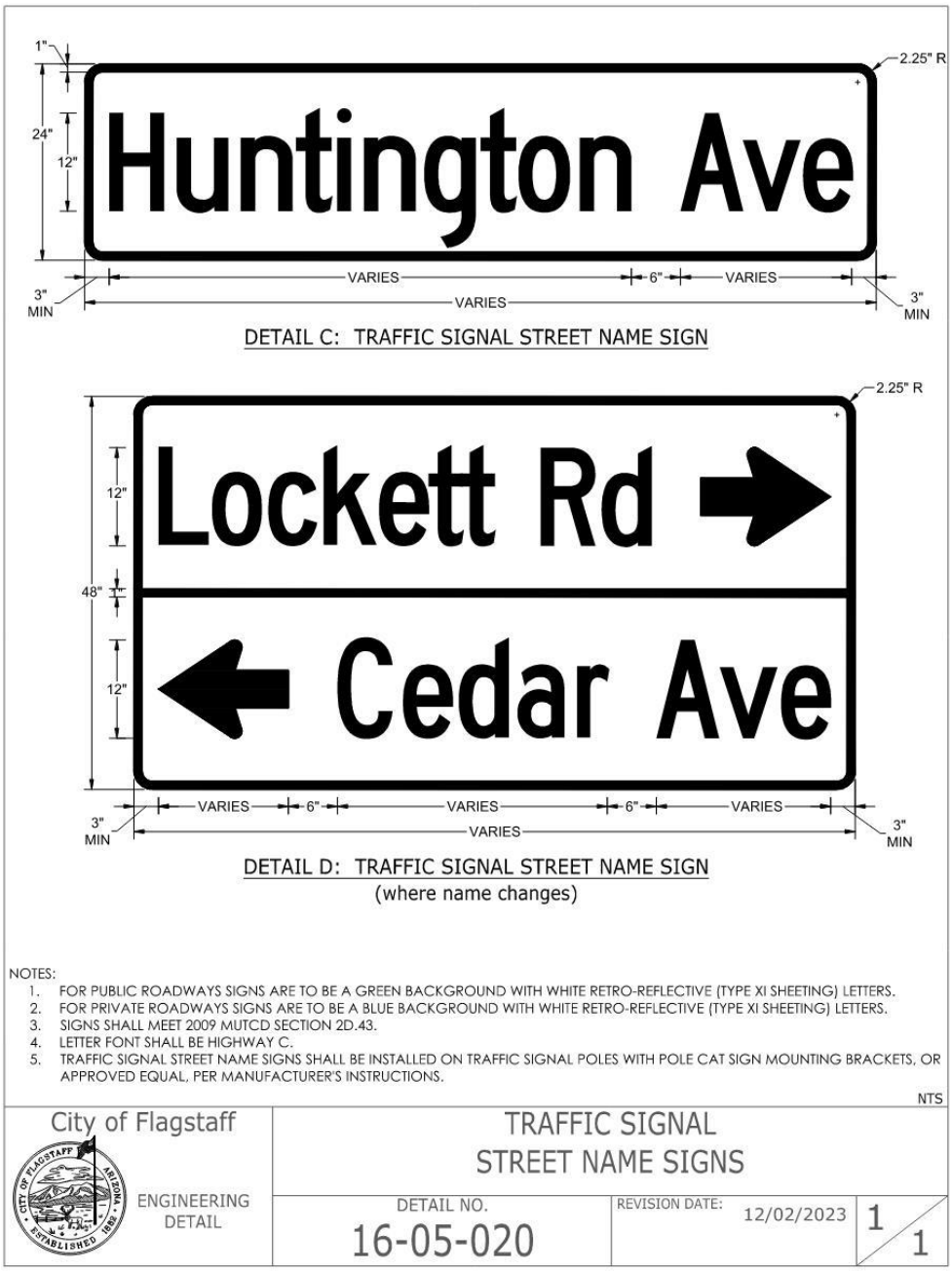
16-05-020: Traffic Signal Street Name Signs

Section 76. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-05-020: Traffic Signal Street Name Signs, delete existing standard drawing 16-05-020 and replace with standard drawing 16-05-020 below:




1"
24"
12"
Huntington Ave
2.25" R
VARIES
6"
VARIES
3" MIN
VARIES
3" MIN
DETAIL C: TRAFFIC SIGNAL STREET NAME SIGN
2.25" R
12"
48"
12"
Lockett Rd
Cedar Ave
VARIES
6"
VARIES
6"
VARIES
3" MIN
VARIES
3" MIN
DETAIL D: TRAFFIC SIGNAL STREET NAME SIGN
(where name changes)
NOTES:
1. FOR PUBLIC ROADWAYS SIGNS ARE TO BE A GREEN BACKGROUND WITH WHITE RETRO-REFLECTIVE (TYPE XI SHEETING) LETTERS.
2. FOR PRIVATE ROADWAYS SIGNS ARE TO BE A BLUE BACKGROUND WITH WHITE RETRO-REFLECTIVE (TYPE XI SHEETING) LETTERS.
3. SIGNS SHALL MEET 2009 MUTCD SECTION 2D.43.
4. LETTER FONT SHALL BE HIGHWAY C.
5. TRAFFIC SIGNAL STREET NAME SIGNS SHALL BE INSTALLED ON TRAFFIC SIGNAL POLES WITH POLE CAT SIGN MOUNTING BRACKETS, OR APPROVED EQUAL, PER MANUFACTURER'S INSTRUCTIONS.
NTS
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL
STREET NAME SIGNS
DETAIL NO.
16-05-020
REVISION DATE:
12/02/2023
1
1

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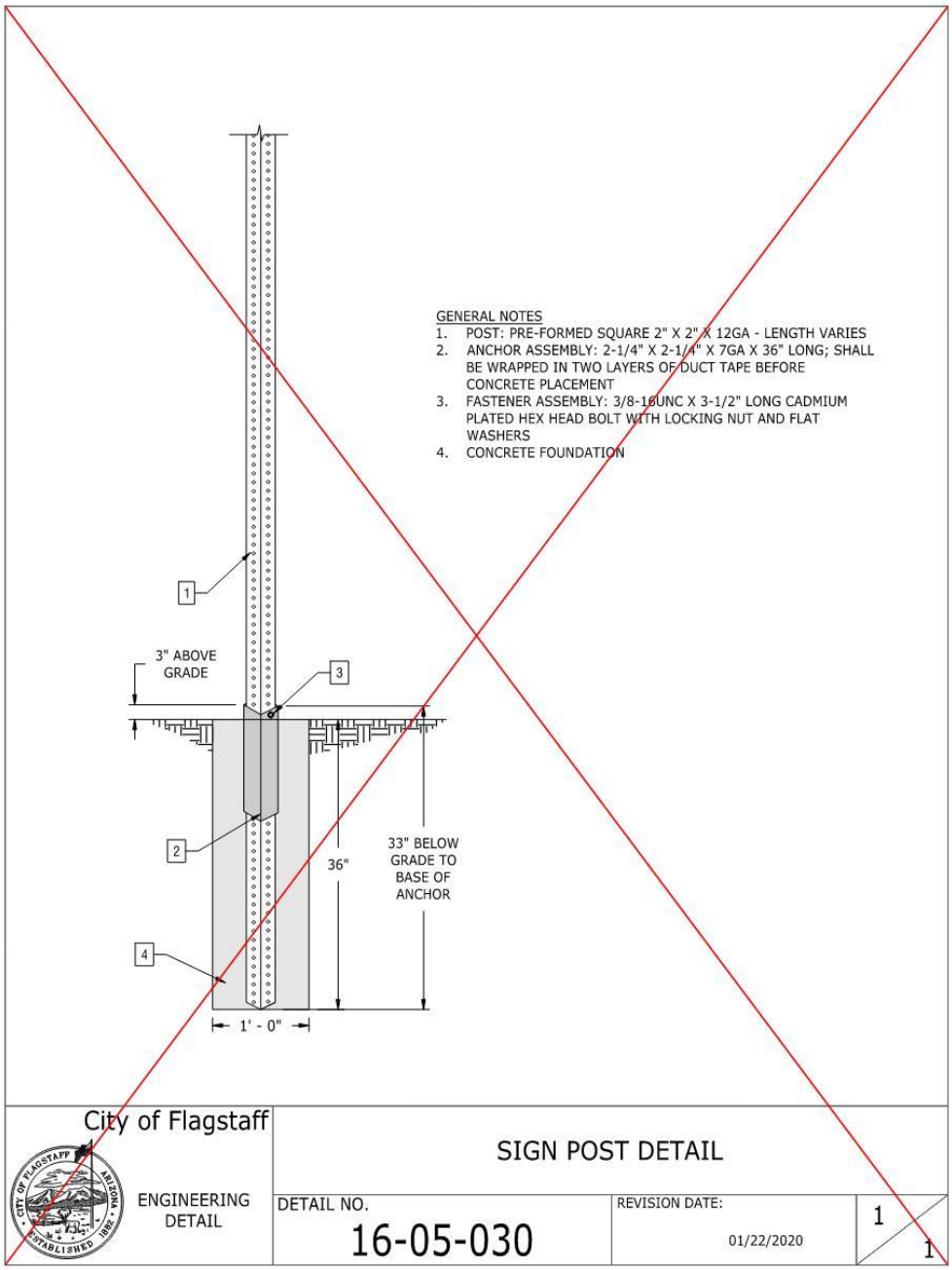
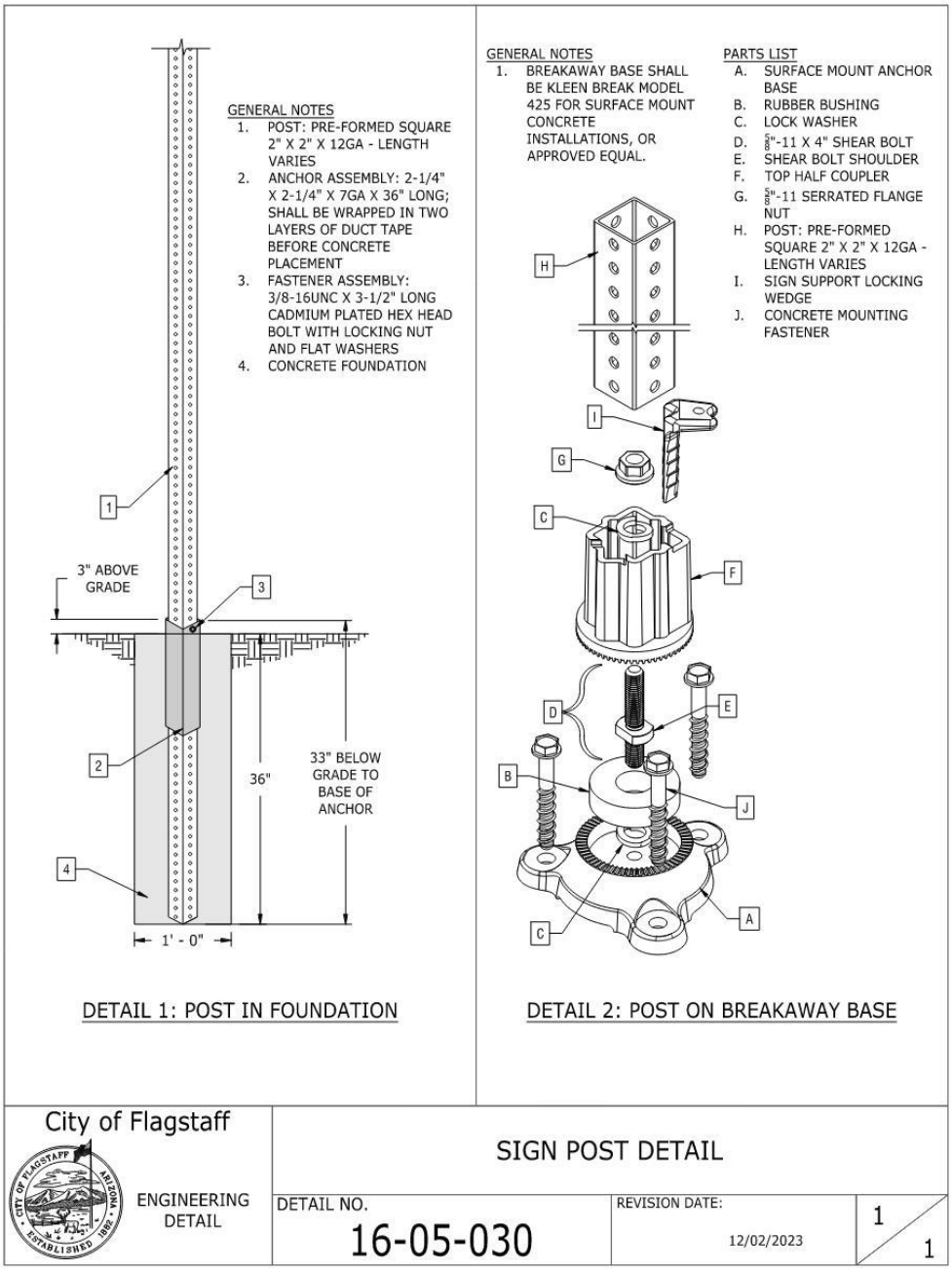
16-05-030: Sign Post Detail

Section 77. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-05-030: Sign Post Detail, delete existing standard drawing 16-05-030 and replace with standard drawing 16-05-030 below:




GENERAL NOTES
1. POST: PRE-FORMED SQUARE 2" X 2" X 12GA - LENGTH VARIES
2. ANCHOR ASSEMBLY: 2-1/4" X 2-1/4" X 7GA X 36" LONG; SHALL BE WRAPPED IN TWO LAYERS OF DUCT TAPE BEFORE CONCRETE PLACEMENT
3. FASTENER ASSEMBLY: 3/8-16UNC X 3-1/2" LONG CADMIUM PLATED HEX HEAD BOLT WITH LOCKING NUT AND FLAT WASHERS
4. CONCRETE FOUNDATION
1
3" ABOVE GRADE
3
2
36"
33" BELOW GRADE TO BASE OF ANCHOR
4
1' - 0"
DETAIL 1: POST IN FOUNDATION
GENERAL NOTES
1. BREAKAWAY BASE SHALL BE KLEEN BREAK MODEL 425 FOR SURFACE MOUNT CONCRETE INSTALLATIONS, OR APPROVED EQUAL.
PARTS LIST
A. SURFACE MOUNT ANCHOR BASE
B. RUBBER BUSHING
C. LOCK WASHER
D. 5/8"-11 X 4" SHEAR BOLT
E. SHEAR BOLT SHOULDER
F. TOP HALF COUPLER
G. 5/8"-11 SERRATED FLANGE NUT
H. POST: PRE-FORMED SQUARE 2" X 2" X 12GA - LENGTH VARIES
I. SIGN SUPPORT LOCKING WEDGE
J. CONCRETE MOUNTING FASTENER
H
I
G
C
F
D
E
B
J
C
A
DETAIL 2: POST ON BREAKAWAY BASE
City of Flagstaff
ENGINEERING DETAIL
SIGN POST DETAIL
DETAIL NO.
16-05-030
REVISION DATE:
12/02/2023
1
1

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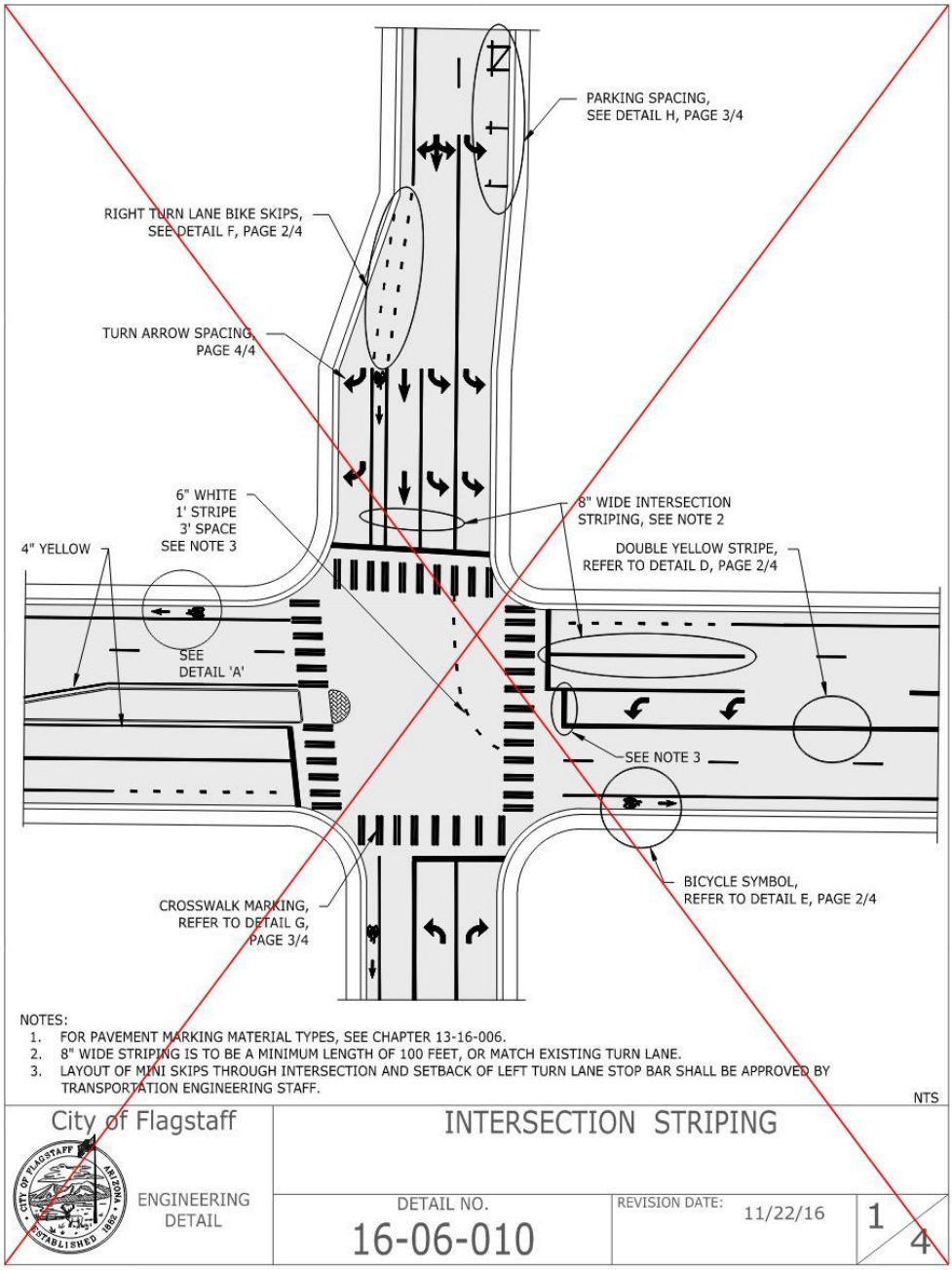
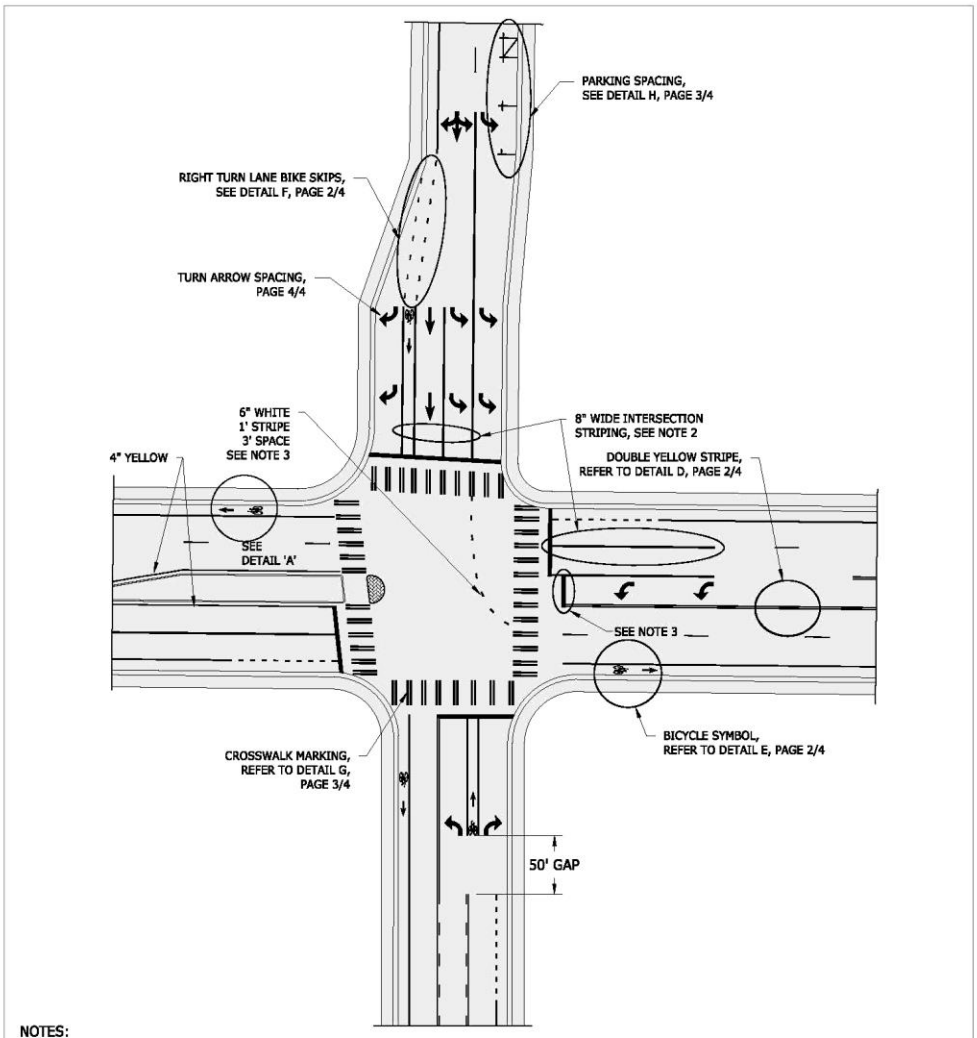
16-06-010: Intersection Striping

Section 78. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-06-010: Intersection Striping, delete existing standard drawing 16-06-010 and replace with standard drawing 16-06-010 below:

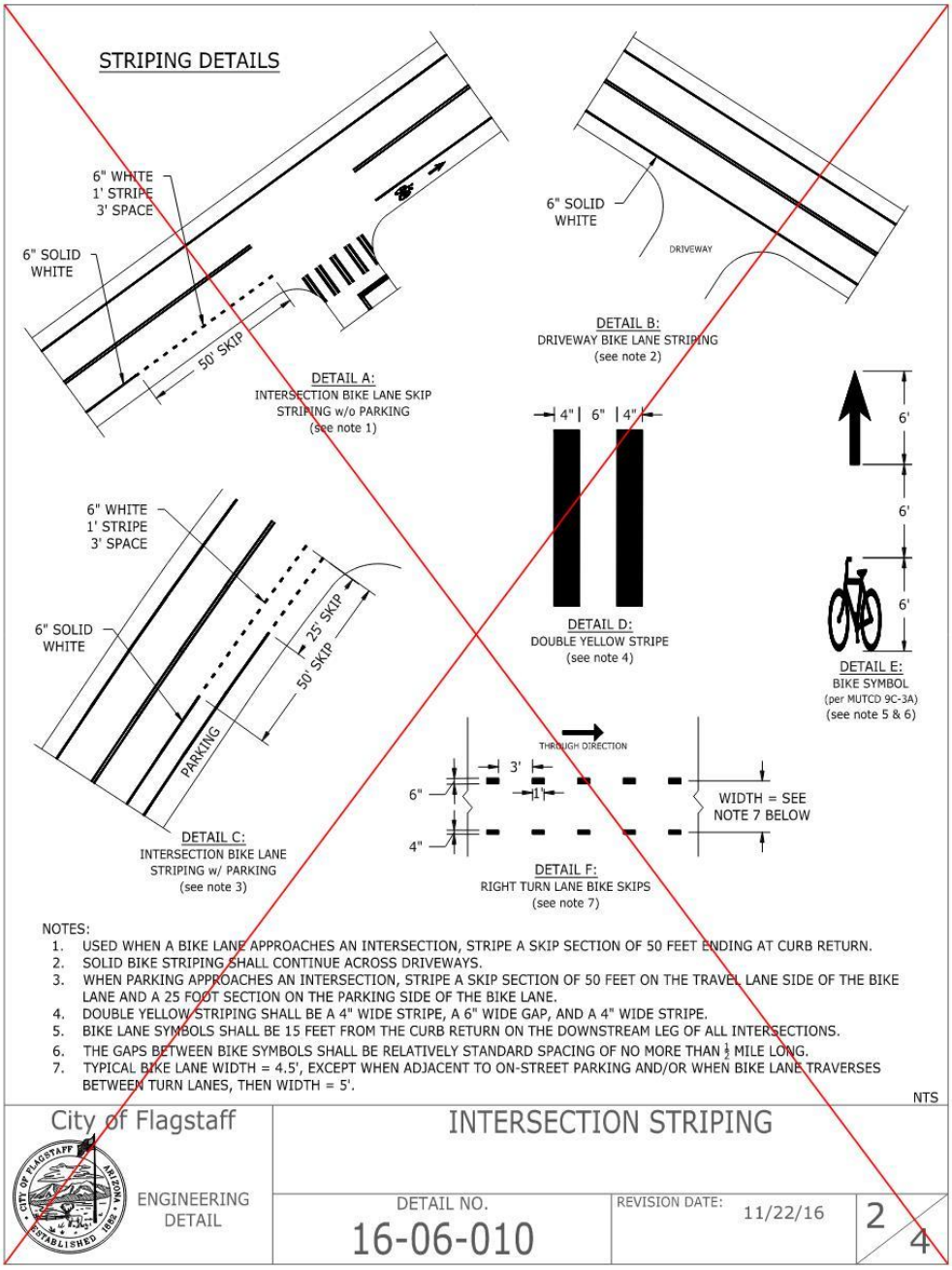


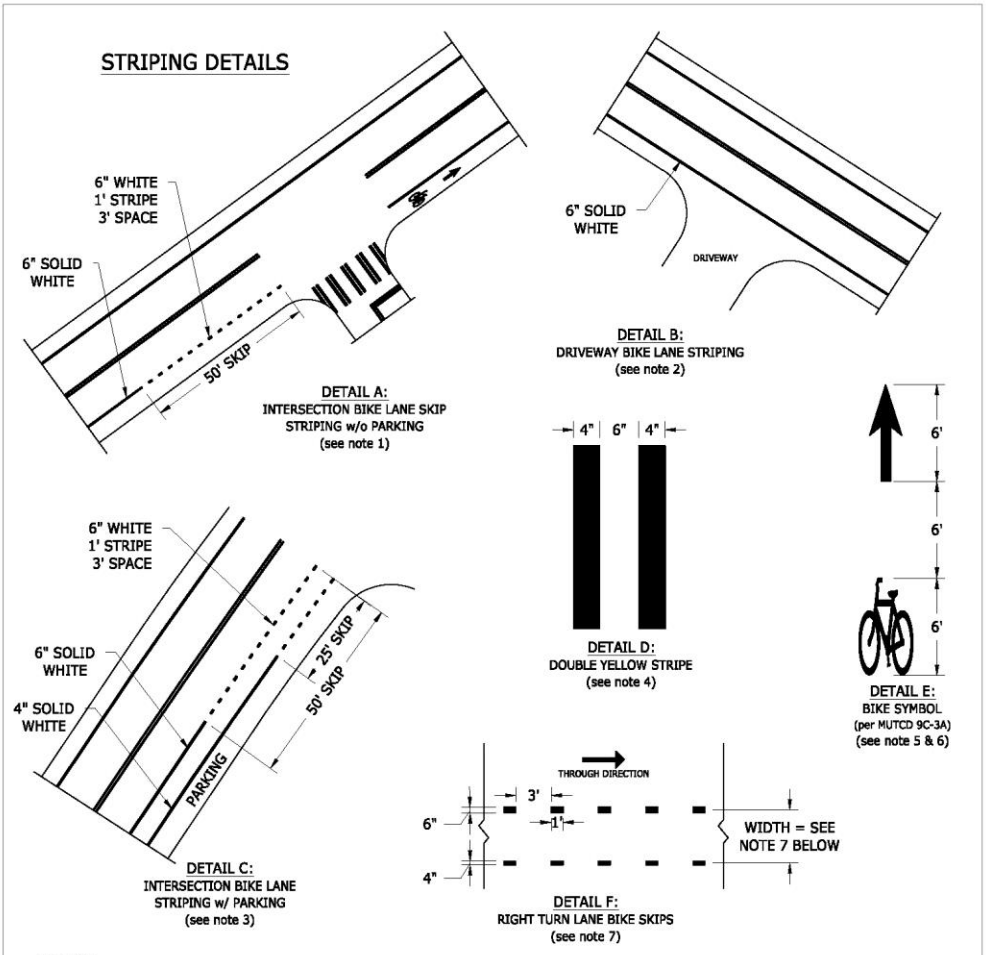


NOTES:
1. FOR PAVEMENT MARKING MATERIAL TYPES, SEE CHAPTER 13-16-006.
2. 8" WIDE STRIPING IS TO BE A MINIMUM LENGTH OF 100 FEET, OR MATCH EXISTING TURN LANE.
3. LAYOUT OF MINI SKIPS THROUGH INTERSECTION AND SETBACK OF LEFT TURN LANE STOP BAR SHALL BE APPROVED BY TRANSPORTATION ENGINEERING STAFF.
4. FOR BICYCLE LANES, STRIPE A SKIP SECTION OF 50 FEET APPROACHING THE INTERSECTION.

NTS

City of Flagstaff	INTERSECTION STRIPING		
ENGINEERING DETAIL	DETAIL NO. 16-06-010	REVISION DATE: 11/29/2023	1 / 4


STRIPING DETAILS
6" WHITE
1' STRIPE
3' SPACE
6" SOLID
WHITE
50' SKIP
DETAIL A:
INTERSECTION BIKE LANE SKIP
STRIPING w/o PARKING
(see note 1)
6" SOLID
WHITE
DRIVEWAY
DETAIL B:
DRIVEWAY BIKE LANE STRIPING
(see note 2)
4" 6" 4"
DETAIL D:
DOUBLE YELLOW STRIPE
(see note 4)
6'
6'
6'
DETAIL E:
BIKE SYMBOL
(per MUTCD 9C-3A)
(see note 5 & 6)
6" WHITE
1' STRIPE
3' SPACE
6" SOLID
WHITE
25' SKIP
50' SKIP
PARKING
DETAIL C:
INTERSECTION BIKE LANE
STRIPING w/ PARKING
(see note 3)
THROUGH DIRECTION
3'
6"
1'
4"
WIDTH = SEE
NOTE 7 BELOW
DETAIL F:
RIGHT TURN LANE BIKE SKIPS
(see note 7)
NOTES:
1. USED WHEN A BIKE LANE APPROACHES AN INTERSECTION, STRIPE A SKIP SECTION OF 50 FEET ENDING AT CURB RETURN.
2. SOLID BIKE STRIPING SHALL CONTINUE ACROSS DRIVEWAYS.
3. WHEN PARKING APPROACHES AN INTERSECTION, STRIPE A SKIP SECTION OF 50 FEET ON THE TRAVEL LANE SIDE OF THE BIKE LANE AND A 25 FOOT SECTION ON THE PARKING SIDE OF THE BIKE LANE.
4. DOUBLE YELLOW STRIPING SHALL BE A 4" WIDE STRIPE, A 6" WIDE GAP, AND A 4" WIDE STRIPE.
5. BIKE LANE SYMBOLS SHALL BE 15 FEET FROM THE CURB RETURN ON THE DOWNSTREAM LEG OF ALL INTERSECTIONS.
6. THE GAPS BETWEEN BIKE SYMBOLS SHALL BE RELATIVELY STANDARD SPACING OF NO MORE THAN ½ MILE LONG.
7. TYPICAL BIKE LANE WIDTH = 4.5', EXCEPT WHEN ADJACENT TO ON-STREET PARKING AND/OR WHEN BIKE LANE TRAVERSES BETWEEN TURN LANES, THEN WIDTH = 5'.
NTS
City of Flagstaff
ENGINEERING
DETAIL
INTERSECTION STRIPING
DETAIL NO.
16-06-010
REVISION DATE:
11/22/16
2
4

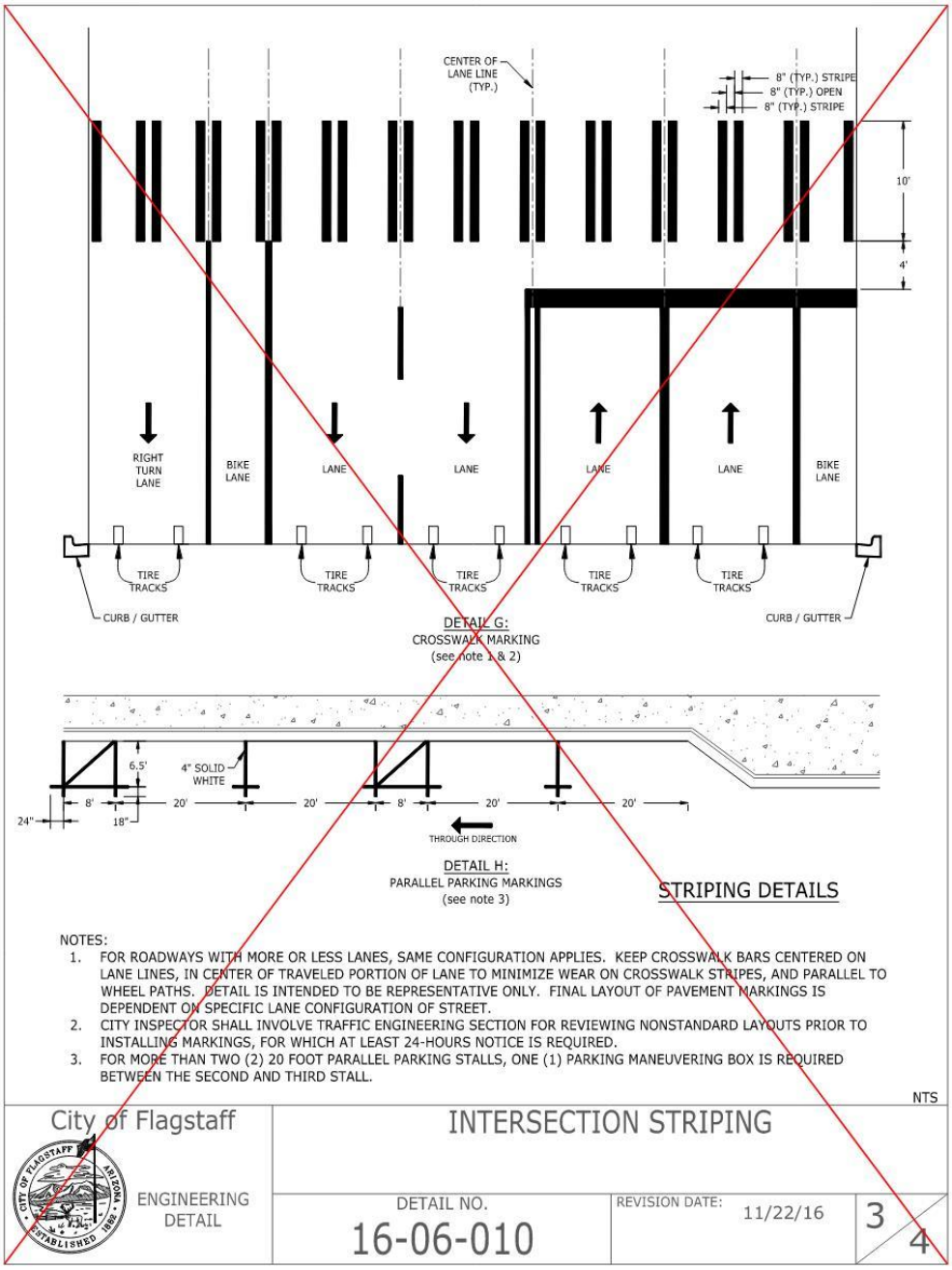


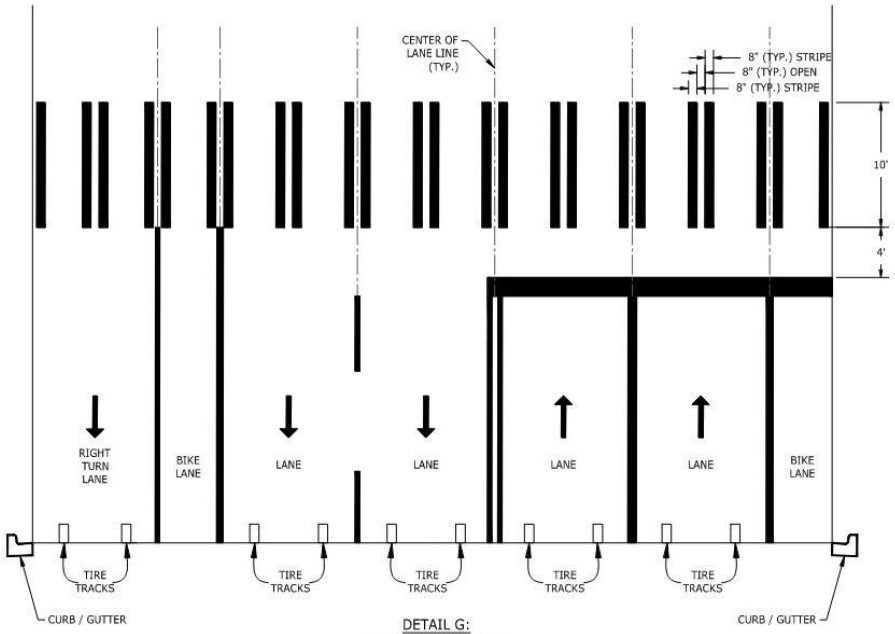
NOTES:

1. USED WHEN A BIKE LANE APPROACHES AN INTERSECTION, STRIPE A SKIP SECTION OF 50 FEET ENDING AT CURB RETURN.
2. SOLID BIKE STRIPING SHALL CONTINUE ACROSS DRIVEWAYS.
3. WHEN PARKING APPROACHES AN INTERSECTION, STRIPE A SKIP SECTION OF 50 FEET ON THE TRAVEL LANE SIDE OF THE BIKE LANE AND A 25 FOOT SECTION ON THE PARKING SIDE OF THE BIKE LANE.
4. DOUBLE YELLOW STRIPING SHALL BE A 4" WIDE STRIPE, A 6" WIDE GAP, AND A 4" WIDE STRIPE.
5. BIKE LANE SYMBOLS SHALL BE 15 FEET FROM THE CURB RETURN ON THE DOWNSTREAM LEG OF ALL INTERSECTIONS.
6. THE GAPS BETWEEN BIKE SYMBOLS SHALL BE RELATIVELY STANDARD SPACING OF NO MORE THAN $\frac{1}{2}$ MILE LONG.
7. TYPICAL BIKE LANE WIDTH = 4.5', EXCEPT WHEN ADJACENT TO ON-STREET PARKING AND/OR WHEN BIKE LANE TRAVERSES BETWEEN TURN LANES, THEN WIDTH = 5'.

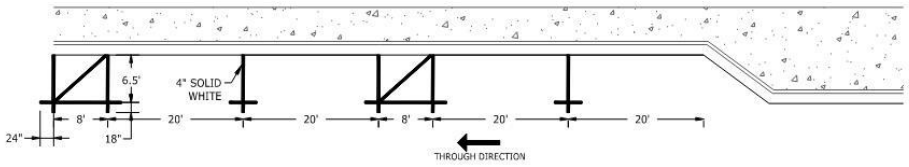
NTS

City of Flagstaff	INTERSECTION STRIPING		
ENGINEERING DETAIL	DETAIL NO. 16-06-010	REVISION DATE: 11/29/2023	2 / 4


CENTER OF LANE LINE (TYP.)
8" (TYP.) STRIPE
8" (TYP.) OPEN
8" (TYP.) STRIPE
10'
4'
RIGHT TURN LANE
BIKE LANE
LANE
LANE
LANE
LANE
BIKE LANE
TIRE TRACKS
CURB / GUTTER
CURB / GUTTER
DETAIL G:
CROSSWALK MARKING
(see note 1 & 2)
6.5'
4" SOLID WHITE
8'
20'
20'
8'
20'
20'
24"
18"
THROUGH DIRECTION
DETAIL H:
PARALLEL PARKING MARKINGS
(see note 3)
STRIPING DETAILS
NOTES:
1. FOR ROADWAYS WITH MORE OR LESS LANES, SAME CONFIGURATION APPLIES. KEEP CROSSWALK BARS CENTERED ON LANE LINES, IN CENTER OF TRAVELED PORTION OF LANE TO MINIMIZE WEAR ON CROSSWALK STRIPES, AND PARALLEL TO WHEEL PATHS. DETAIL IS INTENDED TO BE REPRESENTATIVE ONLY. FINAL LAYOUT OF PAVEMENT MARKINGS IS DEPENDENT ON SPECIFIC LANE CONFIGURATION OF STREET.
2. CITY INSPECTOR SHALL INVOLVE TRAFFIC ENGINEERING SECTION FOR REVIEWING NONSTANDARD LAYOUTS PRIOR TO INSTALLING MARKINGS, FOR WHICH AT LEAST 24-HOURS NOTICE IS REQUIRED.
3. FOR MORE THAN TWO (2) 20 FOOT PARALLEL PARKING STALLS, ONE (1) PARKING MANEUVERING BOX IS REQUIRED BETWEEN THE SECOND AND THIRD STALL.
NTS
City of Flagstaff
ENGINEERING DETAIL
INTERSECTION STRIPING
DETAIL NO.
16-06-010
REVISION DATE:
11/22/16
3
4



DETAIL G:
CROSSWALK MARKING
(see note 1 & 2)



DETAIL H:
PARALLEL PARKING MARKINGS
(see note 3)

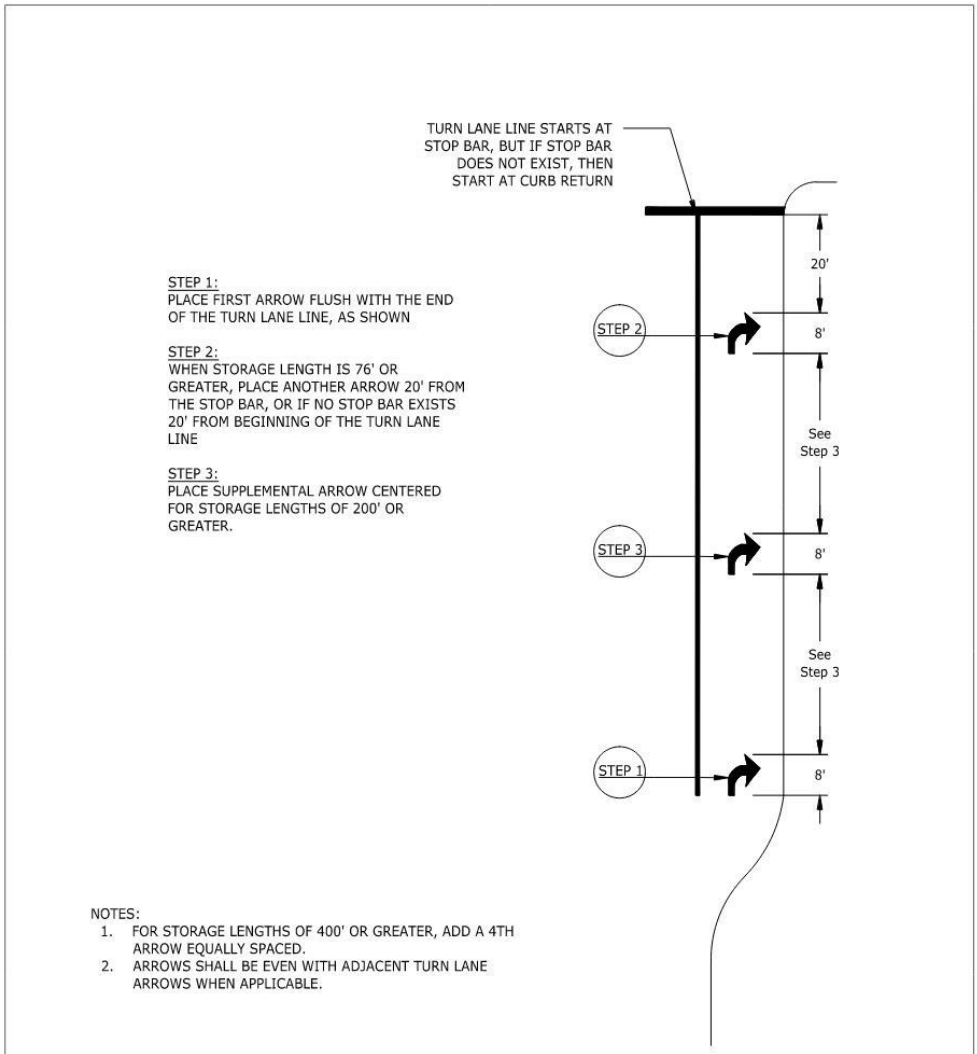
STRIPING DETAILS

NOTES:

1. FOR ROADWAYS WITH MORE OR LESS LANES, SAME CONFIGURATION APPLIES. KEEP CROSSWALK BARS CENTERED ON LANE LINES, IN CENTER OF TRAVELED PORTION OF LANE TO MINIMIZE WEAR ON CROSSWALK STRIPES, AND PARALLEL TO WHEEL PATHS. DETAIL IS INTENDED TO BE REPRESENTATIVE ONLY. FINAL LAYOUT OF PAVEMENT MARKINGS IS DEPENDENT ON SPECIFIC LANE CONFIGURATION OF STREET.
2. CITY INSPECTOR SHALL INVOLVE TRAFFIC ENGINEERING SECTION FOR REVIEWING NONSTANDARD LAYOUTS PRIOR TO INSTALLING MARKINGS, FOR WHICH AT LEAST 24-HOURS NOTICE IS REQUIRED.
3. FOR MORE THAN TWO (2) 20 FOOT PARALLEL PARKING STALLS, ONE (1) PARKING MANEUVERING BOX IS REQUIRED BETWEEN THE SECOND AND THIRD STALL.
4. FOR CROSSWALKS, IF A GAP IS LARGER THAN 6 FEET TO THE CENTER OF THE MARKING, ADD MORE STRIPES AS APPROPRIATE.

NTS

City of Flagstaff	INTERSECTION STRIPING		
ENGINEERING DETAIL	DETAIL NO. 16-06-010	REVISION DATE: 11/29/2023	3 / 4


TURN LANE LINE STARTS AT STOP BAR, BUT IF STOP BAR DOES NOT EXIST, THEN START AT CURB RETURN
STEP 1:
PLACE FIRST ARROW FLUSH WITH THE END OF THE TURN LANE LINE, AS SHOWN
STEP 2:
WHEN STORAGE LENGTH IS 76' OR GREATER, PLACE ANOTHER ARROW 20' FROM THE STOP BAR, OR IF NO STOP BAR EXISTS 20' FROM BEGINNING OF THE TURN LANE LINE
STEP 3:
PLACE SUPPLEMENTAL ARROW CENTERED FOR STORAGE LENGTHS OF 200' OR GREATER.
20'
STEP 2
8'
See Step 3
STEP 3
8'
See Step 3
STEP 1
8'
NOTES:
1. FOR STORAGE LENGTHS OF 400' OR GREATER, ADD A 4TH ARROW EQUALLY SPACED.
2. ARROWS SHALL BE EVEN WITH ADJACENT TURN LANE ARROWS WHEN APPLICABLE.
TURN LANE PAVEMENT MARKINGS
NTS
City of Flagstaff
ENGINEERING DETAIL
INTERSECTION STRIPING
DETAIL NO.
16-06-010
REVISION DATE:
11/22/16
4
4

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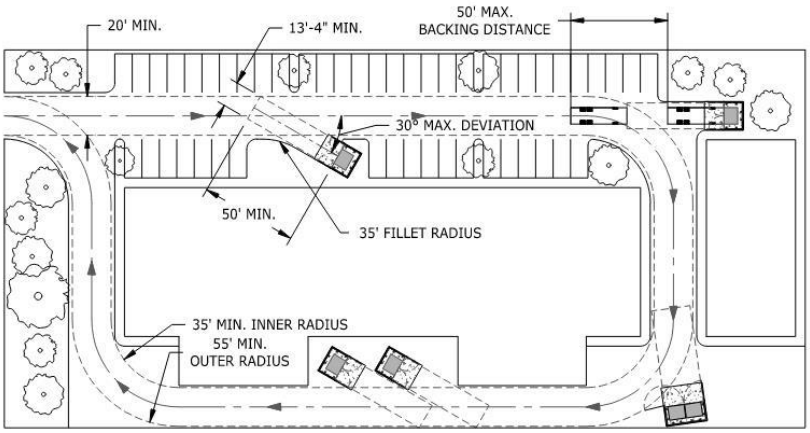
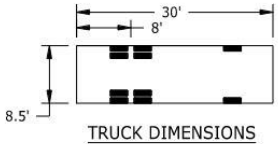
PW-50-001: Solid Waste Vehicle Access Requirements

Section 79. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section PW-50-001: Solid Waste Vehicle Access Requirements, to read as follows:



EXAMPLE ACCESS ROUTE



TRUCK DIMENSIONS

NOTES:

1. ENCLOSURE DESIGN AND PLACEMENT IS ALSO SUBJECT TO THE REQUIREMENTS OF THE ZONING CODE, INCLUDING 10-50.50.040.E.
2. THE SOLID WASTE ACCESS ROUTE SHALL MEET THE REQUIREMENTS OF 2018 INTERNATIONAL FIRE CODE SECTION 503 AND APPENDIX D, AS WELL AS CITY CODE SECTION 5-02-001-0005. THE ACCESS ROUTE SHALL BE AT LEAST 20' WIDE AND BE DESIGNED AND MAINTAINED TO SUPPORT A MINIMUM OF 80,000 LBS. THE REQUIRED MINIMUM TURNING RADIUS SHALL BE 35' INSIDE AND 55' OUTSIDE.
3. THE MINIMUM OVERHEAD CLEARANCE SHALL BE 14' ABOVE THE ACCESS ROUTE AND 25' ABOVE THE BIN SERVICE LOCATION.
4. A CLEARANCE RECTANGLE SHALL BE SHOWN IN FRONT OF EACH ENCLOSURE. THE CLEARANCE RECTANGLE SHALL BE A MINIMUM OF 50' LONG BY 13'-4" WIDE FOR SINGLE ENCLOSURES OR 50' LONG BY 20' WIDE FOR DOUBLE ENCLOSURES.
5. BINS AND BIN ENCLOSURES SHALL BE ANGLED NO MORE THAN 30° FROM THE ACCESS ROUTE CENTERLINE.
6. ENCLOSURE GATES AND HINGES, IF USED, SHALL NOT ENCROACH ON CLEARANCE RECTANGLE OR ACCESS ROUTE WHEN PINNED OPEN.
7. ENCLOSURE CONCRETE PAD SHALL BE COPLANAR WITH ROADWAY SURFACE.
8. FOR THE SAFETY OF OTHERS, A SOLID WASTE VEHICLE SHALL NOT BE REQUIRED TO BACK MORE THAN 50' MEASURED FROM THE BACK OF THE TRUCK, AND SHALL NOT BE REQUIRED TO TURN WHILE BACKING. ALTERNATIVELY, THE BACKING MANEUVER MAY BE PERFORMED WITH TURNING SO LONG AS THE TURNING MOVEMENT OCCURS WITHIN A VEHICLE TURNAROUND SATISFYING SECTION D103.1 OF THE 2018 INTERNATIONAL FIRE CODE.
9. THE ACCESS ROUTE SHALL BE DESIGNED SO THAT ALL BINS ON A SITE CAN BE SERVICED WITHOUT BACKTRACKING.
10. BINS AND BIN ENCLOSURES SHOULD BE LOCATED AWAY FROM SITE ENTRANCES, SITE EXITS, AND DRIVE-THROUGHS SO THAT THE SOLID WASTE VEHICLE DOES NOT CREATE A HAZARD BY BLOCKING TRAFFIC.
11. TO PREVENT TIRE DAMAGE, CURBS ADJACENT TO THE CLEARANCE RECTANGLE SHALL HAVE FILLETS. THE FILLET ON THE APPROACH SIDE SHOULD HAVE A RADIUS OF 35'.

NTS

City of Flagstaff	SOLID WASTE VEHICLE ACCESS REQUIREMENTS		
ENGINEERING DETAIL	DETAIL NO. PW-50-001	REVISION DATE: 01/23/2024	1 / 1

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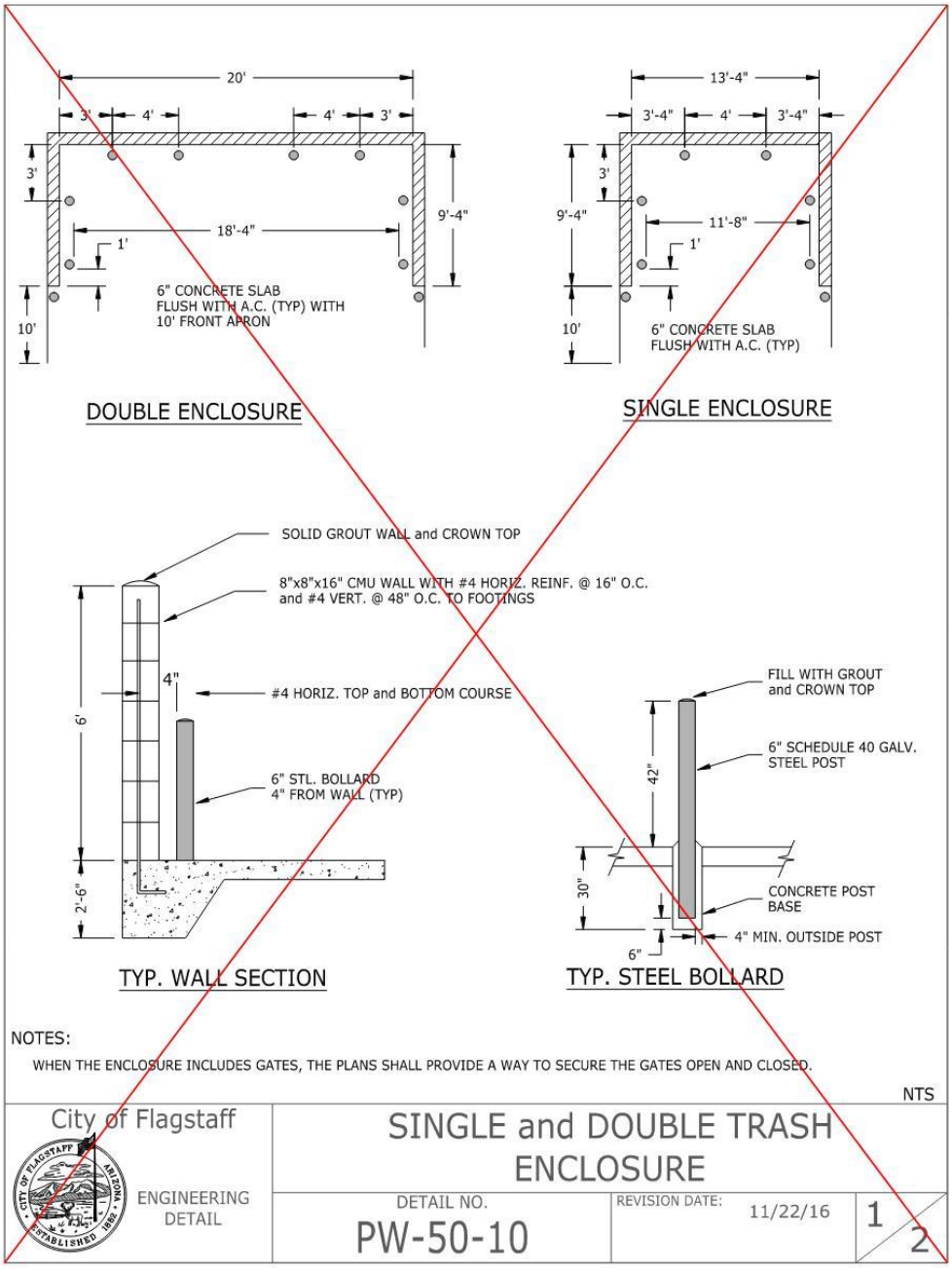
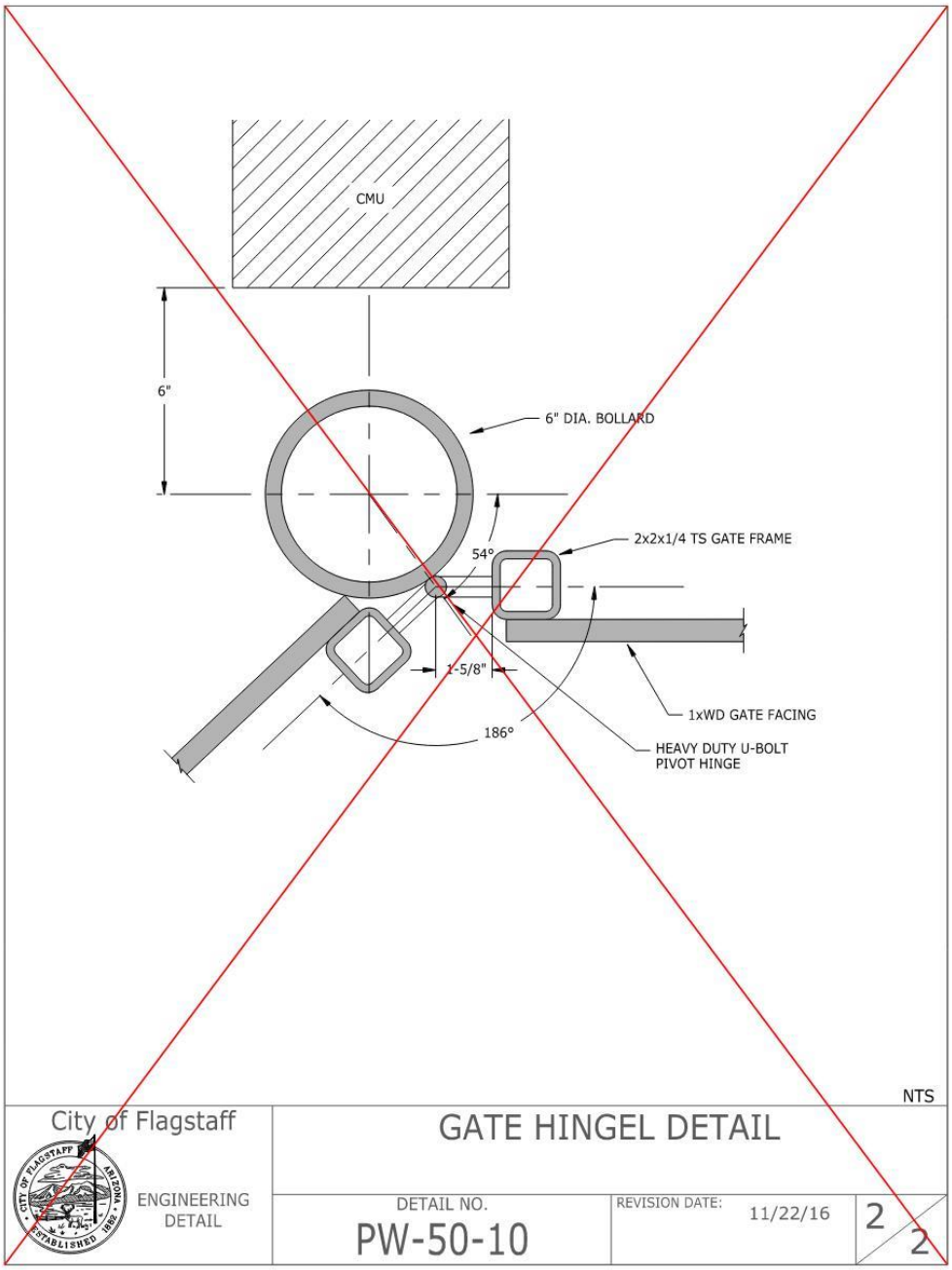
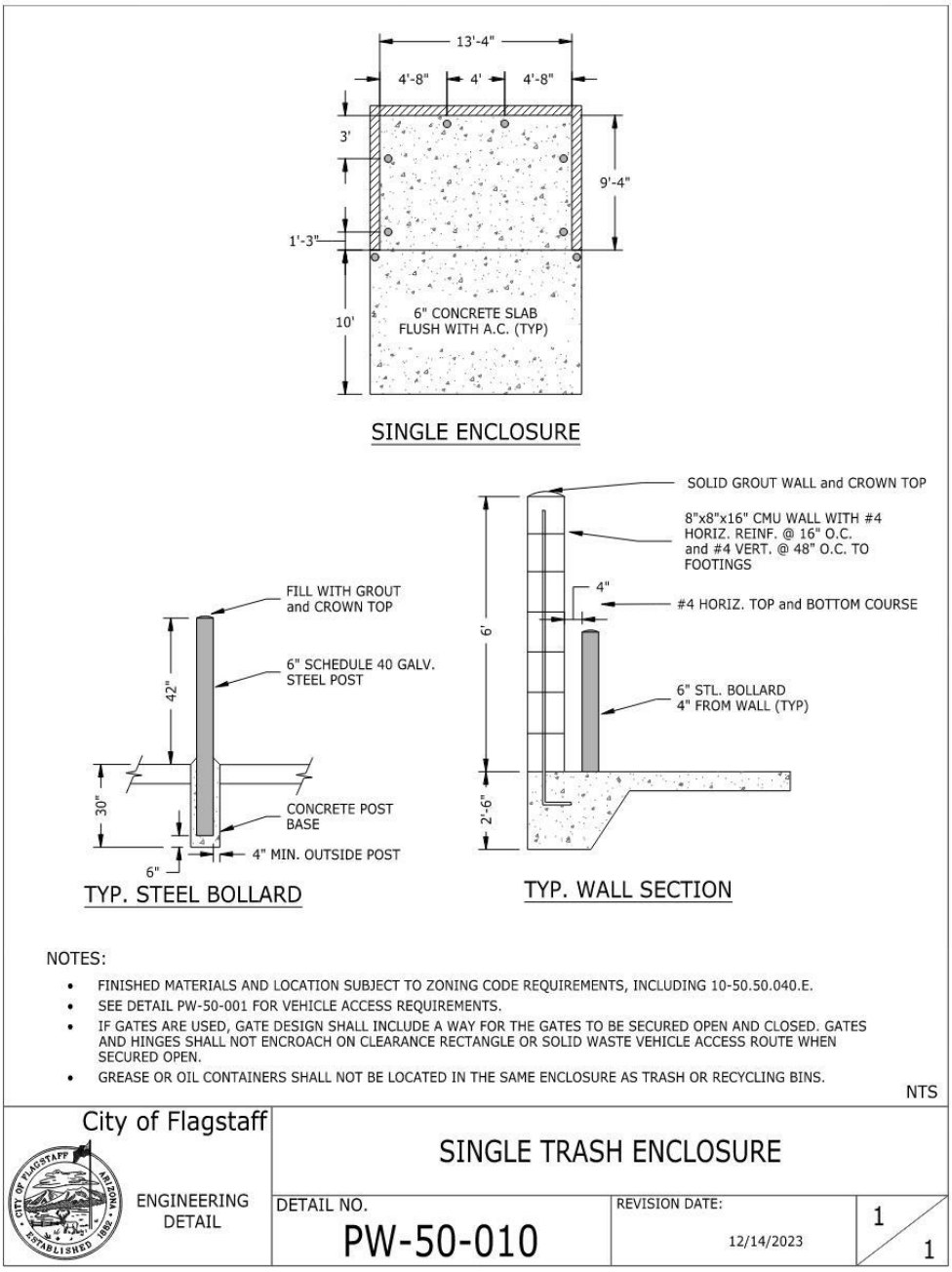
PW-50-010: Single and Double Trash Enclosure

Section 80. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section PW-50-010: Single and Double Trash Enclosure, delete existing standard drawing PW-50-10 and replace with standard drawing PW-50-010 below:




CMU
6"
6" DIA. BOLLARD
2x2x1/4 TS GATE FRAME
54°
1-5/8"
186°
1xWD GATE FACING
HEAVY DUTY U-BOLT
PIVOT HINGE
NTS
City of Flagstaff
ENGINEERING
DETAIL
GATE HINGEL DETAIL
DETAIL NO.
PW-50-10
REVISION DATE:
11/22/16
2
2


13'-4"
4'-8"
4'
4'-8"
3'
9'-4"
1'-3"
10'
6" CONCRETE SLAB
FLUSH WITH A.C. (TYP)
SINGLE ENCLOSURE
SOLID GROUT WALL and CROWN TOP
8"x8"x16" CMU WALL WITH #4
HORIZ. REINF. @ 16" O.C.
and #4 VERT. @ 48" O.C. TO
FOOTINGS
4"
#4 HORIZ. TOP and BOTTOM COURSE
6'
6" STL. BOLLARD
4" FROM WALL (TYP)
2'-6"
FILL WITH GROUT
and CROWN TOP
6" SCHEDULE 40 GALV.
STEEL POST
42"
30"
CONCRETE POST
BASE
4" MIN. OUTSIDE POST
6"
TYP. STEEL BOLLARD
TYP. WALL SECTION
NOTES:
FINISHED MATERIALS AND LOCATION SUBJECT TO ZONING CODE REQUIREMENTS, INCLUDING 10-50.50.040.E.
SEE DETAIL PW-50-001 FOR VEHICLE ACCESS REQUIREMENTS.
IF GATES ARE USED, GATE DESIGN SHALL INCLUDE A WAY FOR THE GATES TO BE SECURED OPEN AND CLOSED. GATES AND HINGES SHALL NOT ENCROACH ON CLEARANCE RECTANGLE OR SOLID WASTE VEHICLE ACCESS ROUTE WHEN SECURED OPEN.
GREASE OR OIL CONTAINERS SHALL NOT BE LOCATED IN THE SAME ENCLOSURE AS TRASH OR RECYCLING BINS.
NTS
City of Flagstaff
ENGINEERING
DETAIL
SINGLE TRASH ENCLOSURE
DETAIL NO.
PW-50-010
REVISION DATE:
12/14/2023
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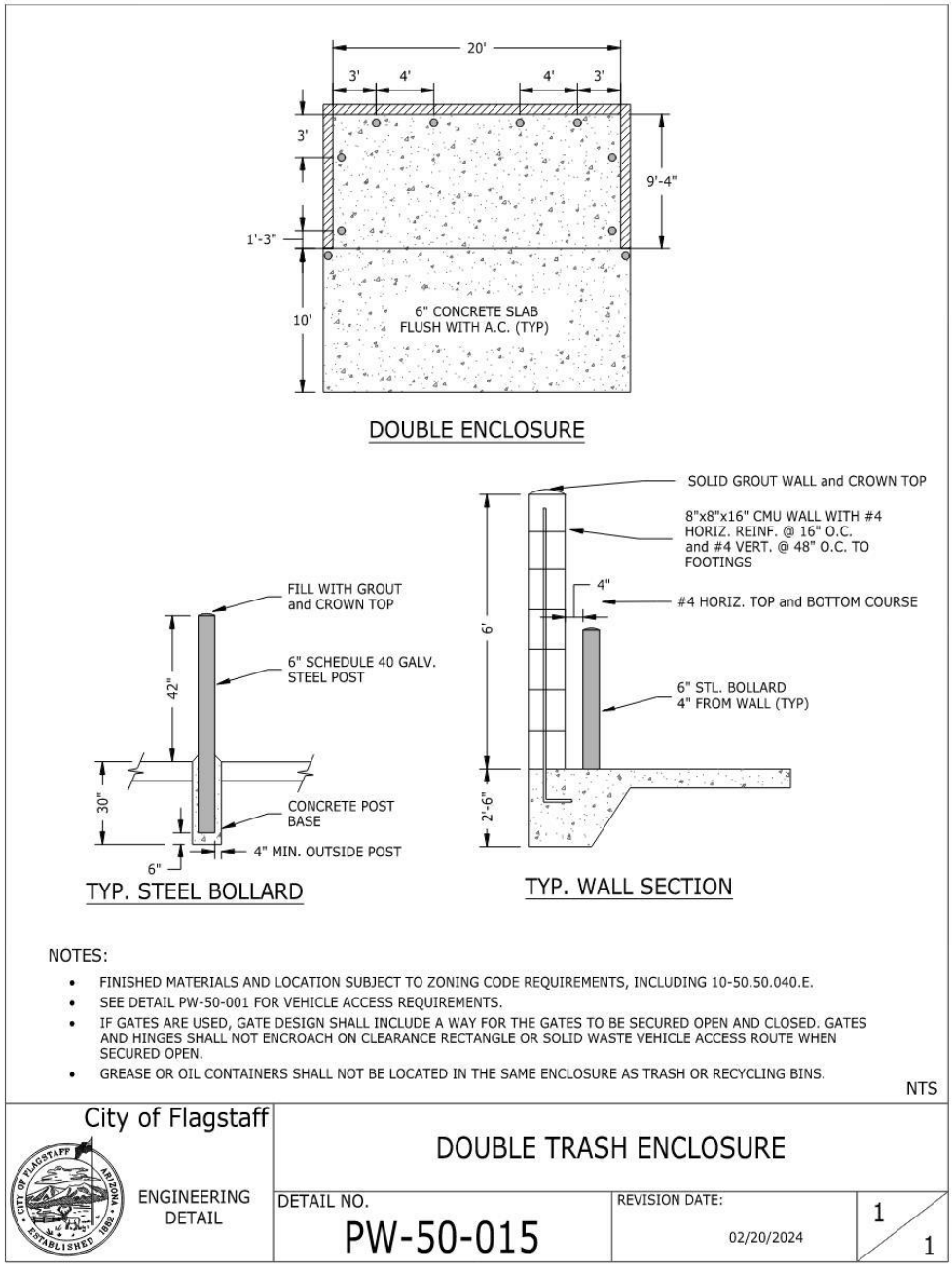
PW-50-015: Solid Waste Double Enclosure

Section 81. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section PW-50-015: Solid Waste Double Enclosure, to read as follows:



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