WORK SESSION AGENDA

CITY COUNCIL WORK SESSION
TUESDAY
FEBRUARY 27, 2024

COUNCIL CHAMBERS
211 WEST ASPEN AVENUE
3:00 P.M.

All City Council Meetings are live streamed on the city's website (https://www.flagstaff.az.gov/1461/Streaming-City-Council-Meetings)

PUBLIC COMMENT

Verbal public comments may be given through a virtual public comment platform or in-person

If you want to provide a verbal comment during the Council Meeting, use the link below to join the virtual public comment room.

VIRTUAL PUBLIC COMMENT WAITING ROOM

Written comments may be submitted to publiccomment@flagstaffaz.gov. All comments submitted via email will be considered written comments and will be documented into the record as such.

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1. Call to Order

NOTICE OF OPTION TO RECESS INTO EXECUTIVE SESSION

Pursuant to A.R.S. §38-431.02, notice is hereby given to the members of the City Council and to the general public that, at this work session, the City Council may vote to go into executive session, which will not be open to the public, for discussion and consultation with the City's attorneys for legal advice on any item listed on the following agenda, pursuant to A.R.S. §38-431.03(A)(3).

2. Roll Call

NOTE: One or more Councilmembers may be in attendance through other technological means.

MAYOR DAGGETT
VICE MAYOR ASLAN
COUNCILMEMBER HARRIS
COUNCILMEMBER HOUSE
COUNCILMEMBER MATTHEWS
COUNCILMEMBER MCCARTHY
COUNCILMEMBER SWEET

3. Pledge of Allegiance, Mission Statement, and Land Acknowledgement

MISSION STATEMENT

The mission of the City of Flagstaff is to protect and enhance the quality of life for all.

LAND ACKNOWLEDGEMENT

The Flagstaff City Council humbly acknowledges the ancestral homelands of this area's Indigenous nations and original stewards. These lands, still inhabited by Native descendants, border mountains sacred to Indigenous peoples. We honor them, their legacies, their traditions, and their continued contributions. We celebrate their past, present, and future generations who will forever know this place as home.

4. Public Participation

Public Participation enables the public to address the Council about an item that is not on the prepared agenda. Comments relating to items that are on the agenda will be taken at the time that the item is discussed. Public Participation appears on the agenda twice, at the beginning and at the end. If you wish to address the Council at today's meeting, please complete a comment card and submit it to the recording clerk as soon as possible. Your name will be called when it is your turn to speak. You may address the Council up to three times throughout the meeting, including comments made during Public Participation. Please limit your remarks to three minutes per item to allow everyone an opportunity to speak. At the discretion of the Chair, ten or more persons present at the meeting and wishing to speak may appoint a representative who may have no more than fifteen minutes to speak.

5. Review of Draft Agenda for the March 5, 2024 City Council Meeting

Citizens wishing to speak on agenda items not specifically called out by the City Council may submit a speaker card for their items of interest to the recording clerk.

6. City Manager Report

Information Only

7. 2024 Amendments to Engineering Design Standards, TITLE 13

Staff will provide an overview of the proposed amendments to the Engineering Design Standards and ask Council to provide initial feedback on the proposed amendments, concerns with any amendments, and any sections the Council would like to review and discuss in more detail.

8. Butler Avenue Corridor and Pilot Bicycle Lanes Update

Staff recommends transitioning the separated bicycle lanes to painted double stripes on Butler Avenue and Beaver Street to lessen the financial impacts and staffing requirements on City snow operations, and in anticipation of the future projects including the Safe Streets for All grant project and the Lone Tree Overpass project. Staff also recommends keeping the speed limit on Butler Avenue the same to promote voluntary compliance, encourage uniform flow, clearly communicate reasonable and prudent speeds, and ensure an effective enforcement environment for the Police Department.

9. Public Participation

10. Informational Items To/From Mayor, Council, and City Manager; future agenda item requests

11. Adjournment

CERTIFICATE OF POSTING OF NOTICE

The undersigned hereby certifies that a copy of the foregoing notice was duly posted at Flagstaff City Hall on _____, at _____ a.m./p.m. in accordance with the statement filed by the City Council with the City Clerk.

Dated this _____ day of _____, 2024.

_____
Stacy Saltzburg, MMC, City Clerk

THE CITY OF FLAGSTAFF ENDEAVORS TO MAKE ALL PUBLIC MEETINGS ACCESSIBLE TO PERSONS WITH DISABILITIES. With 48-hour advance notice, reasonable accommodations will be made upon request for persons with disabilities or non-English speaking residents. Please call the City Clerk (928) 213-2076 or email at stacy.saltzburg@flagstaffaz.gov to request an accommodation to participate in this public meeting.

NOTICE TO PARENTS AND LEGAL GUARDIANS: Parents and legal guardians have the right to consent before the City of Flagstaff makes a video or voice recording of a minor child, pursuant to A.R.S. § 1-602(A)(9). The Flagstaff City Council meetings are live-streamed and recorded and may be viewed on the City of Flagstaff's website. If you permit your child to attend/participate in a televised Council meeting, a recording will be made. You may exercise your right not to consent by not allowing your child to attend/participate in the meeting.

6.

CITY OF FLAGSTAFF

STAFF SUMMARY REPORT

To:	The Honorable Mayor and Council
From:	Stacy Saltzburg, City Clerk
Date:	02/22/2024
Meeting Date:	02/27/2024

TITLE:

City Manager Report

DESIRED OUTCOME:

Information Only

EXECUTIVE SUMMARY:

These reports will be included in the City Council packet for regularly scheduled Work Session meetings. The reports are intended to be informational, covering miscellaneous events and topics involving the City organization.

INFORMATION:

Attachments: City Manager Report
Economic Vitality Monthly Report

City Manager's Report

February 22, 2024

Council and Colleagues, greetings. These reports will be included in the City Council packet for Council Work Sessions. The reports are intended to be informational, covering miscellaneous events and topics involving the city organization. We have an update from Economic Vitality Division this time.

ACMA Conference

The City Manager's Office attended the Arizona City/County Manager's Association (ACMA) Winter Conference in Sedona in late January. Deputy City Manager Joanne Keene was asked to sit on a panel titled "Asking the Necessary Questions: How to Navigate Bond and Ballot Initiatives". Joanne joined Mary Goodman, Assistant Town Manager for Gilbert, Andrew McGuire with Gust Rosenfeld, Vicki Rios, Assistant City Manager for Glendale and Ryan Smith, Director of Communications and Government Relations for the Phoenix-Mesa Gateway Airport Authority.

The panel discussed the challenges local government leaders are facing to obtain funding to maintain infrastructure and existing assets, as well as building an ecosystem the community depends upon. The panel discussed bond initiatives and the role of city employees, the challenges of responding to a citizen-led initiative and the continuing impacts of markets pressures, cost escalation and the ever-increasing needs in local governments.

Also at the conference, NAU had its first participation for their Master of Public Administration program. See below photos.

NAU MPA Curriculum

And speaking of the ACMA conference and NAU's inaugural involvement with this institution, some exciting news. Our own Jessica Kittleson, Customer Service Manager, was part of the first student cohort to attend this conference on behalf of NAU! She was selected to attend based upon her application reviewed by NAU's MPA program faculty. See group photo of Jessica and her colleagues at the conference.

Visits from Delegates

Senator Kelly

It has been referenced already, but at the risk of restating, we had a couple of visits from delegates at both the Federal and State level recently. Senator Kelly was here to conduct a subcommittee hearing at City Hall, which occurred with great success. He followed that with a meeting with ECONA where numerous economic topics were discussed.

Rep. Cook

Arizona Representative Cook was in town last Friday (16th) to attend the Athena Awards and then tour the Hwy 180 culvert improvements afterward, with a consortium of city staff and elected officials. The tour went well. Rep. Cook was involved in the $8.9M appropriation for the city's project last year.

Athena Award

The Greater Flagstaff Chamber of Commerce provided another excellent celebration of the Athena Awards. For more than three decades, the Chamber has presented this wonderful event to honor local businesswomen who have achieved excellence in their field, served the community and assisted other women in the attainment of their goals. In 2023, the award was expanded to differentiate the unique challenges and achievements inherent to the public sector and private sector work respectively.

And this year's recipients included:

- Kate Wyatt, as Athena Young Professional. Kate has assisted the city with it's human trafficking policies and CEASE training.
- Devonna McLaughlin, Athena Public Sector, Housing Solutions of Northern Arizona. Devonna chairs the city's Housing Commission and has significant involvement in many housing programs supported by the city.

- Lisa Lamberson, Athena Private Sector, Mountain Sports Flagstaff. Lisa also sits on the FDBA board and is an active supporter of events and programs occurring downtown.

We were fortunate to have Governor Hobbs attend and participate in a chat session focused upon many issues and topics addressing the State and the Flagstaff community. Some nice photos to follow:

Engineering Week

And this from our esteemed City Engineer, related to his contributions during National Engineer's Week:

> *Yesterday I spoke to Mr. Langmade's 7th grade engineering class in the morning. I talked about various types of engineering but focused on municipal engineering and all of the things that go on to get our roads, water lines, sewers, treatment plants, parks, fire stations, etc. built in the City of Flagstaff. The class was really engaged and asked great questions.*
>
> *In the afternoon I went to Tynkertopia. I spoke to about 6 kids and I brought 2 wood truss bridge kits to make as an activity with them. This one was a little more hectic to try to get the kids to follow instructions on how to make the bridge and to give the glue enough time to drive. Overall it was a good experience and the kids had fun. Next time we will use "hot glue". 😊 Below are a few photos I took.*

Mr. Langmade and his 7th grade engineering class!

And Bridges at Tynkertopia …

That's all for now, Council. More updates in a couple weeks.

AIRPORT

AIRPORT RESCUE FIRE FIGHTING (ARFF):

- ARFF staff attended a firefighting foam workshop at the Dallas Fort-Worth Fire Training Research Center on the new Florine-Free Foam (F3). Staff got to speak with the manufacturer of the new foam as well as see application techniques on its effective use on training fires.
- ARFF staff attend a Fire Officer Leadership Program (FOLP) session this month put on by the Greater Flagstaff Regional (GFR) Fire Departments. This is one of many sessions being put on over the next few months.

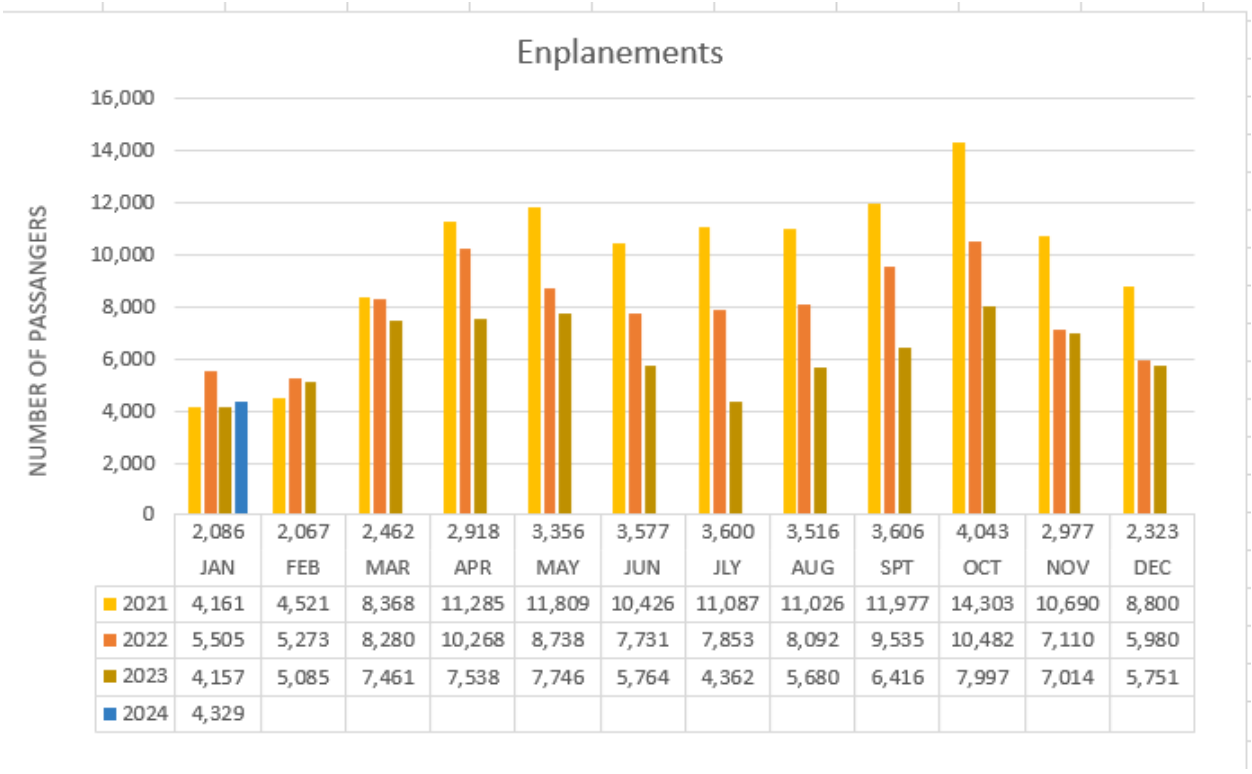
AIRPORT MARKETING AND AIR SERVICE ATTRACTION:

- Staff attended an air service data seminar to learn more about attracting additional air service. The air service data seminar prepared staff for the largest annual air service attraction conference in May.
- Ads running in print and digital in Arizona Daily Sun and Flagstaff Business News, as well as on NAIPTA busses throughout the city.

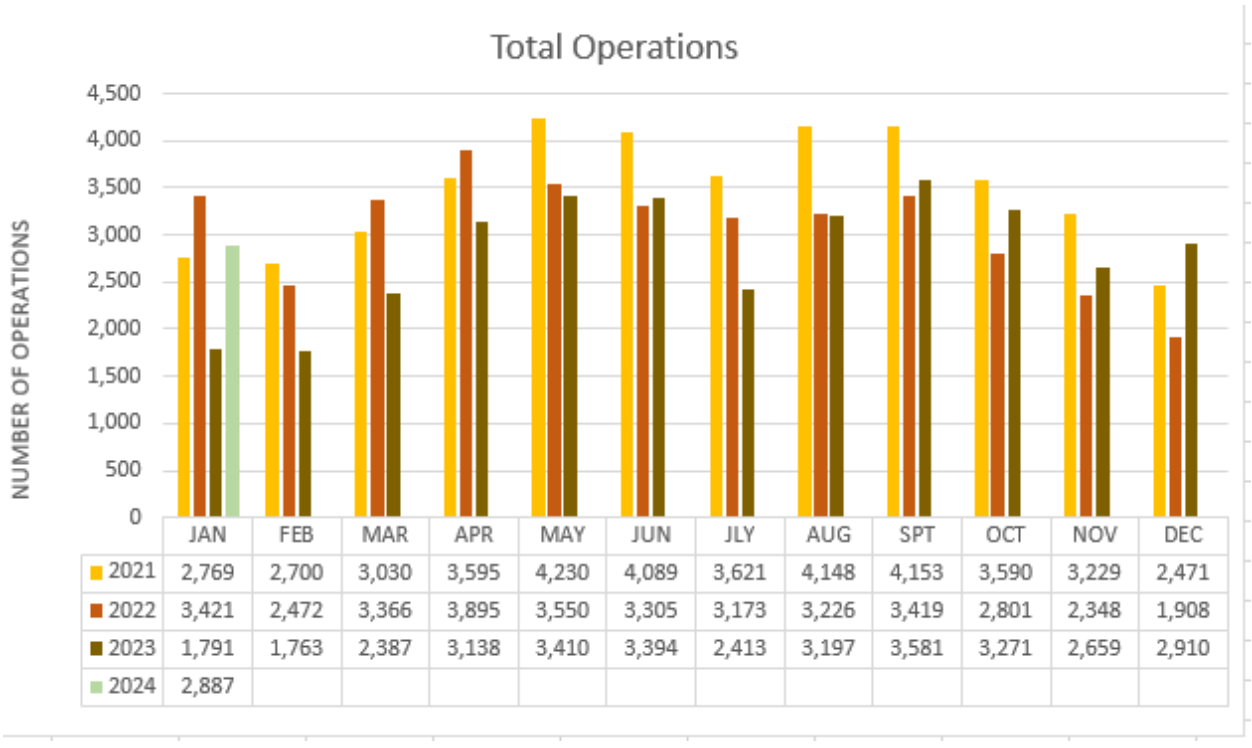
PROJECT & GRANT UPDATES:

- The fire sprinkler project has started, and the contractor has begun setting up site laydown and facility work zones.
    - The contractor and their subcontractors are scheduled to begin in full force starting on February 20 and the first phase of construction will be conducted during daylight hours. Subsequent phases are expected to be conducted in the late evening hours. The duration of the project is expected to last to the first of June.
- The fencing project is on a winter hold until the contractor can access the fence and gates areas. The project is approximately 75% complete.
- The terminal parking lot improvement project (two phases) is anticipated to begin in the Spring.

ENPLANEMENTS & OPERATIONS: January numbers increased over 2.5% this JANUARY!!! Total operations increased by 60%. Lots of activity at the airport.



	2,086 JAN	2,067 FEB	2,462 MAR	2,918 APR	3,356 MAY	3,577 JUN	3,600 JLY	3,516 AUG	3,606 SPT	4,043 OCT	2,977 NOV	2,323 DEC
2021	4,161	4,521	8,368	11,285	11,809	10,426	11,087	11,026	11,977	14,303	10,690	8,800
2022	5,505	5,273	8,280	10,268	8,738	7,731	7,853	8,092	9,535	10,482	7,110	5,980
2023	4,157	5,085	7,461	7,538	7,746	5,764	4,362	5,680	6,416	7,997	7,014	5,751
2024	4,329											

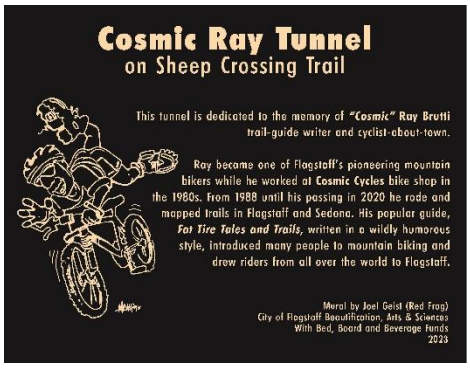


	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SPT	OCT	NOV	DEC
2021	2,769	2,700	3,030	3,595	4,230	4,089	3,621	4,148	4,153	3,590	3,229	2,471
2022	3,421	2,472	3,366	3,895	3,550	3,305	3,173	3,226	3,419	2,801	2,348	1,908
2023	1,791	1,763	2,387	3,138	3,410	3,394	2,413	3,197	3,581	3,271	2,659	2,910
2024	2,887											

BEAUTIFICATION AND ARTS &SCIENCE:

ONGOING PROJECTS

- **Aspen (Niche) Bicycle and Pedestrian Enhancements**: Staff worked on cement diamond size with the design team. The smallest recommended is 2'x2', which was chosen. Design outcome shared with property owner Century Link. Questions arose over vehicular gate design.
- **City Lawn**: Staff met with Council Liaison Miranda Sweet to discuss raising the profile of this project via Council.
- **City Hall Railings**: A new project. Staff met with Public Works staff to scope the railing replacement for the front steps. Railings need to be attractive and ADA compliant. There are currently 3 rails. The new steps will have 7 rails. Staff reached out to a consultant to create specs and choose attractive railing. Staff reviewed and accepted their proposal.
- **Cosmic Ray Tunnel & Sheep Crossing Plaques:** Staff reviewed revised artwork from graphic designer. Graphic designer revising Basque Shepherd plaque based on staff and BPAC Chair feedback.
- **DCC Southside Grove Sculpture:** Staff worked with Contractor and Artist Team on schedule for sculpture permit.
- **Downtown Green**: Staff worked with the Downtown Business Alliance on inventory schedule and met with the Clean Team on inventory progress. The team received training from IT on how to use the app and aim to have the inventory wrapped up first week of February.



- **Flowers Program**: Artisan Metals fabricated 4 brackets to be installed on light poles along Birch Avenue, which will result in eight new hanging baskets will be added to the program in 2024. Staff received and reviewed the 2024/25 proposal from Foxglove Gardening and is working with procurement/legal on the contract amendment.
- **Multicultural Park Sculpture Exhibition, formerly known as Indigenous Representation Project:**
    - Staff met with Coconino County Operations & Maintenance Manager to determine placement of sculptures and discussed interpretive signage. Two more artist contracts were executed, and initial payments invoiced.
    - Staff received sculpture installation plan from final artist and sent to Coconino County Operations and Maintenance Manager for review and approval. Final contract will follow.
    - Staff worked with artists to obtain bios and headshots for upcoming project marketing/PR and drafted initial exhibition press release.
    - Staff submitted videography and photography scope of work to Outlive Creative for project estimate and they met with them to review three options. After a round of revisions, contract was sent to legal for review
- **Utility Cabinets, formerly known as Signal Traffic Cabinets**: Staff scouted locations and reached out to APS for permissions. Staff wants to beautify APS cabinet in *pic left*, amongst others! Staff also attended meeting with ADOT re potential traffic signal cabinet locations on Route 66. Initial reaction from ADOT was negative. They raised concern of overheating and having to have a

statewide standard in all climates. There have been no issues of overheating in the 3-4 years for the City owned cabinets in Flagstaff.

PROGRAMS & OUTREACH

- **Arizona Forward Award**: *Touch home, reach sky*, the library entry sculpture, has been nominated as a finalist for this prestigious environmental excellence award in the Art in Public Places category. The application emphasized the universal inclusiveness, the low water plantings, and the lighting modeling best practices for dark skies (diminishing light pollution). More information on the award and its history can be found here. https://arizonaforward.org/environmental-excellence-awards/. There will be many opportunities to promote Flagstaff through this nomination. BAS will purchase a table at the event for the project team.

- **Beautification in Action (BIA) Grants**: Staff met with provisionally approved grantee and Visitor Center staff to determine location for the Historic Train Rail Bench and provided input on BPAC presentation. After BPAC approval and comments, artist revised graphics and staff conferred with Visitor Center staff on the final choice. Staff received a revised budget for the Historic Train Rail Bench and submitted first project invoice.

- **Cultural Sector/Non-Profit Study**: Staff met with consultant and began planning Café Conversations. Tentative dates are February 22 and March 14. Venues and were explored and first review of topics.
- **STAFF PROMOTION:** Cristen Crujido was promoted from Coordinator to Project Administrator. Budget team granted request to reclassify vacant Coordinator position to Project Administrator level.

HIGHLIGHTED EVENTS IN DECEMBER BY A NONPROFITS SUPPORTED BY BBB TAX FUNDS

January Contra Dance, newcomer lesson
Saturday, January 6, 7:30-10pm
Jazzercise Flagstaff, 1798 E Route 66

Was presented by Flagstaff Friends of Traditional Music
All were invited to grab dancing shoes and bring friends for an evening of dance! Live music was provided by Just Desserts. Cost was $5 for members; $7 for non-members.

Ceramics Orientation at the Coco-Op
Saturday, January 13, 3-4 pm
Plus, Open House & Tours each Sunday from 2-4 pm
Free and open to the public
1155 W. Kaibab Lane
Presented by **Flagstaff Coco-Op**

Participants learned how the ceramic studio operates at Flagstaff's Coco-Op and all were invited to not miss the weekly open house each Sunday. From the Tool Library, Clay Studio, and Digital Fabrication Lab to the Wood Shop, Metal Shop, and Textiles Room! No RSVP was necessary.

Symphonic Soul: Morgan James
Performance was Saturday, January 20, 7:30 pm
$12.50-$79.00
Ardrey Auditorium, Northern Arizona University
Presented by Flagstaff Symphony Orchestra

Performance was a love letter to one of the great American birthplaces of soul and featured brand-new arrangements of Memphis classics by Al Green, Otis Redding, Ann Peebles, Sam, and Dave, and, of course, Elvis. Attendees heard favorite soul tunes come to life in a brand-new way and Morgan rounded out the evening with her own Memphis soul originals and storytelling.

Fleece Mittens: Kids Workshop (Two-part workshop)
Monday, January 29 & Monday, February 5, 3:45-5:15 pm
$90 (Sliding scale pricing + scholarships available) · For ages 8+
Presented by **Threaded Together**

Participants learned to keep fingers warm this winter by making their very own pair of fleece mittens! Designs of own making decorated the mittens using a sewing machine. Skills learned included pattern drafting, sewing with stretchy fleece fabric, and applique methods. This class was designed for beginners with some prior sewing machine experience and practiced young sewists alike. All materials and tools were included. Registration 48 hours in advance was required to make sure that classes have enough enrollment to go forward.

PARKFLAG:

Operational Updates

- Six kiosks required either updates, repairs, or both during the month of January. Staff Members continue to conduct regular cleaning and maintenance tasks.
- Team members are working together to make language changes on the reverse sides of violations in preparation for ordinance clarification, which will be presented to the Council in February and March.

- ParkFlag met with internal partners several times during the Month of January to discuss the program's citation process as well as the possible implementation of an immobilization list and booting and towing procedures.

Recruitment Update

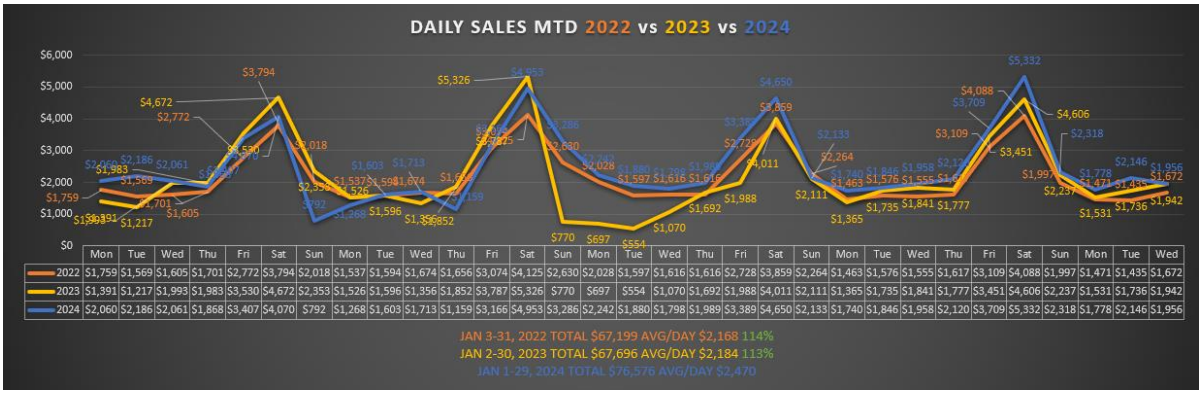
We received 18 applications for the two open Parking Aide positions and scheduled six interviews. Offers are expected to be made during the first week of February.

Community Engagement

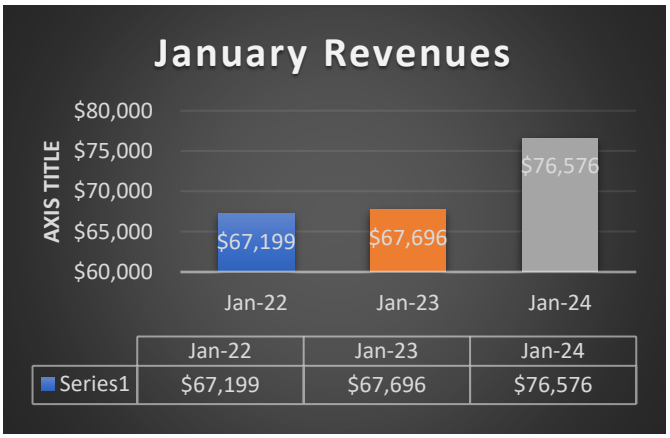
In January, we met with the business owner of the Pizza Patio on West Phoenix Avenue to discuss the addition of a Parklet in hopes to enhance his business operations. The owner may begin the application process in February.

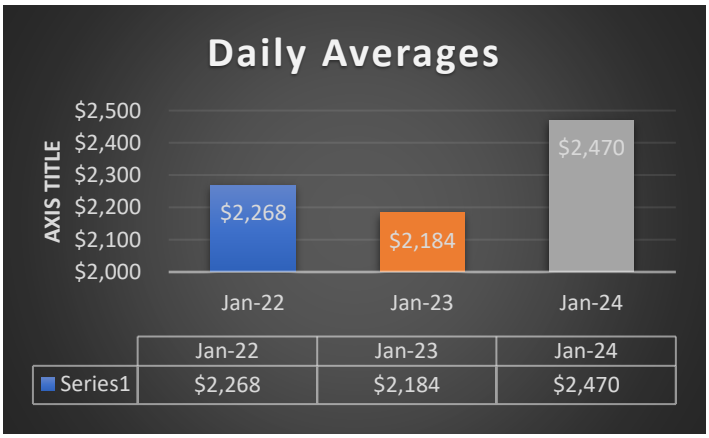
Parking Statistics

- ParkFlag customers parked a total of 76,574 hours during the month of January with an average of 2.12 hours per parking session.
- Parking revenues were up over January of 2022 and January of 2023.



	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed
2022	$1,759	$1,569	$1,605	$1,701	$2,772	$3,794	$2,018	$1,537	$1,594	$1,674	$1,656	$3,074	$4,125	$2,630	$2,028	$1,597	$1,616	$1,616	$2,728	$3,859	$2,264	$1,463	$1,576	$1,555	$1,617	$3,109	$4,088	$1,997	$1,471	$1,435	$1,672
2023	$1,391	$1,217	$1,993	$1,983	$3,530	$4,672	$2,353	$1,526	$1,596	$1,356	$1,852	$3,787	$5,326	$770	$697	$554	$1,070	$1,692	$1,988	$4,011	$2,111	$1,365	$1,735	$1,841	$1,777	$3,451	$4,606	$2,237	$1,531	$1,736	$1,942
2024	$2,060	$2,186	$2,061	$1,868	$3,407	$4,070	$792	$1,268	$1,603	$1,713	$1,159	$3,166	$4,953	$3,286	$2,242	$1,880	$1,798	$1,989	$3,389	$4,650	$2,133	$1,740	$1,846	$1,958	$2,120	$3,709	$5,332	$2,318	$1,778	$2,146	$1,956





ECONOMIC DEVELOPMENT:

PROJECT UPDATES:

FINANCIAL FITNESS IN ACTION: BR&E staff participated in the first Financial Fitness in Action (FFA) event which occurred at the Summit High School in Flagstaff. These events sponsored by the Arizona Council on Economic Education and NAU'S Economic Policy Institute, invite students to participate in this hands-on financial planning journey in which they are challenged to manage their finances as they create a monthly budget. Each student was randomly assigned an occupation profile budget sheet, including monthly income and marital status, providing all the information they need to choose their expenses. Staff served as one of the facilitators of the Home Table which challenged the students to develop a financial plan to accommodate their housing needs. The picture shows students moving from the various tables which represent a different element of managing a personal budget. The event was very instructive and engaging, and not just for the students!

LOCAL FIRST GREEN BUSINESS BOOTCAMP: BR&E staff is supporting the Community Investment Director and Sustainability Analyst in partnership with Local First Arizona to deliver the first Green Business Bootcamp. The Bootcamp will convene area businesses and will teach conservation practices that will result in lowering some of the costs of doing business. This is very timely as inflation and related costs continue to increase.

JOY CONE COMPANY: BR&E Staff convened Joy Cone Company, the BNSF, and interdepartmental staff to navigate the ADOT grant process that will deliver improvements to the rail spur that is used to deliver raw materials to Joy Cone Company. Joy Cone Company will work to deliver plans and a scope of work. Staff will administer the delivery of the improvements. There are several moving parts on this project. Fortunately, the team knows how to keep the project advancing in preparation of the upcoming construction season as soon as the snow stops flying.

INNOVATE WASTE: Staff has been growing the internal team to include Sustainability and Water Services as we prepare for the next round of the Innovate Waste Challenge. Still being discussed is the name. Last year, we used the longer name of Innovate Waste: The Carbon Neutrality Challenge which is a mouthful. We are contemplating cutting it back for now. We have also incorporated a water element to invite entrepreneurs to explore enhancements to water use, management, reclamation, or the like. The internal team has also discussed developing a scope of work to secure an administrator who will be able to formally manage

the pitch event for the City of Flagstaff in the coming years.

KATALYST SPACE TECHNOLOGY - GRAVITY LABS: Ghonhee Lee, President and Founder of Katalyst Space Technologies, is inviting members of the various science sectors to serve as forum to advance collaborations and entrepreneurial success. Collider Events are proposed to bring people together once a month to discuss ideas and technologies that may be supported by the attendees. The Gravity Labs will fill a gap that exists between the Small Business Development Center and the services at the Moonshot@NACET Campus. Gravity Labs is a venue for someone to bring an idea and to potentially develop a team that may then feed into the partner services mentioned above. The Katalyst Team is making their mark on Flagstaff, and we all are benefitting from their efforts.

PULLIAM INNOVATION CENTER: BR&E and Real Estate staff met with the new owners of the Pulliam Innovation Center to discuss expansion possibilities. The new owner is very interested in growing the businesses that currently make the Pulliam Innovation Center their home and wanted to learn more about the possibilities to do so. Staff has done some work to compile information that may help while also directing the owner to take time to build solid working relationships with his tenants.

INTERNATIONAL ECONOMIC DEVELOPMENT COUNCIL (IEDC) – BASIC ECONOMIC DEVELOPMENT COURSE (BEDC or Basic): Staff presented the topic of Business Retention and Expansion to the recent IEDC Basic class. The class was attended by economic development practitioners and supporters mostly from Arizona but also from as far as Alaska. It was a great opportunity to highlight the successes of the industry practices and the Flagstaff program which started from ground zero almost 15 years ago.

HELIOS-ASU DECISION CENTER: Mayor Daggett recently invited several representatives and supporters of education and workforce development to explore the robust data offered by the ASU Decision Center at the Helios Facility in Phoenix. The Decision Center uses Lightcast Data connecting various data points to present coherent insights into the relationships between education and employment outcomes. Staff invited Keen Independent Research to attend as they are the consultants delivering our Workforce Development Analysis. Their presence was very impactful to the dialogue. Staff will support the effort as needed.

Downtown and EFCL Libraries

YOUTH SERVICES:

- The winter programming session began in January and features six weekly storytimes as well as the biweekly programs of LEGO Club, Creation Station, Game Time Hang Time, Bards & Nobles,

and the new Chess Club. Attendance at programs has been great. Saturday storytimes have been especially busy during the cold weather with up to 40 attendees.

- Willow Bend Environmental Education Center had a program on puppet making on 1/20 that was a big success. FCCCPL is partnering with them on a grant they received for doing a touring puppet show about environmental issues.
- A special storytime for Read Across America Day will be held on Saturday on March 2nd. The program will feature stories read by special guests including Flagstaff Mayor, Becky Daggett.

CIRCULATION:

- Three new staff members, Amanda Teague, Ava Jones, and Janice Danforth joined the Circulation Department, which is now fully staffed.
- Zanna followed up the gorgeous paper tree she crafted for the holiday season with another bookish botanical paper sculpture to beautify the Circulation desk. Patrons have loved these creations and frequently share praise and compliments for her artistry!

IT:

- Flagstaff City Council approved the purchase of security cameras at the Feb 6th meeting. The cameras will be installed at the Flagstaff, East Flagstaff and Tuba City Libraries. The installation will require additional wiring which IT is currently working to procure.
- The library card printers for the branch & affiliate libraries are up and running. New cards have been delivered to the Grand Canyon Community Library.
- The vertical files project is back in the mix. Dave is making the docs ADA compliant before they can be back up on the website.

REFERENCE:

Staff completed a major shifting move of the fiction, biography, new books, and science fiction collections. Graphic Novels, Braille, and Foreign Languages will be the next collections moved, and then Large-Type will be back shifted.

Another round of inventory for all circulating adult collections is complete. The various reference collections will be inventoried next.

Quilt Show - The Coconino Quilters' Guild is showcasing their quilts at the Downtown Library. The quilts, including one created by library patrons for last year's Summer Reading Challenge, can be viewed throughout the library. Library patrons can view the Guild's work and vote on their favorite quilt from February 2nd to March 21st.

EAST FLAGSTAFF LIBRARY:



- Crafty Corner is off to a good start this session. Participants have made pipe cleaner ninjas and designed and created paper toy squishies.
- Spring Programming session will feature Family Storytime, Game Day, Crafty Corner, Climate Conversations, Pride in Your Community programs, and Lego Club.

STAFF UPDATES:

- Richard Tutwiler won the Aspen award for Leadership at the City of Flagstaff City Manager Awards.
- Reference has a new Temporary Library Specialist, Isabella Qualls and Circulation has two new staff members: Ava Jones, Temporary Page, and Janice Danforth, Temporary Clerk.

Branch Libraries:

FOREST LAKES:

Forest Lakes Public Library is planning to expand their biography collection this month to prepare for summer.

LIBRARY STATS:

Downtown & EFCL		Jan-24	Jan-23	Difference
Circulation	Downtown	24,448	21,786	12.22%
	East Flagstaff	9,230	10,178	-9.31%
	Total	**33,678**	**31,964**	**5.36%**
Value of Loaned Materials	Downtown	$476,972	$380,996	25.19%
	East Flagstaff	$164,157	$186,839	-12.14%
	Total	**641,129**	**567,835**	**12.91%**
In-House Use	Downtown	19,132	16,939	12.95%
	East Flagstaff	6,414	6,372	0.66%
	Total	**25,546**	**23,311**	**9.59%**
Door Count	Downtown	17,841	15,630	14.15%
	East Flagstaff	14,349	11,920	20.38%
	Total	**32,190**	**27,550**	**16.84%**
Wi-Fi Use	Downtown	3,235	2,915	10.98%
	East Flagstaff	1,453	1,049	38.51%
	Total	**4,688**	**3,964**	**18.26%**
Public Computer Use	Downtown	2,359	1,684	40.08%
	East Flagstaff	1,933	2,203	-12.26%
	Total	**4,292**	**3,887**	**10.42%**
Number of Programs	Downtown	24	44	-45.45%
	East Flagstaff	17	17	0.00%
	Total	**41**	**61**	**-32.79%**
Program Attendance	Downtown	377	470	-19.79%
	East Flagstaff	168	189	-11.11%
	Total	**545**	**659**	**-17.30%**
Reference Help	Downtown	2,560	1,854	38.08%
	East Flagstaff	1,936	1,905	1.63%
	Total	**4,496**	**3,759**	**19.61%**

Countywide		Jan-24	Jan-23	Difference
Overdrive Circulation	All Libraries & Sora	9,455	7,041	34.28%

Branches		Jan-24	Jan-23	Difference
Circulation	Grand Canyon	171	463	-63.07%
	Forest Lakes	450	593	-24.11%
	Tuba	882	285	209.47%
In-House Use	Grand Canyon	100	141	-29.08%
	Forest Lakes	39	0	38900.00%
	Tuba	115	292	-60.62%
	Detention Center	2,400	1,390	72.66%
Door Count	Grand Canyon	704	386	82.38%
	Forest Lakes	238	145	64.14%
	Tuba	3,875	1,263	206.81%
	Detention Center	867	570	52.11%
Wi-Fi Use	Grand Canyon	186	62	200.00%
	Forest Lakes	4	11	-63.64%
	Tuba	1,577	1,807	-12.73%
Public Computer Use	Grand Canyon	103	54	90.74%
	Forest Lakes	2	1	100.00%
	Tuba	473	148	219.59%
Number of Programs	Grand Canyon	0	1	-100.00%
	Forest Lakes	0	0	0.00%
	Tuba	3	0	2900.00%
Program Attendance	Grand Canyon	0	4	-100.00%
	Forest Lakes	0	0	0.00%
	Tuba	31	0	30900.00%
Reference Help	Grand Canyon	181	62	191.94%
	Forest Lakes	320	173	84.97%
	Tuba	608	444	36.94%
	Detention Center	81	23	252.17%

TOURISM METRICS: JANUARY 2024

YOY RevPAR for the Month of January:
The RevPAR number of $54.31, although down January 2023, is up by $9.45 to January 2019. The demand for traditional accommodation in January this year was 90,300 room-nights; demand for January 2023 was 92,314. This slight difference, coupled with the fact that there was 3.3% more supply in the marketplace, is what contributed to the -11.9% number we are seeing.

Rationale:
The city of Flagstaff did reasonable in terms of **demand** for the traditional accommodation's product in January. If it were not for an increase in available rooms, RevPAR would have only been down slightly to

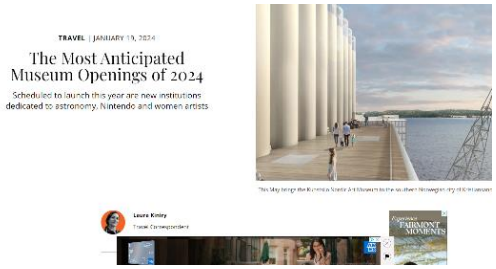
the highest year on record in 2023. ***Also, snowfall for January 2023 was 61.4" compared to January 2024 with 19.6".***

Following is a snapshot of the metrics for January 2024:

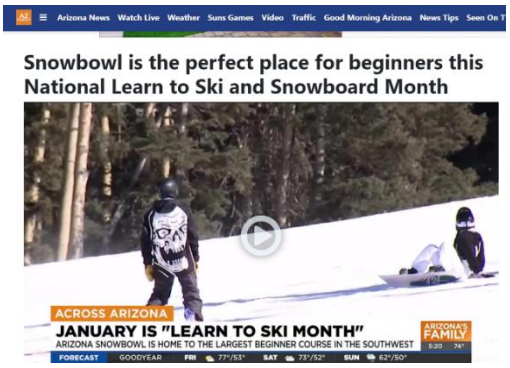
January	2023	2024	Diff
OCC	58.6%	55.4%	-5.3%
ADR	$105.32	$97.99	-7%
RevPAR	$61.67	$54.31	-11.9%

MARKETING & MEDIA RELATIONS:

Highlight coverage included:



- **Arizona Republic:** These Arizona chefs and restaurants are semifinalists for James Beard awards 2024. http://tinyurl.com/y8ksvmjk (4.5M readership)
- **Axios: These Arizona restaurants are 2024 James Beard award semifinalists** https://www.axios.com/local/phoenix/2024/01/24/arizona-james-beard-semifinalist-restaurants-chefs (15.2M readership)
- **Smithsonian: Most anticipated museum openings of 2024** https://www.smithsonianmag.com/travel/the-most-anticipated-museum-openings-of-2024-180983604/ **(5.7M readership)**



- **3TV/CBS 5: Snowbowl is the perfect place for beginners this National Learn to Ski and Snowboard Month** https://www.azfamily.com/2024/01/18/snowbowl-is-perfect-place-beginners-this-national-learn-ski-snowboard-month/ **(2.5M total readership)**
- **2 AOT media FAMS** were hosted in tandem with Arizona Office of Tourism:
    1) Freelance writer who has written for Conde Naste and dozens of other publications
    2) Journalist group of 5 from Mexico

EMAIL CAMPAIGN:

- **Discover Flagstaff**
    - January's results for Discover Flagstaff subject matter saw a decreased open rate by -2%, but a 13% increase in opt-ins. We went back to sending the email at an earlier time in the day and experimented with sending on a different day; while we still sent one email on a weekday, we sent the resend to non-openers on the weekend to see if that would help improve open rate. We will continue experimenting with send days/times to increase our open rate. Top clicks went to the Route 66 things to do page, the Winter

Stay and Play Responsibly sweepstakes, the Flag365 calendar and the runner up was Accommodations.

- **Flagstaff Local**
    - January's results for Flagstaff Local showed a -6% decrease in YoY open rate, however, this is an increase from December. Like the Discover Flagstaff email, we experimented with the send days and sent one send on a weekday and one send to non-openers on the weekend. We will continue experimenting with send days/times. NAU landing page for volunteer opportunities in Flagstaff, the City of Flagstaff Sustainability Community Stewards Program page, and to the Flag365 calendar. While open rate is ultimately down, CTR is high at 3% whereas in 2023 it was only at 2%.

FILM:

FILM PERMITS ISSUED: 1

- Film Commissioner issued a permit for a documentary with the Arizona Department of Health Services which will do a walk-and-talk interview with a local doctor downtown in February as well as film at the Weatherford and climbing gym.

FILM SCOUTING:

- **Discover Flagstaff** conferenced with two location scouts who the former Film Commissioner met at the FOCUS London conference. Scouts Melissa "Zippy" Downing (Shrinking, Yellow Jackets) and Miranda Carnassale (Killers of the Flower Moon, Barbie) both plans to visit Flagstaff this year in coordination with Flagstaff Film Office.
- Location scout from the production company behind Love Island is considering a private-property location to film in Flagstaff.

STATE FILM OFFICE:

- Communicated with the state film office seeking input on their experience with paid media. This interest was also shared at a routine state film office call attended by Tucson and PHX film offices.
- They'll be sending paid media info by mid-February.
- There may be multiple AZ film office interest for a co-op, perhaps in June.
- They are working on an AZ location scouts data base and will soon share.
- Potential of AZ film office co-ops - Screens International has an annual mag issue titled World of Locations. If the state, Tucson, and Phoenix participate, then FLG would also co-op. In general, Film Flagstaff will focus on domestic publications.

WEBSITE:

Comparisons are made YOY to 2023

- **Domestic engaged sessions** decreased 18% from 120,237 to 96,865 primarily from metro-Phoenix and Los Angeles. Cities with increases included Las Vegas up 32% from 1,277 to 1,681; San Diego up from 668 to 1,431; Chicago up from 1,357 to 1,372; NY up 18% from 805 to 952.
- **Int'l markets had increased engagement sessions:** MX had 2,187 from 1,613; Canada had 1,316 from 1,286; UK had 657 from 599; while Germany decreased 9% from 407 to 370.
- **The engagement rate increased 21% from 54.34% to 65.76%.**
- **Top performing landing pages' sessions (and please note Google has made changes with added widgets above the organic search results which is impacting URLs beyond Discover Flagstaff):** Things to do increased 17% from 5,726 to 6,704, Webcam decreased 31% from 98,930 to 64,970; Snowometer increased to 6,559 from 5,957; Nature and Winter Adventure had a 12% increase, dining and nightlife and restaurant had a big increase to 1,844 landing page visits. Events and winter rec map also had nice increases.
- **There were 246 newsletter opt-in addresses received, and 353 visitor guide requests.**

SWEEPSTAKES:

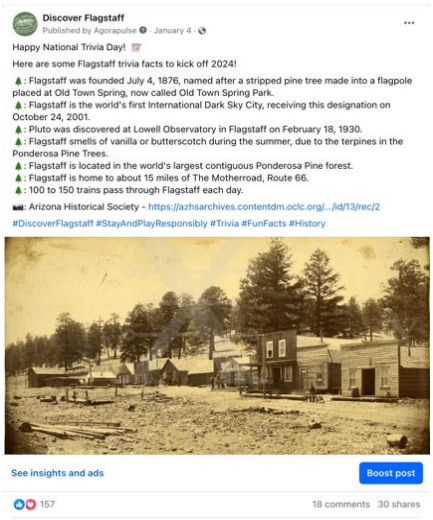
- **Flagstaff Winter Stay and Play Responsibly Sweepstakes**
    - Unfortunately, there was an issue with an abundance of spam entries effecting our total results. A bird's eye view shows a total of 121,989. Woobox is our sweepstakes provider and was contacted to make aware of the issue and find a remedy. They added a column to our exported spreadsheet report process so that we could eliminate spam entries. Woobox said that because our sweepstakes entry process was designed for one entry per person per day it made our sweepstakes a prime target for scammers. Moving forward we will be designing our entry processes to be one entry per person to hopefully combat spam entries. This will also lead to a more accurate representation of true entries, true entries being different people entering opposed to the same people entering multiple times. With the entries being an 18% decrease compared to 2023, the content callout was originally lower on our homepage which we later moved up to a higher position on the page to hopefully attract more entries. Content callouts will always be put up higher on the page the first time so to receive the most views and entries from the start. We will also be utilizing social media stories more**.**

SOCIAL MEDIA:

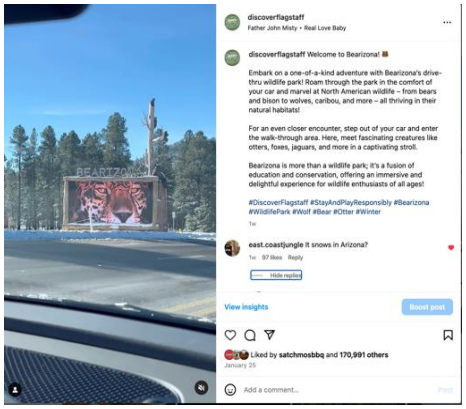
- **Top post this month on FACEBOOK** was a post congratulating Chef Sam Greenlaugh on receiving a James Beard Award nomination for Best Chef Southwest, this garnered 11,585 impressions and 624 engagements.

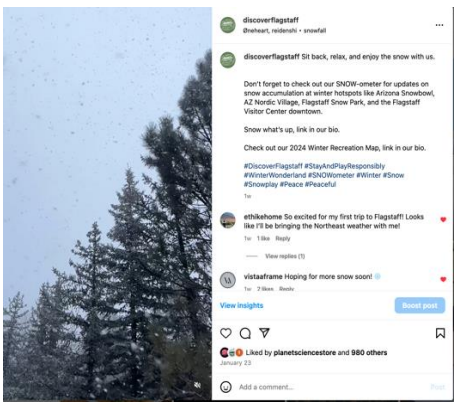
- **Second top post on FACEBOOK** was the first post of the Flagstaff Then and Now series, with 11,487 impressions and 307 engagements. This campaign has not been posted as regularly as I would like, so will be posting on a bi-weekly basis until the spring.
- Giving **FLAG LOCAL** a bit more love this month, trying to post more consistently. Top post was an adoption listing in collaboration with High Country Humane.
- We had an **INSTAGRAM** Reel go viral! This Reel was a video done for Bearizona, as we thought it could get a bit of love from us, and boy, did it! Currently (as of 01-05), it has about 2.4 million plays, with 1.7 million impressions and over 250k interactions. This is currently our top post ever made regarding impressions, views, and interactions. We also gained about 8,000 followers from the video! 🎉
  Here is the link to the video:
  https://www.instagram.com/reel/C2iIcw1PO28/?utm_source=ig_web_copy_link&igsh=MzRlODBiNWFlZA==

Top FACEBOOK posts this month:



Top INSTAGRAM posts for this month:





SALES:

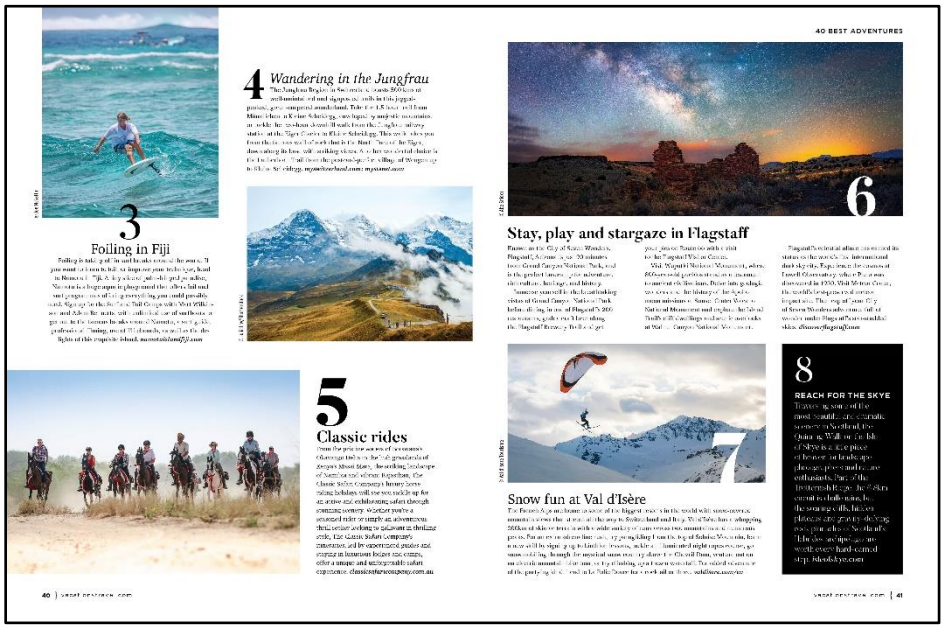
INTERNATIONAL TRAVEL TRADE:

** RTO: Receptive Tour Operator; OTA: Online Travel Agency; FIT: Flexible Independent Traveler*

- **Top Trade Accounts**
  - Hotelbeds – OTA
  - American Tours International (ATI) – RTO
  - Destination America – RTO
  - WebBeds – RTO
- **Successful Results from Visit USA France Programs**
  - Visit USA France Experts e-Learning online program reported 174 Flagstaff module graduates.
  - Visit USA France Western U.S. Training Day in Paris reported 64 travel agents attended the presentation and luncheon. The Discover Flagstaff PowerPoint and was presented by Olivier Barthez from Rep and Co.

Discover Flagstaff at Visit USA France Paris Event

- **Published Vacations & Travel Magazine, Website and E-newsletter Advertorials**
  - Vacations & Travel is Australia's leading publisher of travel content with a commitment to support responsible tourism and sustainability.
  - Publication Demographics: Australian Readership 63% couples, 37% Millennials, 48% Families; 81% travel internationally each year; 400,000 Reach
  - Content featured Flagstaff's astro-tourism and seven wonders to stay, play and stargaze in Flagstaff, Arizona in digital and print as a half-page editorial in Vacations & Travel "40 Adventures." Flagstaff was listed as number six.



Vacations & Travel Advertorial

- An additional full feature “Why Flagstaff is the world’s best astrotourism destination” was also featured online and included with their e-news. https://mailchi.mp/signaturemedia/27-jan-2023

- **Notable Partner & Industry Meetings**
  - Conducted partner meetings with the Americana Motor Hotel and Lowell Observatory.
  - Conducted industry meeting with Hotelbeds.
  - Our partner in Flagstaff is why we do what we do. The Discover Flagstaff sales team met with new General Manager, Belen Mendez and Assistant General Manager, Jaime Schmaing from the DoubleTree by Hilton Flagstaff to discuss industry news, hotel updates and sales strategies. The outcome of the meeting produced new insight on this top producing Flagstaff hotel such as the new Burger & Bourbon Bar, Woodlands Restaurant featuring some of the finest steaks found in our town and Sakura continuing to provide outstanding Tappanyaki experiences.

- **Arizona Office of Tourism (AOT) & American Tours International (ATI) Campaign**
  - Discover Flagstaff joined the AOT/ATI Co-Op 2023/2024 Campaign with Visit Mesa, Red Feather Lodge (City of Tusayan), City of Page, and Front Burner Media (Sedona, Williams, Cottonwood, and Prescott.)
  - There are several deliverables in the campaign for example Drive America road trip packages, destination itineraries on Travel Mole, press release, digital ad campaign an ATI webinar and more.
    - On January 31, 2024, a live ATI hosted webinar was broadcasted to ATI's domestic travel advisors and to ATI's international clients, focused on product managers. The webinar secured 122 registrations and more that 40 attended live. Destinations provided a PPT and trivia question during the webinar session providing insightful and valuable knowledge encouraging Arizona bookings.

AOT/ATI live webinar presenters

Presentation slide during live webinar

- **Arizona Office of Tourism Greater Los Angeles Receptive Tour Operator Sales Mission**
  - This mission offered participants to interact with trade Receptive Tour Operators from the European, Japanese, and other International markets to promote Arizona as a single state itinerary. The events included networking, presentations, luncheon, trade show components and meeting with attendees at a display table.

- Participants of this AOT mission included Discover Flagstaff, Ascend Capital Management, Little America Hotel, Experience Scottsdale, Discover Gilbert, and Front Burner Media (Sedona, Williams, Cottonwood, and Prescott.)
- This successful sales mission connected with 33 Receptive Tour Operators.

Arizona Office of Tourism Sales Mission Group at K1 Speed Event

Presenting at K1 Speed Event

C Tour Holiday Appointment at LAX Cambria

Presenting at Top Golf Event

MEETINGS/EVENTS/CONFERENCES:

CONFERENCE/ROOMS LEADS/BOOKINGS: 3 Leads were sent in the month of January for a total of 1,907 room nights and total estimated economic impact of $570,193. At time of reporting 1 Lead booked for a total of 500 room nights and total estimated economic impact of $149,500. This Program booked with the It Pays to Meet in Flagstaff program.

MEETINGS/CONFERENCE SERVICES: Staff attended the EAC Meeting, AzSAE Board Meeting, Tourism Commission Meeting, Route 66 Centennial partner presentation, and the Citizen of the year awards. Staff organized a site visit for a planner that resulted in 2 bookings. The Sales team met with Doubletree staff and their new Director of Sales.

DoubleTree Meeting at Tourist Home

VISITOR SERVICES:

January	2023	2024	YoY Change
Walk-ins	4,978	5,712	15%
Retail Sales	$13,941	$16,187	16%

Model Train

- The Model Train ran 42 times during the month of January.

Brewery Trail

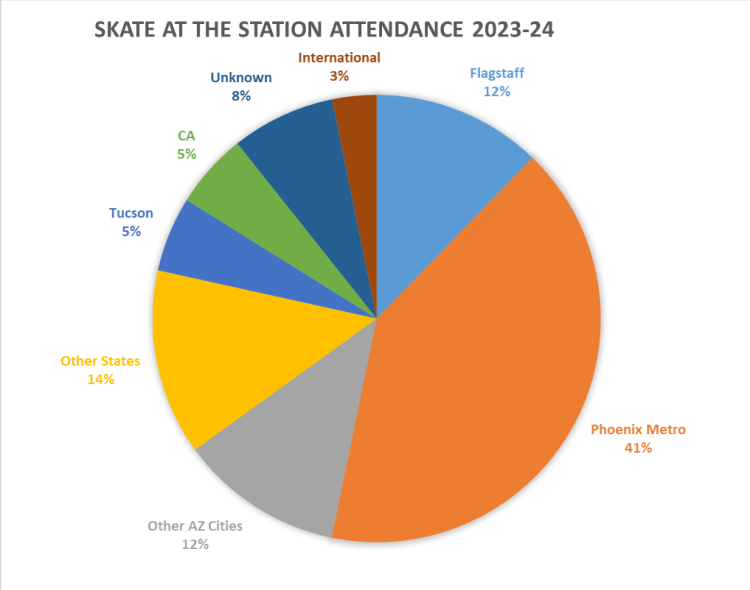
- Visitor Center gave out 89-pint glasses for Flagstaff Brewery Trail redemptions!

Winter Recreation Hotline

- The Winter Recreation Hotline received 519 calls in January; this resource provides callers with updated information on current conditions at Winter Recreation Sites in our area.

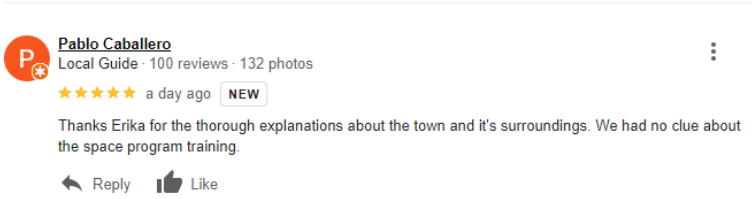
Skate at the Station

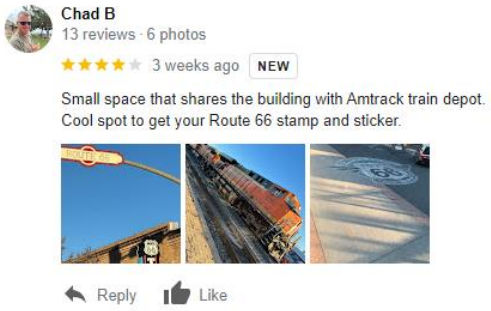
- Skate at the station closed out its final season on January 7th. This season we had 1161 participants with the largest number of skaters coming from the Phoenix metro area.



Google Reviews

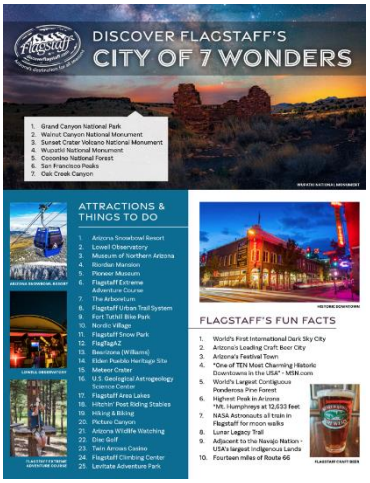
- Visitor Center received many positive reviews on our Google listing below are a couple examples.





CREATIVE SERVICES:

ADVERTISING:



- **DRIVE MARKET/NATIONAL CAMPAIGNS:** Produced digital ads for January **Datafy** (AZ Beer Week, Valentines Day, Cactus League Spring Training, I heart Pluto Festival) and **Woobox Sweepstakes**; produced print ads for the ***East Valley Theater Programs, Los Angeles Magazine, Route Magazine,*** and ***Grand Circle Travel Planner***
- **2024 FESTIVALS LOGO:** In progress
- **2024 VISITOR GUIDE:** Completed and ready to print pending contract approval.
- **LOCAL NEWSPAPER ADS:** Created print and digital ads for Arizona Beer Week in the Arizona Daily Sun and Flagstaff Business News
- **CITIZEN OF THE YEAR:** Designed a full-page ad featuring local business owners for the Flagstaff Citizen of the Year event
- **CHOCOLATE WALK:** Created 2024 Flagstaff Chocolate Walk promotional flyer, help wanted flyer, passports, print and digital ads, and posters for the Flagstaff Visitor Center
- **TRAVEL TRADE SHEET:** Updated the Travel Trade one-sheet for Meg Roederer

CITY JOBS:

- **INNOVATE WASTE:** Designed a half page print ad, full page flyer, and a social media graphics for the Innovate Waste Challenge
- **EMERGENCY MANAGEMENT LOGO:** Worked on logo designs for City of Flagstaff's Emergency Management
- **AIRPORT WELCOME SIGN:** Mocked up more options for a new airport welcome/directional sign at the Flagstaff Airport

WEBSITE:

- **CONTENT UPDATES:** Updated beer week pages, sweepstakes, and new listing photos on discoverflagstaff.com

Beer Week Carousel - DATAFY
Serve Metro Phoenix only
February 1-22, 2024

https://www.flagstaffarizona.org/events/festivals/arizona-beer-week/

THANK YOU FOR YOUR CONTINUED PARTNERSHIP WITH THE ECONOMIC VITALITY DIVISION FOR THE CITY OF FLAGSTAFF!

7.

CITY OF FLAGSTAFF

STAFF SUMMARY REPORT

To:	The Honorable Mayor and Council
From:	David Millis, Development Engineer
Date:	02/20/2024
Meeting Date:	02/27/2024

TITLE:

2024 Amendments to Engineering Design Standards, TITLE 13

DESIRED OUTCOME:

Staff will provide an overview of the proposed amendments to the Engineering Design Standards and ask Council to provide initial feedback on the proposed amendments, concerns with any amendments, and any sections the Council would like to review and discuss in more detail.

EXECUTIVE SUMMARY:

The intent of the Engineering Standards and Specifications is to provide information on minimum acceptable design and construction practices for new infrastructure in the City of Flagstaff. The last update to these standards was made in 2017. Since then, through regular use and enforcement of the standards, Engineering staff have identified some necessary amendments. These amendments have been proposed to correct errors and omissions, incorporate best practices, incorporate new technologies, improve the ease of interpretation of the standards, and provide consistency with other adopted codes and standards.

Proposed Schedule for Discussion and Adoption:
02/27 Work Session: Council will provide initial comments to staff regarding proposed amendments
03/19 Council Meeting: Finalize any discussions and read Ordinance for the first time
04/02 Council Meeting: Read Ordinance by title only for the final time/adopt Ordinance

INFORMATION:

Background/History:

The City of Flagstaff last made major amendments to Title 13 of City Code entitled "Engineering Design Standards and Specification for New Infrastructure" (also referred to as the Engineering Standards) in Ordinance 2017-22. The City also made minor amendments to the Engineering Standards in Ordinance 2020-10.

The proposed and ongoing amendments to the Engineering Standards ensure that the City continues to address and improve public safety. These standards also ensure high performing infrastructure that will improve and reduce maintenance in the future.

The proposed amendments to the Engineering Design Standards are the result of input and review from an internal stakeholder committee, which were then presented to the professional community including, two public open houses, the Business Advocacy Division, the Transportation Commission, the Bicycle Advisory Committee, the Pedestrian Advisory Committee, the Commission on Inclusive and Adaptive

Living, and City Council. Comments were solicited at these meetings and through the City's online community forum. The proposed amendments have been available on the City's website for the last month and a half and have been updated based on internal and external comments received, when appropriate.

Upon approval of the proposed amendments, Engineering will begin another regular revision cycle. Staff will include the same stakeholders, and involve key community partners, as we work through the next revision cycle. Staff will bring proposed revisions generated in the future revision cycle proposed revisions to Council in approximately two to three years. Staff anticipate that other code revisions that include amendments to Engineering Standards driven by Council priorities and/or adopted policy may occur prior to the next cycle of regular administrative amendments

Key Considerations:
Below are some of the highlighted amendments made to the Engineering Design Standards:

- Allow cost consideration for Engineering Standards modification requests
- Utility easement restrictions to limit obstruction to maintenance access
- Electronic submittal process
- Scheduling of temporary traffic restrictions and providing public notice
- Allow roll curb in new single-family residential subdivisions with narrow lot widths
- Pedestrian and bicycle facilities updates

See the attachments for the full amendment document along with a summary of all of the amendments made.

Community Benefits and Considerations:
The community benefits economically by providing public infrastructure that is designed and constructed to serve the public in the most efficient way possible. This includes minimizing cost of operation and maintenance. The proposed updates are intended to correct inconsistencies and errors, clarify vague language, address issues with interpretation or implementation, and to ensure that our Code reflects current construction and design practices. They are intended to be cost-neutral overall for developers.

Options and Alternatives:
1. The Council may choose to accept or reject any or all of the proposed amendments.
2. The Council could choose to make different amendments.
3. The Council can postpone adoption of the standards as a public record in order to gather more information or public input.

Attachments: Presentation
Proposed Amendments
Summary Bullets
Public Comments

Title 13 2024 Amendments

Engineering Design Standards and Specifications for New Infrastructure

CITY OF FLAGSTAFF · ARIZONA · ESTABLISHED 1882

TEAM FLAGSTAFF

WE MAKE THE CITY BETTER

Purpose of Engineering Standards

- To establish minimum design and construction criteria for public infrastructure (Streets, Water, Sewer, Grading, Drainage, etc.)
- To establish a limited set of criteria for private civil design and construction where private improvements impact public infrastructure

Reason for Amendments

- Last update was in 2017. Historically updated every 3 years
- Correct inconsistencies and errors in code
- Clarify vague portions of code
- Incorporate electronic process
- Reference current M.A.G. standards
- Reflect current construction and design practices
- Address issues encountered in the interpretation or implementation of existing standards

Intended to be Administrative Changes not Policy Changes

- Future amendments likely to reflect Council priorities and policies.
- Intention of this round is to be administrative/technical and cost neutral or reduction (on balance)

Amendment Process

- Updates committee of City Staff from:
  - Engineering & Transportation
  - Water Services & Stormwater
  - Public Works
  - Housing
  - Sustainability
- Regular meetings to bring forward proposed changes for approval by the committee
- Ongoing list of feedback from design consultants, contractors and community partners

Schedule and Public Input

Done	Meeting Date	Meeting Type
√	6-Dec	Transportation Commission
√	7-Dec	Bicycle Advisory Committee
√	27-Dec	Commission on Inclusion & Adaptive Living
√	18-Jan	Business Advocacy Division
√	31-Jan	Public Meeting (in person open house)
√	1-Feb	Public Meeting (virtual open house)
√	1-Feb	Combined Bicycle Advisory Committee & Pedestrian Advisory Committee
√	9-Feb	Close survey
	21-Feb	Commission on Inclusion & Adaptive Living
	27-Feb	Council Work Session
	19-Mar	Council Regular Session (1st Read of Ordinance)
	2-Apr	Council Regular Session (2nd Read of Ordinance)

Highlighted Updates

- Allow cost consideration for Engineering Standard modification requests
- Civil plan submittal & resubmittal format updates to streamline review and approval process
- Utility easement restrictions (limit obstructions to maintenance access)
- Electronic submittal process

Highlighted Updates

- Scheduling of temporary traffic restrictions and provide public notice
- Miscellaneous water & sewer technical changes
- Updated street design standards including allowable intersection approach grades increase
- Driveway paving requirements
- Allow roll curb in new single-family residential subdivisions with narrower lot widths

Highlighted Updates

- Traffic signal pole technical changes
- Pedestrian and bicycle facilities updates and reference AASHTO standards
- FUTS detail updates
- Signal, sign and pavement markings
- Commercial dumpster access criteria

Potential Future Updates

- Respond to Council priorities and policies
- Housing affordability/availability
- Roadway cross-sections
- Allow private hydrants and private on-site sewer collection systems
- Active Transportation Master Plan (ATMP)
- Sustainability improvements

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, unless otherwise indicated.

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

13-04-001: Easements

Section 1. 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.

Justification:

The language on what private improvements are allowed in easements needs to be clarified in order to ensure access for maintenance and repairs. The organization of this section caused most of the text to be a sub-part of part B related to multiple easements occupying the same ground. Reorganization will allow the intent to be communicated more coherently. There have been numerous instances where the existing code has been interpreted to allow for the placement of private improvements within easements that prevent access to City facilities for maintenance and repair.

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13-06-002: Plans Required

Section 2. 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.**

Justification:

In practice, most modification requests are based in part on cost of complying with the Engineering Standard. The Standards should be adjusted to allow for costs to be considered in modification requests where the costs of compliance would be unreasonably high vs alternatives.

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Section 3. 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.

Justification:

The scale conversions are incorrect and redundant.

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Section 4. 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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Justification:

Engineering records are now being electronically submitted, processed, and retained.

Often, design engineers will make changes to a plan set beyond those specific items outlined in the comment response. This requires plan reviewers to re-check every item on every plan sheet with each subsequent revision resulting in longer plan review timeframes than would otherwise be required.

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Section 5. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0005: 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.

Justification:

With the use of electronic plan reviews and submittal it has become clear that staff needs to more clearly identify and distinguish plans that have been approved in order to reduce the likelihood of construction occurring based on unapproved plan sets.

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Section 6. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0008: 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.

Justification:

Engineering records are now being electronically submitted, processed, and retained. PDF/A is a standardized version of the Portable Document Format (PDF) specialized for use in the archiving and long-term preservation of electronic documents. PDF/A differs from PDF by prohibiting features unsuitable for long-term archiving, such as font linking (as opposed to font embedding) and encryption.

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Section 7. Amend Title 13 Engineering Design Standards, Chapter 13-06: Construction Plans, Division 13-06-002: Plans Required, Section 13-06-002-0009: 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).~~

Justification:

Engineering records are now being electronically submitted, processed, and retained. PDF/A is a standardized version of the Portable Document Format (PDF) specialized for use in the archiving and long-term preservation of electronic documents. PDF/A differs from PDF by prohibiting features unsuitable for long-term archiving, such as font linking (as opposed to font embedding) and encryption.

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13-06-003: Grading Plans

Section 8. 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.

Justification:

Engineering records are now being electronically submitted, processed, and retained. PDF/A is a standardized version of the Portable Document Format (PDF) specialized for use in the archiving and long-term preservation of electronic documents. PDF/A differs from PDF by prohibiting features unsuitable for long-term archiving, such as font linking (as opposed to font embedding) and encryption.

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13-06-007: General Notes

Section 9. 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.

Justification:

A note on all construction plans will make contractors aware of the standards for preservation of survey monuments.

Note the revision to MAG Standard Trench Plating detail to accommodate unique weather conditions of Flagstaff as it relates to snow operations.

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Section 10. 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.

Justification:

Note S: Water stub outs are extended to parcels to allow for future development while minimizing disturbance to existing right-of-way. However when a project design does not utilize those stubs, unnecessary points of potential failure are added to the City water system and need to be abandoned at the nearest active main.

Note T: This will help to ensure proper coordination between building and sewer plans.

Note U: The hydrant testing standard is not currently clarified in the standard. The American Water Works Association Manual AWWA M-17 is widely recognized as the standard test method for fire flow testing.

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13-06-008: Construction Traffic Control Plans

Section 11. 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**.

Justification:

Added statement of when a construction traffic control plan is required.

Clarified that Traffic Control Plans are to be approved by the City of Flagstaff Traffic Engineering Section to clean up job title and chain of responsibility.

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Section 12. 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.

Justification:

Removed the requirements for a specific engineering drawing scale.

Removed the requirement to include a City permit number on the traffic control plan

Added that bicycle and pedestrian accommodations need to be made during temporary realignment or rerouting of existing facilities.

Added note that accessible routes need to be included per ADA requirements.

Updated a note to include that the permittee needs to reach out to the transit agency a minimum of 3-days in advance if a transit stop will need to be relocated.

Updated a note to include that a new plan needs to be submitted and approved if work extends past the original dates.

Added a note regarding advanced VMB, when they are required to be posted and which roadways and types of closures it applies to.

Added a note to clarify what criteria must be met for a traffic control plan to be approved for implementation within the City of Flagstaff right-of-way.

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13-09-001: Underground Utilities

Section 13. 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.**~~

Justification:

Code is not clear enough on what is allowed to be built in easements. Removing the requirements here and instead referring to Division 13-04-001 will avoid potentially duplicative or conflicting language.

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13-09-002: Sewer System Design

Section 14. 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.**

Justification:

ADEQ R18-9-E301 D 2 (e) does not allow for minimum slope calculations to utilize a lower coefficient of roughness than 0.013. COF requirements need to be updated to stay in compliance with ADEQ. ADEQ requires flatter-sloped sewer runs to have quarterly maintenance plan which would become the extra responsibility (burden) of City of Flagstaff Water Services.

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Section 15. 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
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.

Justification:

We typically allow for a change in pipe material without requiring a manhole when extra protection is required per MAG 404-2.

Resurfacing the existing manhole sacrifices the integrity of the manhole base.

Code does not currently disallow manholes being located in sidewalks, bikeways, bike lanes, and FUTS trails.

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Section 16. 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.

Justification:

Current language has been interpreted by some applicants to indicate that a sewer service may pass under an adjacent parcel if the same party owns both parcels. This creates problems for access and repair, particularly if one parcel is later sold.

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13-09-003: Water System Design

Section 17. 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.

Justification:

Added statement that water valves should be located outside of sidewalks, bikeways, bike lanes, and FUTS trails, when feasible.

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Section 18. 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.**

Justification:

Current language has been interpreted by some applicants to indicate that a water service may pass under an adjacent parcel if the same party owns both parcels. This creates problems for access and repair, particularly if one parcel is later sold. The location requirement for water meters is not clearly spelled out in code.

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13-09-006: Sewer and Water Line Materials

Section 19. 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~~.

Justification:

The pipe for connecting the hydrant comes in lengths that are multiples of six inches. Increasing the allowable range from four to six inches will make it easier for contractors to get a configuration that meets the standard.

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Section 20. 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.**

Justification:

Many residential neighborhoods cannot accommodate the maximum hydrant spacing requirement and maintain the 10-ft minimum separation from the driveway. This is also a growing issue with new developments where there are wide, shared driveways and narrow lots.

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13-10-002: Street Design

Section 21. 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:

Note: Tables 13-10-011-01 and 13-10-011-02 are proposed to be moved here from Section 13-10-011-0001 with minor changes. For this revision only, standard text denotes provisions that have not changed or that have been moved here from 13-10-011-01 without change, bold strikethrough denotes provisions that are being deleted, and bold text denotes new provisions that are not in previously approved code.

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-~~**011**~~**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'
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-~~011~~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 ~~must~~**shall** be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.

*** Roll~~ed~~ curb ~~is~~**may be** permitted on **local** streets in **new single-family and** 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.**~~**subdivisions, subject to the following minimum criteria:**

1. Where 95% of the lots within the subdivision have a width of less than or equal to fifty (50) feet,

2. Vertical curb is not otherwise required for drainage,

3. A minimum five (5) foot parkway separates the back of curb from the sidewalk except at Cul-de-sacs where roll curb may be placed adjacent to sidewalks,

4. Roll curb is constructed in accordance with the current MAG standard details and subject to any City of Flagstaff Revisions,

5. Vertical curb shall be used through all curb returns and shall include minimum five (5) foot curb transitions from point of curve to point of tangency and per MAG Standard Detail 221,

6. ADA-compliant curb ramps are provided at all intersections and where mid-block crossings are designated, and

7. Unless otherwise stipulated during Preliminary Plat Approval, no more than one maximum 20-foot-wide driveway may be placed at any residential lot frontage with roll curb. Such restriction shall be included on the Final Plat.

Table 13-10-~~011~~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'
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'

Table 13-10-~~011~~002-01 (Continued)

Functional Classification/Design Criteria

URBAN					
COMMERCIAL CENTER STREETS					
Functional Classification (*)	Major Arterial	Minor Arterial	Major Collector	Minor Collector	Local
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~~**shall** be a minimum through lane width of twelve (12) feet and a thirty (30) foot curb return radius at intersections.

Table 13-10-~~011~~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)					

Table 13-10-~~011~~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
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
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~~**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 ~~must~~**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) ~~**must**~~**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 ~~**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.

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-~~011~~002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

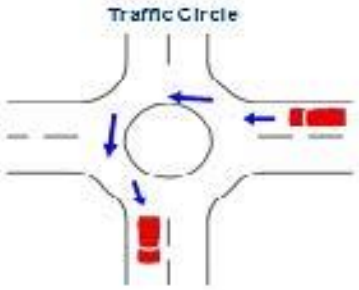
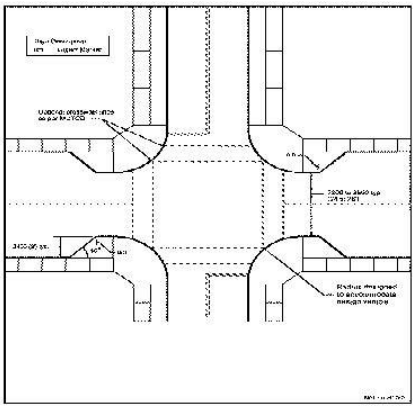
Design Option	Description	Diagram	Advantages	Disadvantages
Neighborhood Traffic Circle	Raised circular islands placed in intersections, around which traffic circulates. Typically, min. 14' diameter and includes 2-foot wide mountable truck apron and landscaping		a. Effective moderating speed b. Improves 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
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

Table 13-10-~~011~~002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

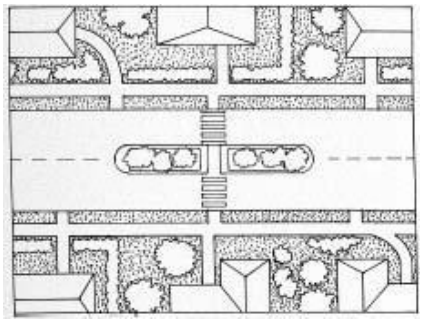
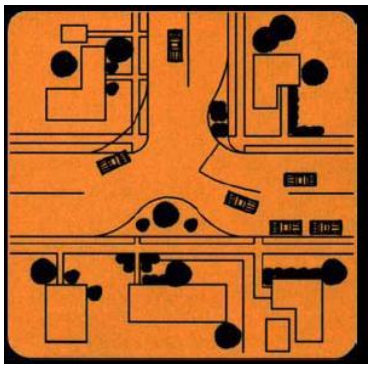
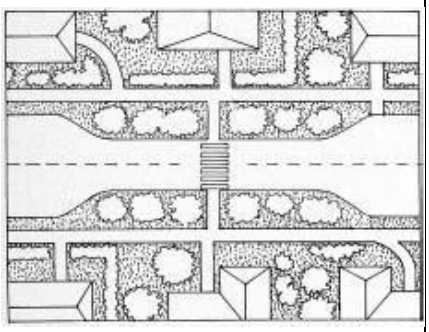
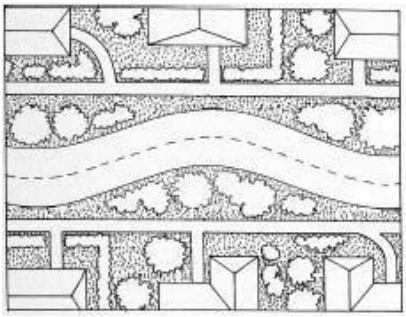
Design Option	Description	Diagram	Advantages	Disadvantages
Center Island Narrowing	A raised island located along the centerline of a street that narrows the travel lanes at that location. A min. of 6' x 20' and landscaped with pedestrian cut-through		a. Increases pedestrian safety b. Reduces traffic 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
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~~002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

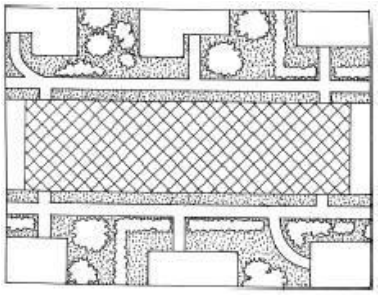
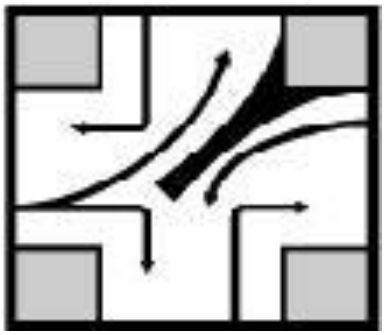
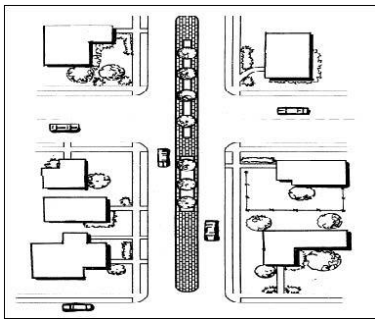
Design Option	Description	Diagram	Advantages	Disadvantages
				d. May eliminate some on-street parking e. Snow plowing may be difficult to maneuver
Textured Pavement	A surface material on the roadway (such as stamped asphalt or concrete) which is installed to produce small, constant changes in vertical 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
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	a. Requires available street width on the major street b. Limits turns to and from the side street for local residents and emergency services

Table 13-10-~~011~~002-02 – New Design and Retrofit of Existing Streets

Traffic Calming Design Features for Local Residential Streets

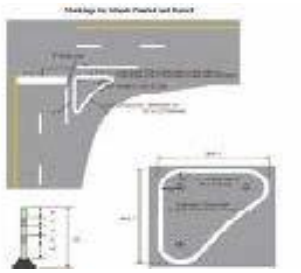
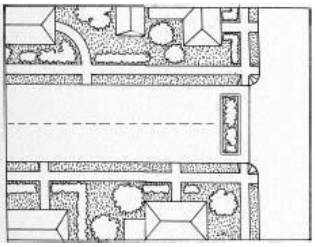
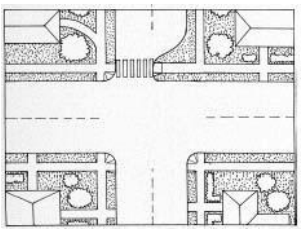
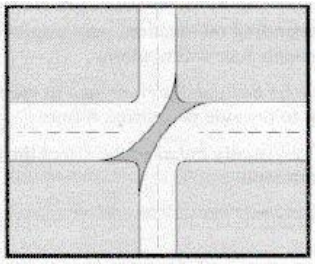
Design Option	Description	Diagram	Advantages	Disadvantages
			intersects a major street	c. Reduces access to driveways on major arterials
Pavement Markings Note: Applies only to retrofit of existing streets	Painted striping or channelization to guide traffic		a. Modestly affects speed	a. Extreme unacceptable 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 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	a. Cause circuitous routes for local residents and emergency service vehicles b. May be expensive

Table 13-10-~~011~~002-02 – New Design and Retrofit of Existing Streets Traffic Calming Design Features for Local Residential Streets				
Design Option	Description	Diagram	Advantages	Disadvantages
			c. Reduces traffic volumes	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.

Justification:

The tables were located in the section of code for resource and slope design criteria but are not related resource or slope protection. The street design section of code is a more logical location. Moving them there will make them easier to locate when browsing.

Due to the tight spacing of driveways and lack of parkway, meeting sidewalk ADA cross-slope requirements is impractical at cul-de-sacs without either parkway or the use of roll curb. Many newer subdivisions are incorporating higher densities and smaller lots, resulting in the need for a high percentage of vertical curb to be cut for driveway entrances. Roll curb would, in many cases, result in lower costs and improved carbon neutrality.

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13-10-006: Intersection Design

Section 22. 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	
Posted Speed (mph)	Minimum Spacing to Intersection (ft)
< or =30	230
35	275
40	320

Table 13-10-006-01

Minimum Spacing of Driveways to Intersections	
45	365
UNSIGNALIZED	
30	115
35	135
40	155
45	180
ROUNDABOUT	
≤ 30	**50**
35	**50**
40	**75**
45	**75**

Justification:

Added requirements for lane alignment through intersections.

Changed the approach intersection grade for signalized, or likely to become signalized, intersections from 2% to 3%.

Added the approach intersection grade for a roundabout to be 4% for 200-ft.

Added that an intersection shall maintain a maximum 2% cross slope.

Added a table for minimum spacing of driveways to a roundabout controlled intersection.

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13-10-007: Horizontal Alignment

Section 23. 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.

Justification:

The referenced table is being moved from Section 13-10-011-0001 to 13-10-002-0001.

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13-10-010: Driveways

Section 24. 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

Justification:

Engineering staff has had safety concerns with previously constructed driveways. Adoption and enforcement of this revision would improve safety within newly constructed driveways and drive aisles.

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Section 25. 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.

Justification:

In order to maintain the integrity of City facilities, access should meet City standards.

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13-10-011: Resource and Slop Design Criteria

Section 26. Amend Title 13 Engineering Design Standards, Chapter 13-10: Streets, Division 13-10-011: Resource and Slop Design Criteria, Section 13-10-011-0001: Resource and Slop 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'**~~

~~**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**~~
~~**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**~~
~~**Max. A.C. Width at Nonsignalized Inters. w/o Median**~~	~~**48'**~~	~~**48'**~~	~~**48'**~~	~~**48'**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~

~~**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**~~
~~**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 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'**~~
~~**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 13-10-011-01 (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 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~~

~~**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**~~
~~**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 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.**~~

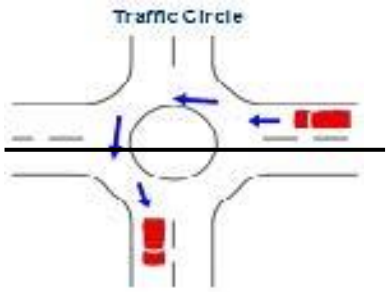
~~**9. Where two (2) local residential "narrow" streets do not intersect at a right angle, the radius of curb returns on the acute angles shall be twenty (20) feet.**~~

~~**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.**~~

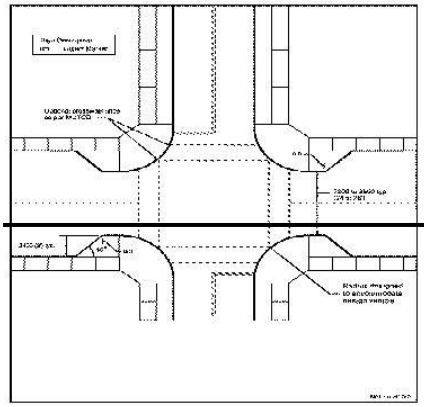
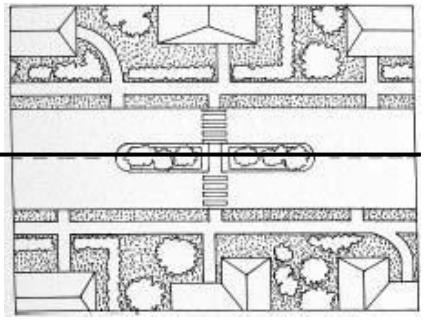
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**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~~ ~~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~~

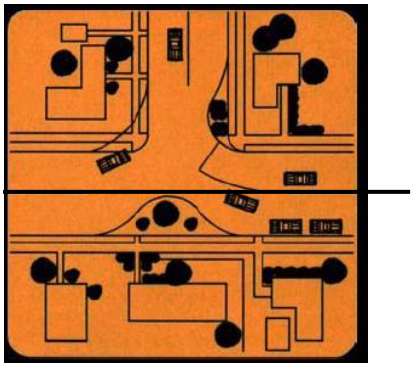
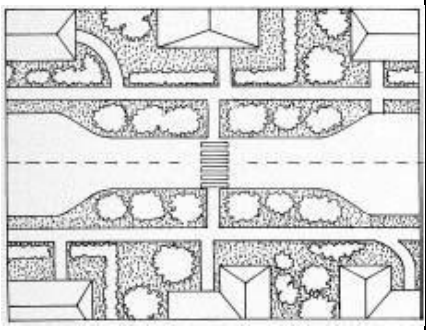
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**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**~~

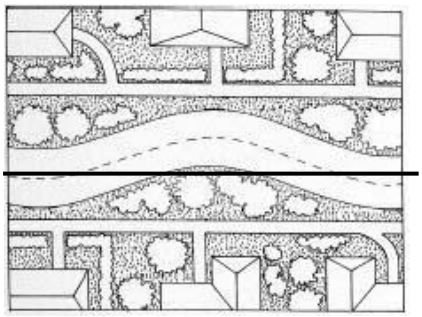
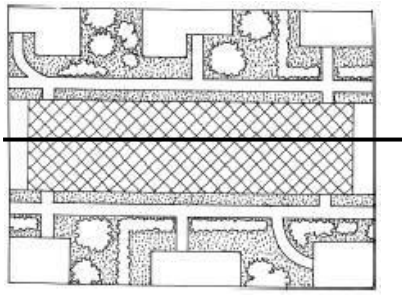
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**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~~

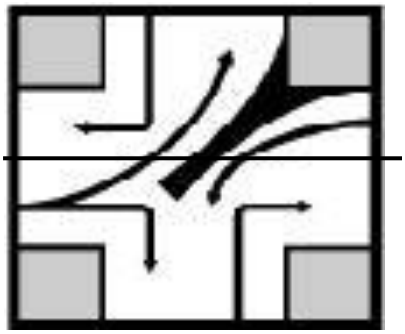
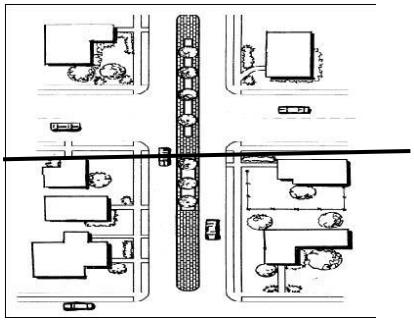
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**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~~

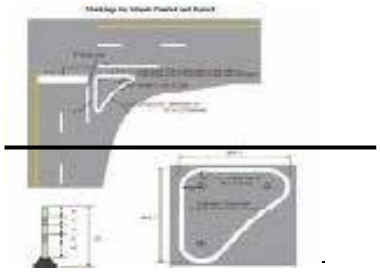
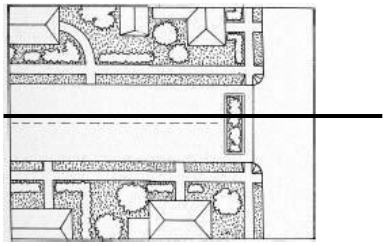
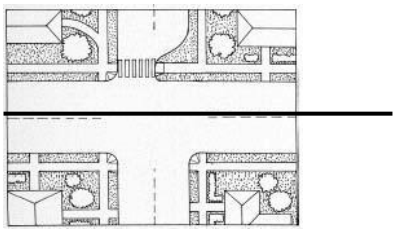
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**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~~

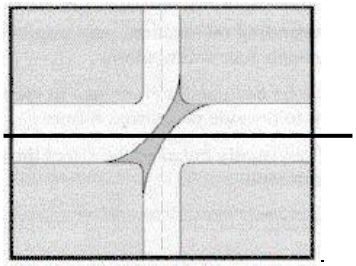
~~**Table 13-10-011-02 – New Design and Retrofit of Existing Streets**~~

~~**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 13-10-011-02 – 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~~

Justification:

The tables are not related resource or slope protection and are being moved to the street design section of code, which is a more logical location. Moving them there will make them easier to locate when browsing.

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13-12-003: Lighting Layout Requirements

Section 27. 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

Justification:

In Table 13-12-003-01 changed the IESNA Distribution number for the Local (All) from 1 to 2.

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13-12-005: Street Light Equipment

Section 28. 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

Justification:

In Table 13-12-005-01 changed the Maximum EPA to 1.5 square feet to match the design of our new Signal Pole design standards.

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Section 29. 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.

Justification:

Updated the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals to the newer edition (6th edition, with 2015 Interim Revisions).

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13-14: Bicycle Facilities

Section 30. 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."**

Note: Division 13-14-002 is a proposed new division of code. For this revision only, standard text denotes provisions that have been moved here from other areas of code and bold text denotes new provisions that are not in previously approved code.

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.

Justification:

Added this whole new division.

Added detail for design guidelines, dimensions, structural requirements, expansion and control joints, shoulders, street/sidewalk transitions, fencing, and tunnels and underpasses for Flagstaff Urban Trail Systems.

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

Section 31. Amend Title 13 Engineering Design Standards, Chapter 13-15: Work in Public Rights-of-Way and Easements, to relocate the text of Chapter 13-15 to be part of Chapter 13-04 and to modify the text as follows:

~~**Chapter 13-15**~~**Division 13-04-003**: Work in Public Rights-of-Way and Easements

13-~~**15**~~**04**-00~~**1**~~**3**-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.

~~A~~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 fifty percent (50%) of the original permit fees.

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

~~D~~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.

~~E~~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 (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~~G. When trenching is necessary, and permanent~~,~~ pavement patch is not practicable, temporary trench pavement shall consist of UPM~~**TM**~~ (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.

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.

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

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

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

~~**K**~~**L**. The permittee shall fully conform to the requirements of A.R.S. Section 40-360.21 et seq. (~~**Blue Stake**~~**Arizona 811** requirements, call ~~**1-800-STAKE-IT**~~**811**).

~~**L**~~**M**. The permittee shall fully conform to the requirements of A.R.S. Section 40-360.~~**21**~~**41 et seq.**, restrictions for working near or over power lines.

~~**M**~~**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 ~~**Division 13-15-002**~~**Section 13-04-003-0002**.

~~**N**~~**O**. 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**~~**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.

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

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

Section 13-~~**15**~~**04**-00~~**2**~~**3**-000~~**1**~~**2**: Project Clean-Up Requirements

Justification:

There are two different sections of code applying to rights-of-way and easements. It makes more sense to have them together. The text has been modified to match current practices and clarify existing requirements.

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13-16-002: Signal Design Elements

Section 32. 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.

~~**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.

Justification:

Added statement that signal cabinets, poles, push buttons, and streetlight poles shall be outside of pedestrian/bicycle ways, and that full width shall be maintained. Referenced the newly added Pedestrian Push Button Locations standard drawing.

Added statement that push buttons shall be located to meet ADA requirements.

Changed multiple references to ADOT Type G signal heads to instead be a 12" – 4 section heads.

Added statement that all signal heads shall include a 1" retroreflective border around the perimeter of the backplate.

Changed a reference to ADOT Type R signal head to instead be 12" – 3 section heads.

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Section 33. 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.

Justification:

Added new section titled 13-16-002-0003 Traffic Signal Pole Design Requirements. This specification describes the general requirements for traffic signal equipment to be installed within, or supplied to, the City of Flagstaff.

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13-16-004: Intersection Design Requirements

Section 34. 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.

Justification:

Added specification for bagging new traffic signal and pedestrian heads.

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Section 35. 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**).

Justification:

Engineering records are now being electronically submitted, processed, and retained.

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13-16-005: Traffic Signs

Section 36. 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.

Justification:

Added statement that traffic signs shall be outside of pedestrian/bicycle ways.

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13-16-006: Pavement Markings

Section 37. 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.

Justification:

Added statement that pavement markings shall comply the MUTCD, the Arizona Supplement to the MUTCD, the ADOT Traffic Safety for School Area Guidelines, and these standards.

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Section 38. 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.

Justification:

Added statement that pavement markings shall comply the MUTCD, the Arizona Supplement to the MUTCD, the ADOT Traffic Safety for School Area Guidelines, and these standards.

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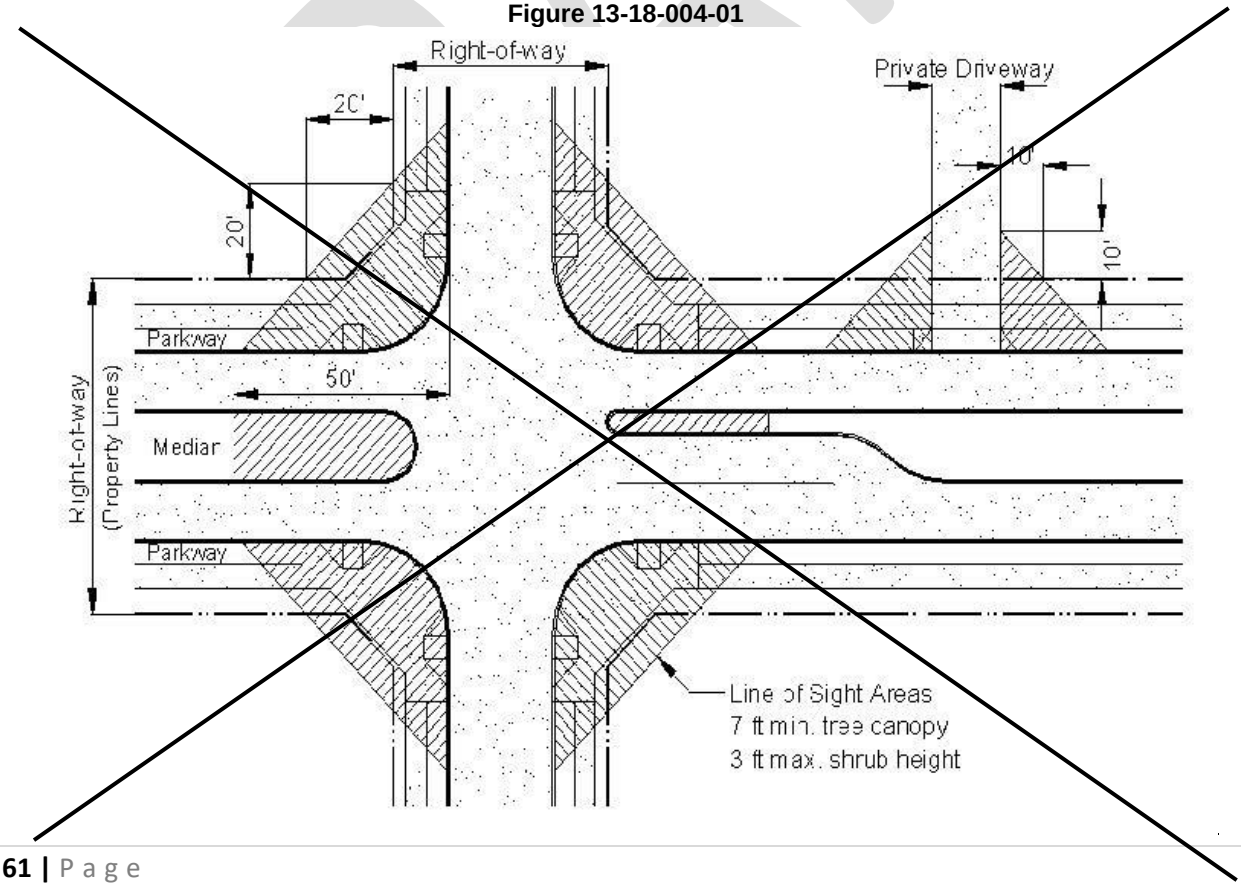
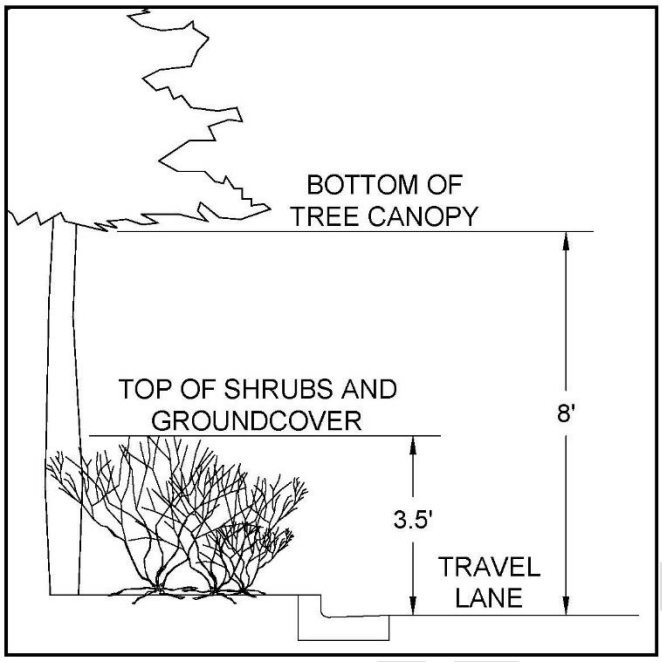
13-18-004: Installation, Placement, and Planting

Section 39. 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:

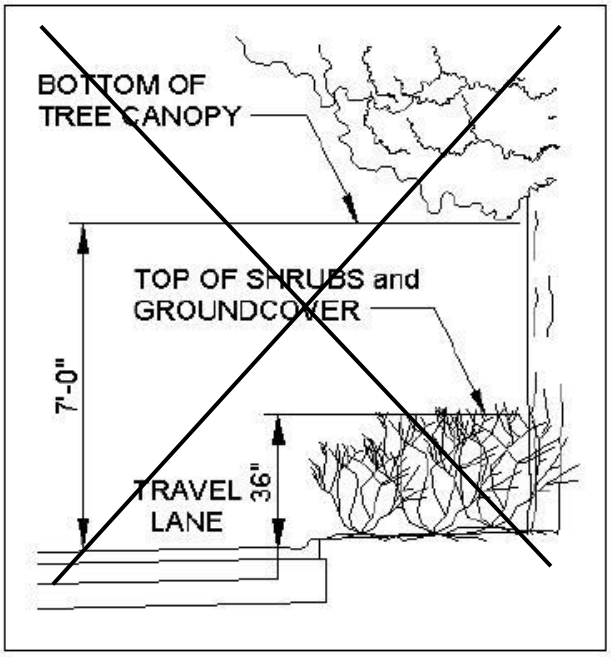
A. Lines of Sight. At intersections and driveways, landscaping proposed to be located within the **line of sight** ~~**triangular area on a corner lot formed by measuring twenty (20) feet along both street side property lines from their intersection, or ten (10) feet from the intersection of a property 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**~~



Justification:

Updated the line of site at intersections and driveways section to follow AASHTO standards.

Created new figure to illustrate the new dimensions.

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

Section 40. 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.**

Justification:

Revise MAG Standard Trench Plating detail to accommodate unique weather conditions of Flagstaff as it relates to snow operations.

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Section 41. 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).**

Justification:

Engineering staff has had safety concerns with previously constructed driveways. Adoption and enforcement of this revision would improve safety within newly constructed driveways and drive aisles.

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Section 42. 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.

Justification:

Built-in manhole steps corrode and become unsafe over time. Maintenance crews utilize ladders to access all manholes regardless of whether steps are installed. Other minor revisions made to be consistent with newly adopted MAG details.

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Section 43. 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…"**~~

Justification:

Minor revisions made to be consistent with newly adopted MAG details. MAG Detail 421 no longer has a note beginning "1:3 Cement...".

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Section 44. 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.

Justification:

Built-in manhole steps corrode and become unsafe over time. Maintenance crews utilize ladders to access all manholes regardless of whether steps are installed. Other minor revisions made to be consistent with newly adopted MAG details.

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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 13-21-002-0422: 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.

Justification:

Built-in manhole steps corrode and become unsafe over time. Maintenance crews utilize ladders to access all manholes regardless of whether steps are installed. Other minor revisions made to be consistent with newly adopted MAG details.

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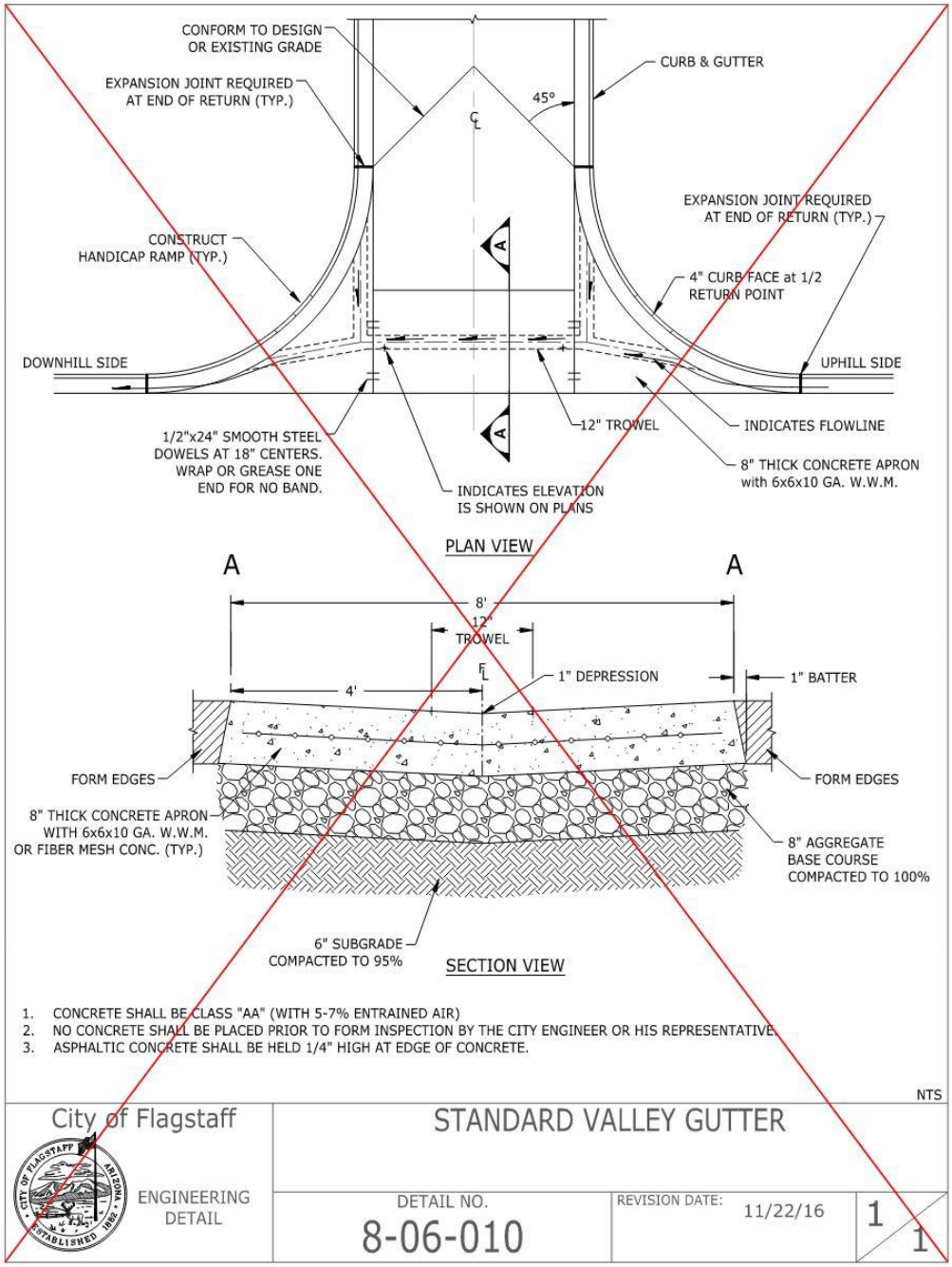
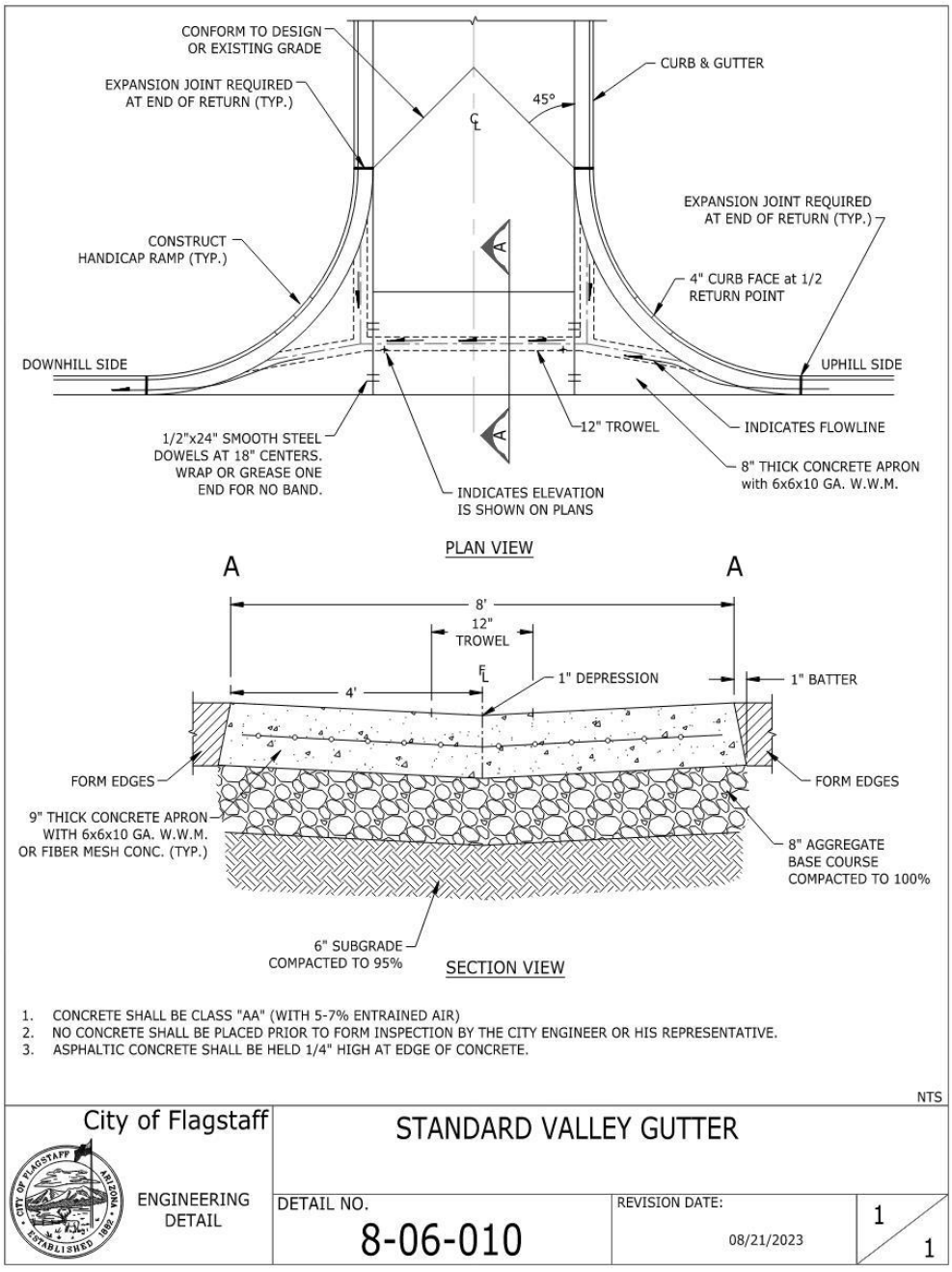
8-06-010: Standard Valley Gutter

Section 46. 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:





Justification:

Revised thickness to match MAG standard detail 240.

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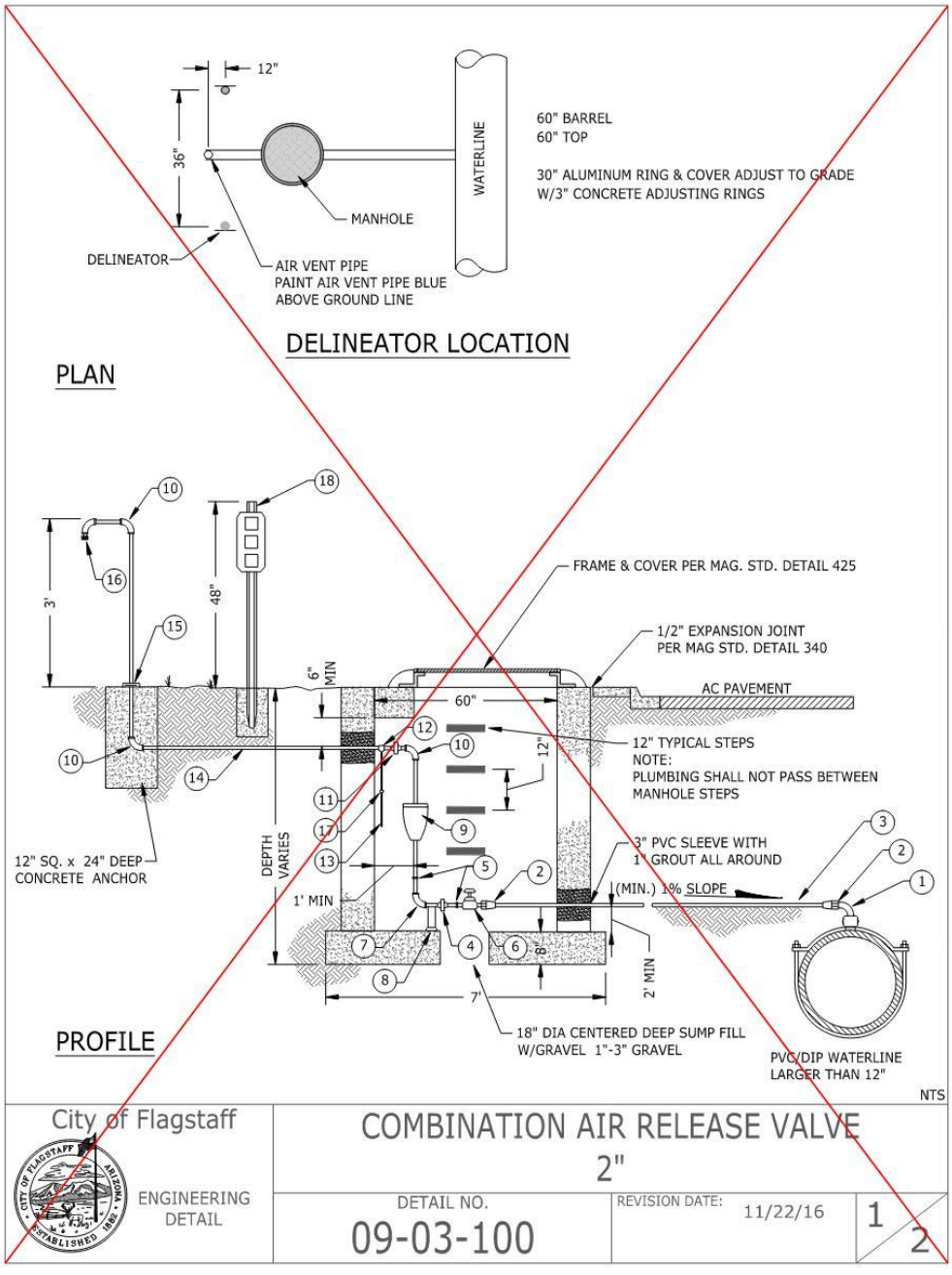
09-03-100: Combination Air Release Valve 2”

Section 47. 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:



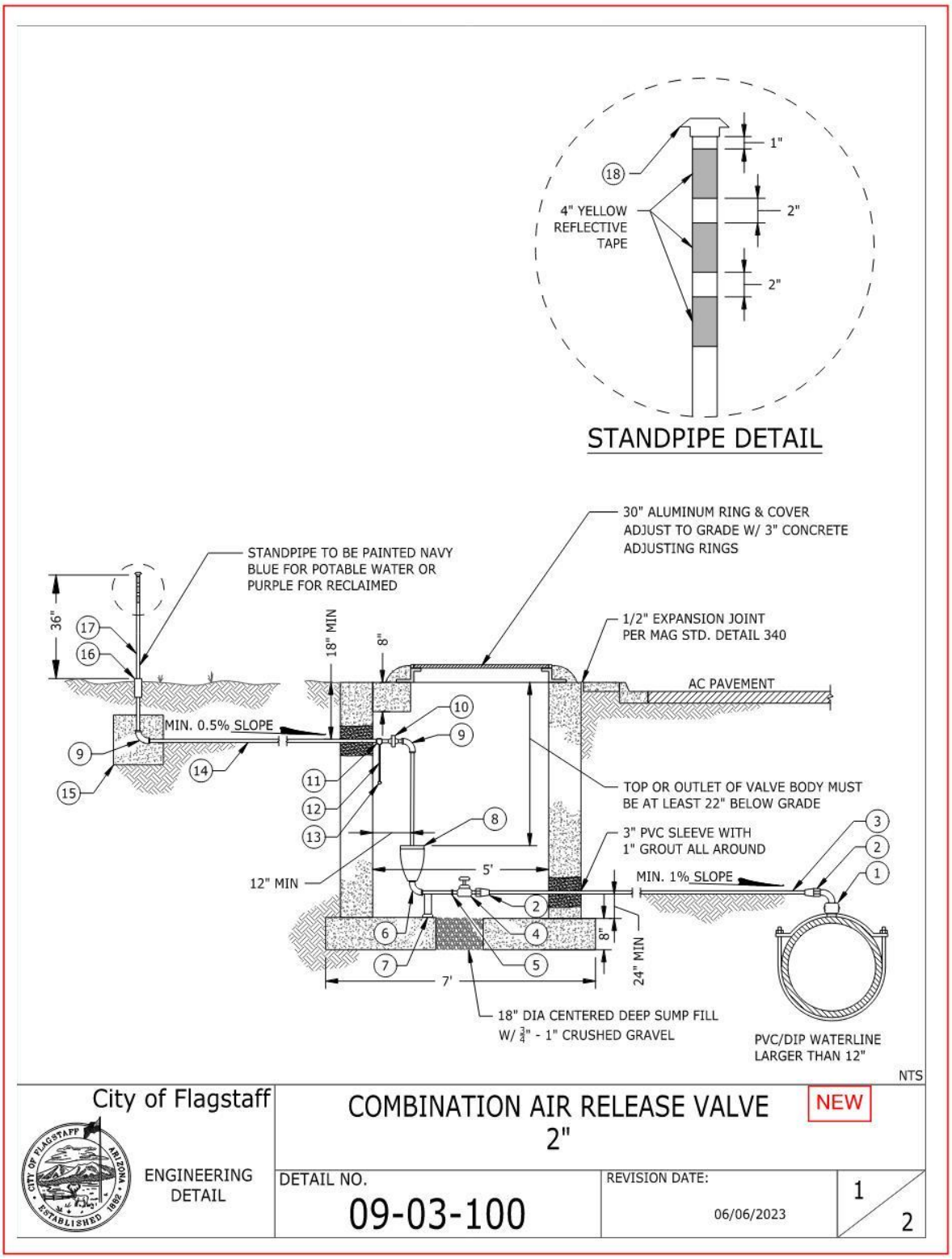
KEYNOTE:

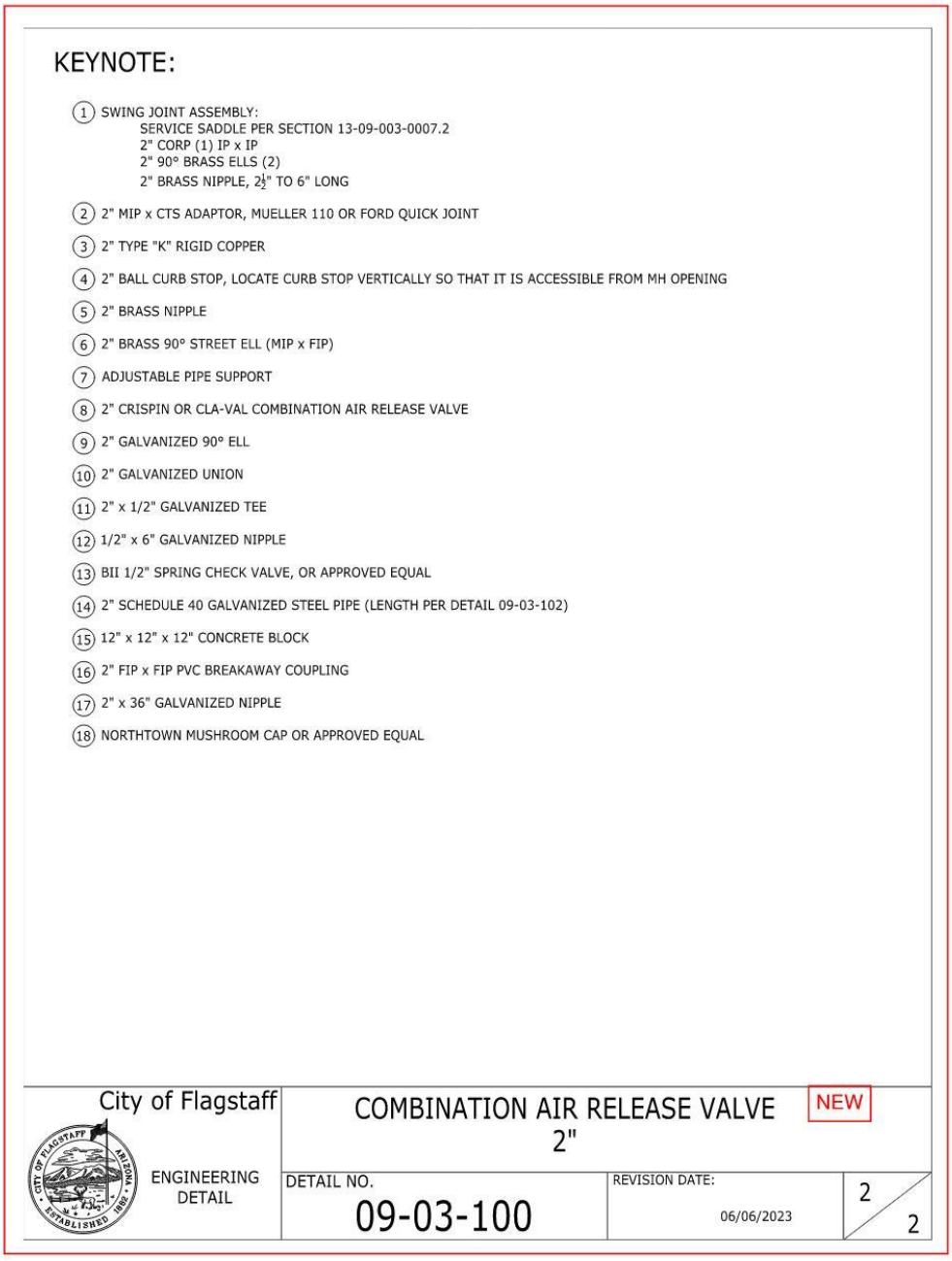
1. SWING JOINT ASSEMBLY:
   SERVICE SADDLE, DOUBLE STRAP:
   2" CORP (1) IP x IP
   2" 90° BRASS ELLS (2)
   2" BRASS NIPPLE, 2 1/2" TO 6" LONG
2. 2" IP x SWEAT COPPER ADAPTOR IP THREADS, SWEAT WITH BRAZING ROD AS PER COF STD FOR SWEAT FITTINGS, 110 or QUICK
3. 2" TYPE "L" RIGID COPPER
4. 2" BRASS UNION
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
COMPINATION AIR RELEASE VALVE 2"
NEW
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" NEW

DETAIL NO. 09-03-100

REVISION DATE: 06/06/2023

2 / 2

Justification:

Unifying and clarifying ARV detail drawings will help ensure correct construction. Elimination of delineators and marking standpipes with reflective tape will significantly reduce the likelihood of damage to underground parts.

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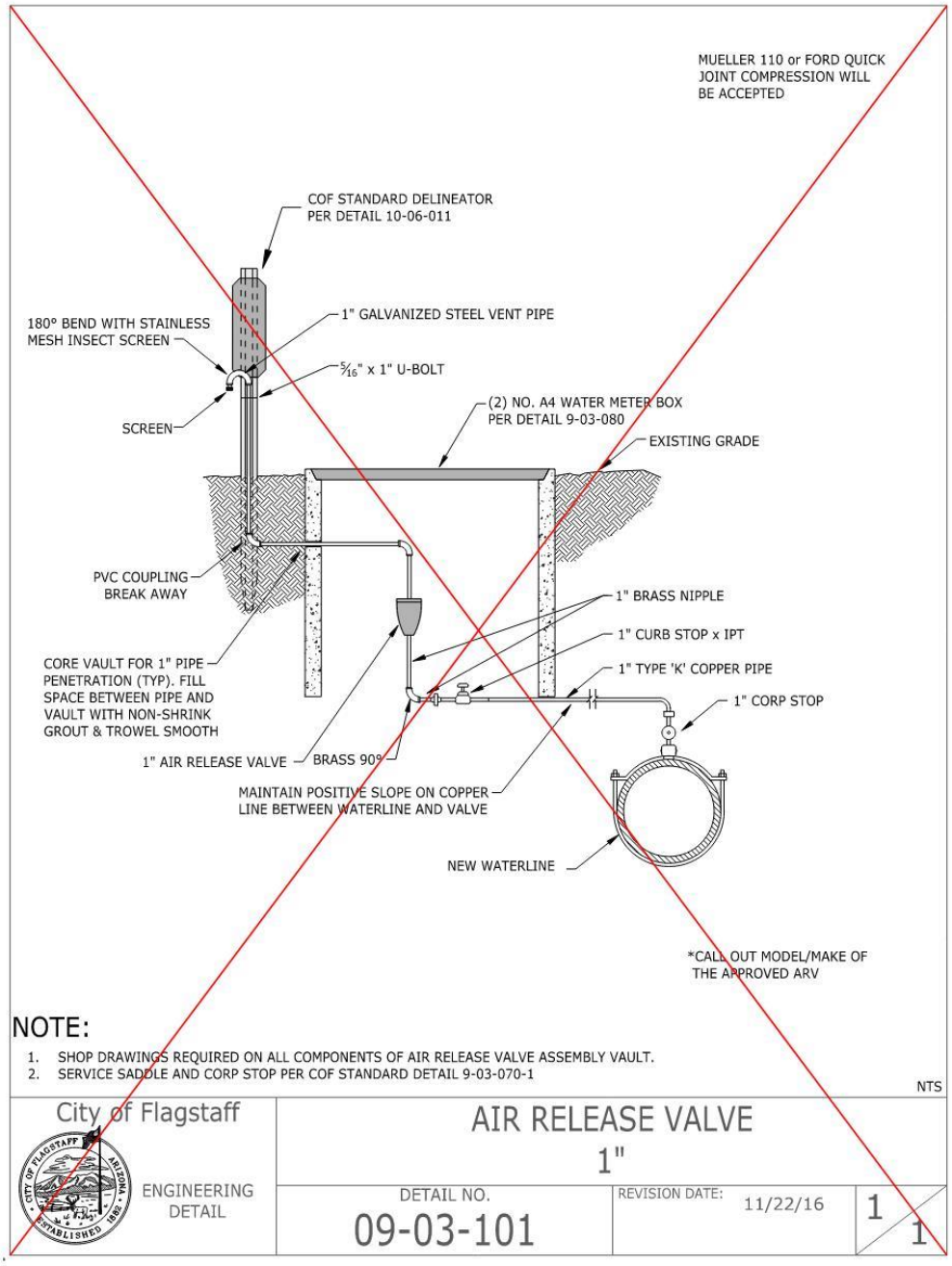
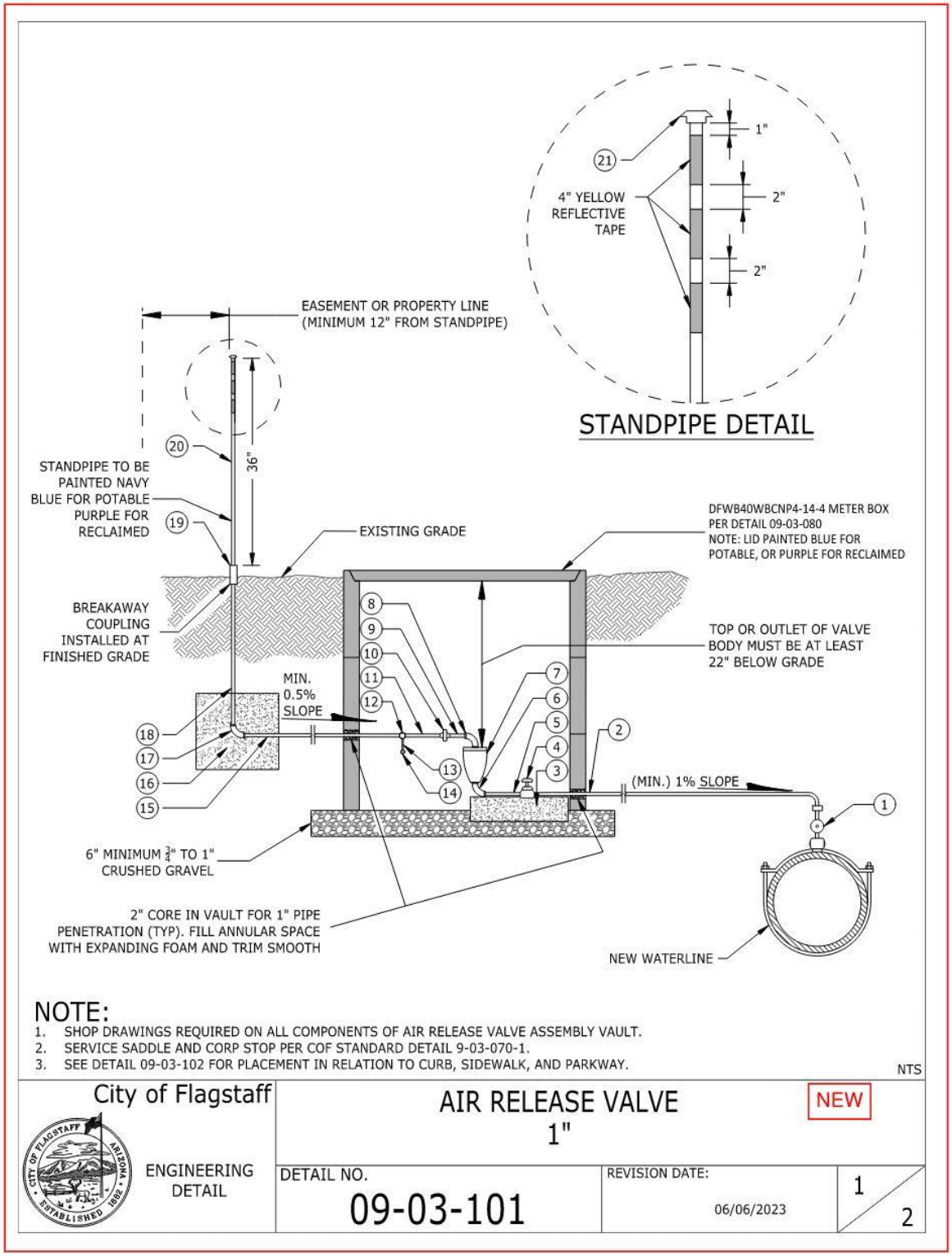
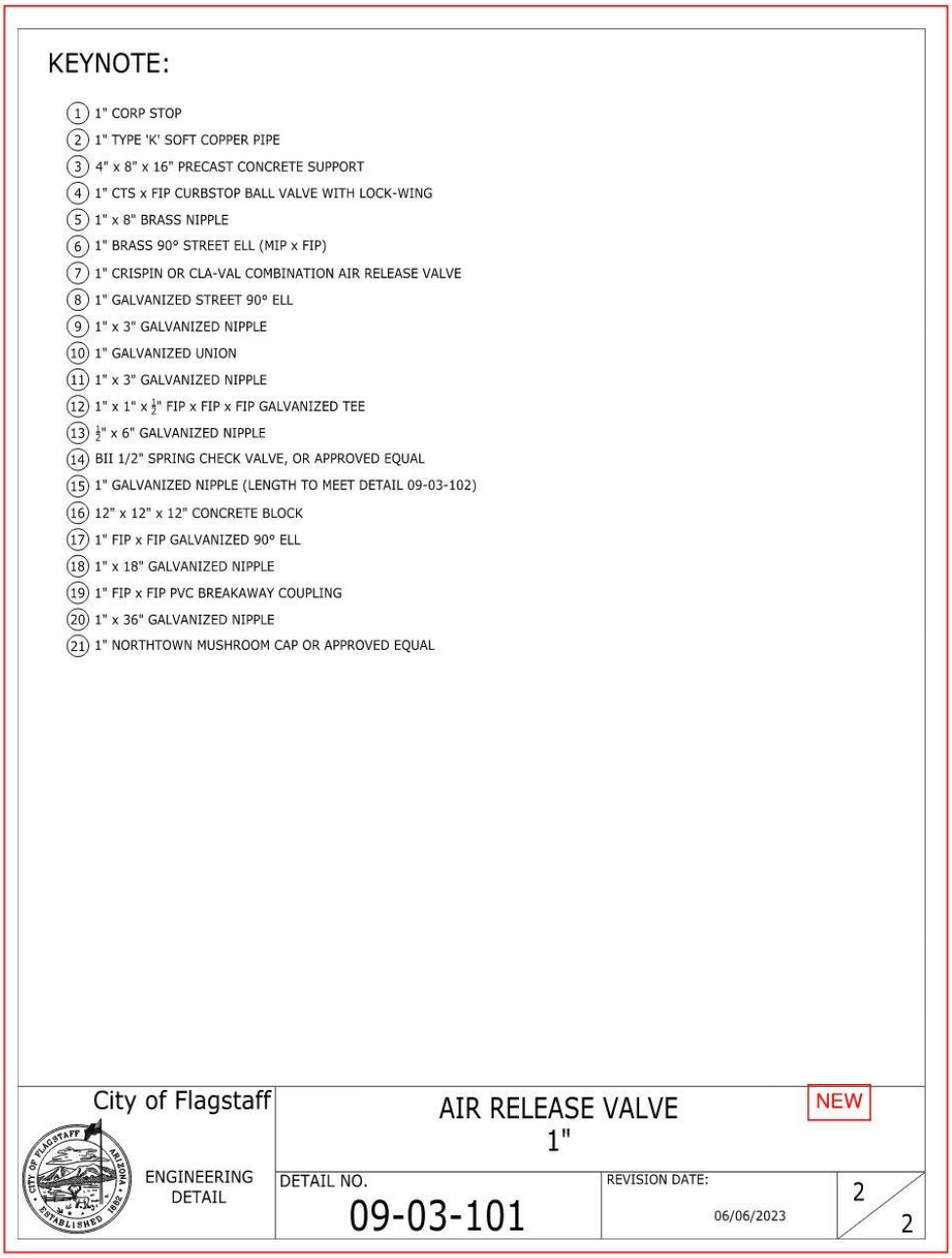
09-03-101: Air Release Valve 1”

Section 48. 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:




STANDPIPE DETAIL
1"
2"
2"
21
4" YELLOW REFLECTIVE TAPE
EASEMENT OR PROPERTY LINE (MINIMUM 12" FROM STANDPIPE)
36"
20
STANDPIPE TO BE PAINTED NAVY BLUE FOR POTABLE PURPLE FOR RECLAIMED
19
EXISTING GRADE
DFWB40WBCNP4-14-4 METER BOX PER DETAIL 09-03-080
NOTE: LID PAINTED BLUE FOR POTABLE, OR PURPLE FOR RECLAIMED
BREAKAWAY COUPLING INSTALLED AT FINISHED GRADE
TOP OR OUTLET OF VALVE BODY MUST BE AT LEAST 22" BELOW GRADE
MIN. 0.5% SLOPE
8
9
10
11
12
7
6
5
4
3
2
18
17
16
15
13
14
(MIN.) 1% SLOPE
1
6" MINIMUM ¾" TO 1" CRUSHED GRAVEL
2" CORE IN VAULT FOR 1" PIPE PENETRATION (TYP). FILL ANNULAR SPACE WITH EXPANDING FOAM AND TRIM SMOOTH
NEW WATERLINE
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
ENGINEERING DETAIL
AIR RELEASE VALVE
1"
NEW
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"

NEW

DETAIL NO. 09-03-101

REVISION DATE: 06/06/2023

2 / 2

Justification:

Unifying and clarifying ARV detail drawings will help ensure correct construction. Elimination of delineators and marking standpipes with reflective tape will significantly reduce the likelihood of damage to underground parts.

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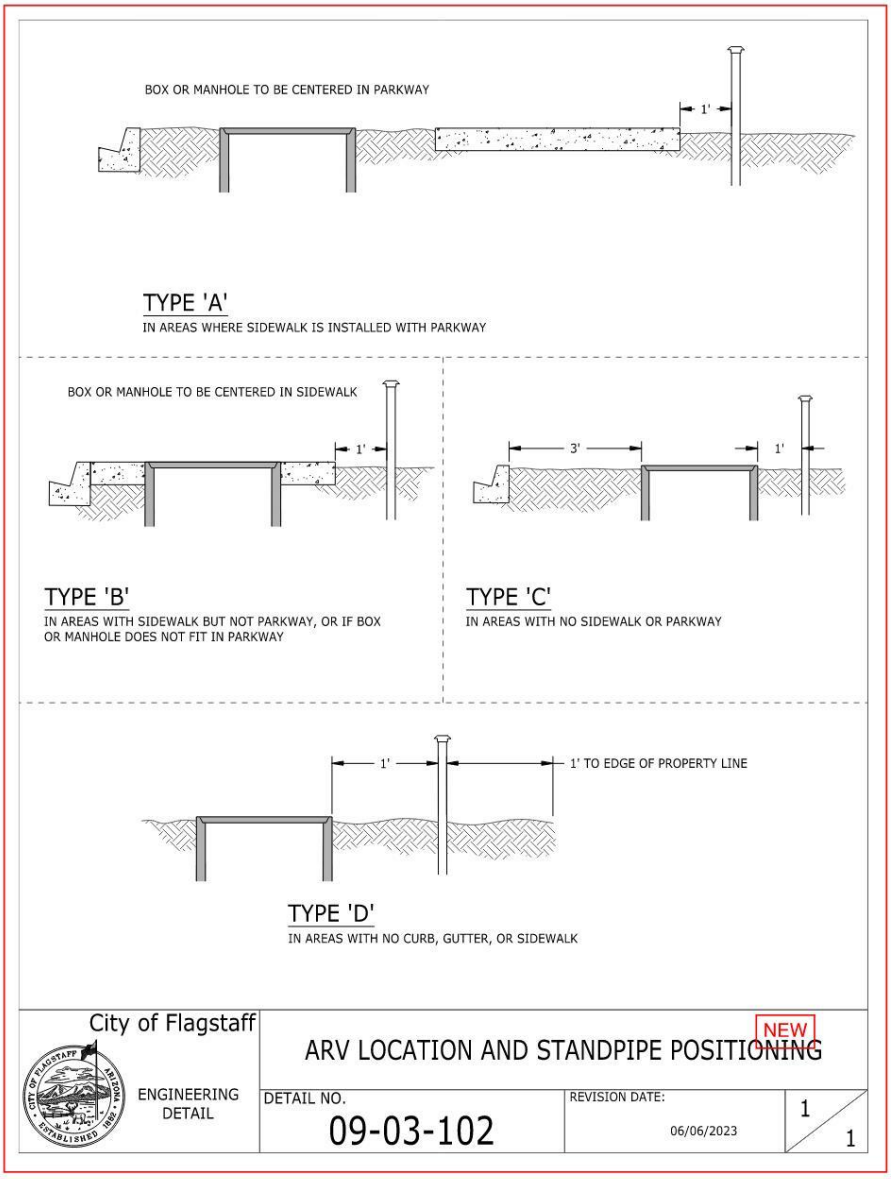
09-03-102: ARV Location and Standpipe Positioning

Section 49. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-03-102: ARV Location and Standpipe Positioning, to read as follows:



Justification:

Adding this detail drawing will help reduce confusion about how ARV systems should be installed.

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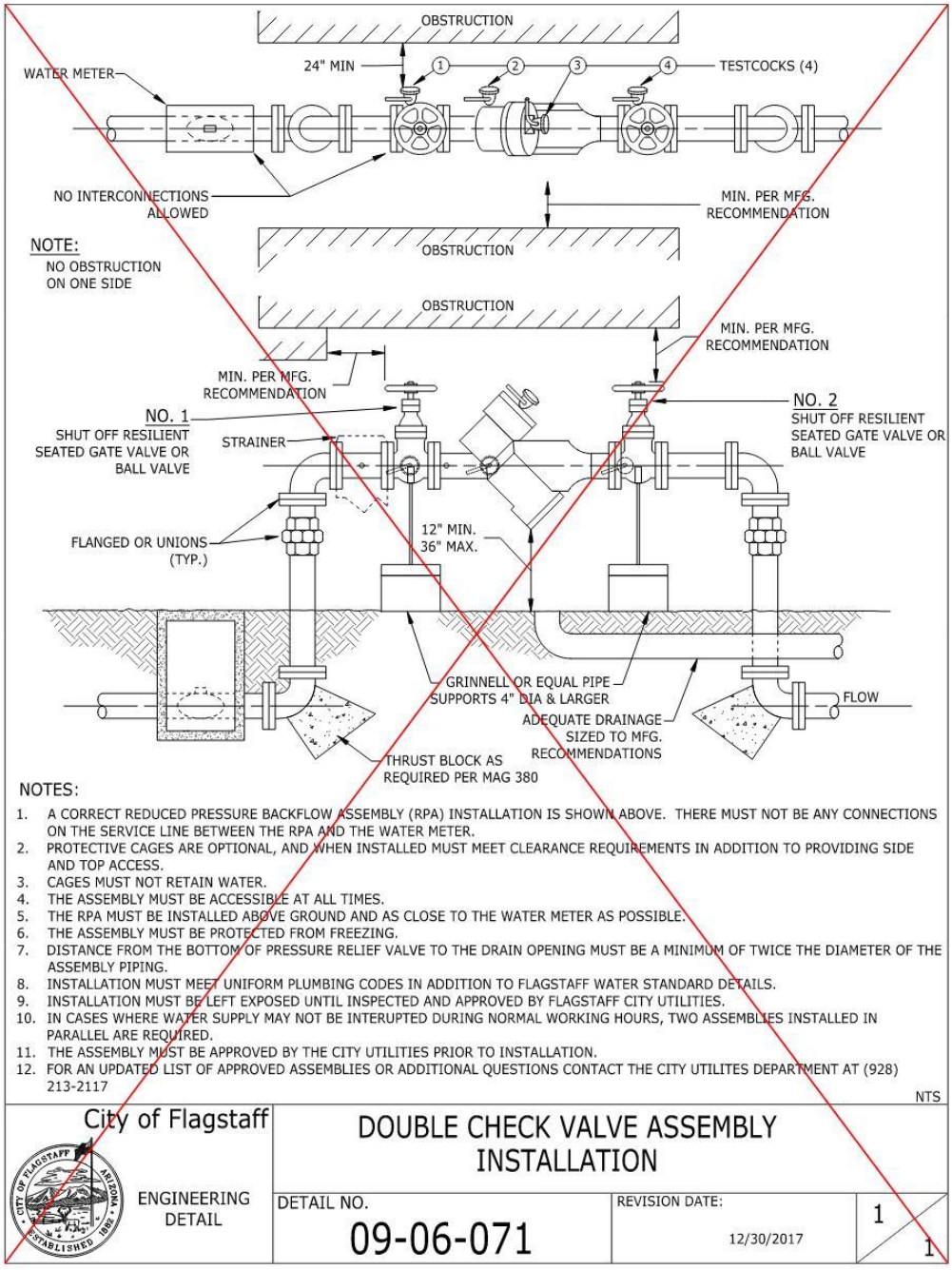
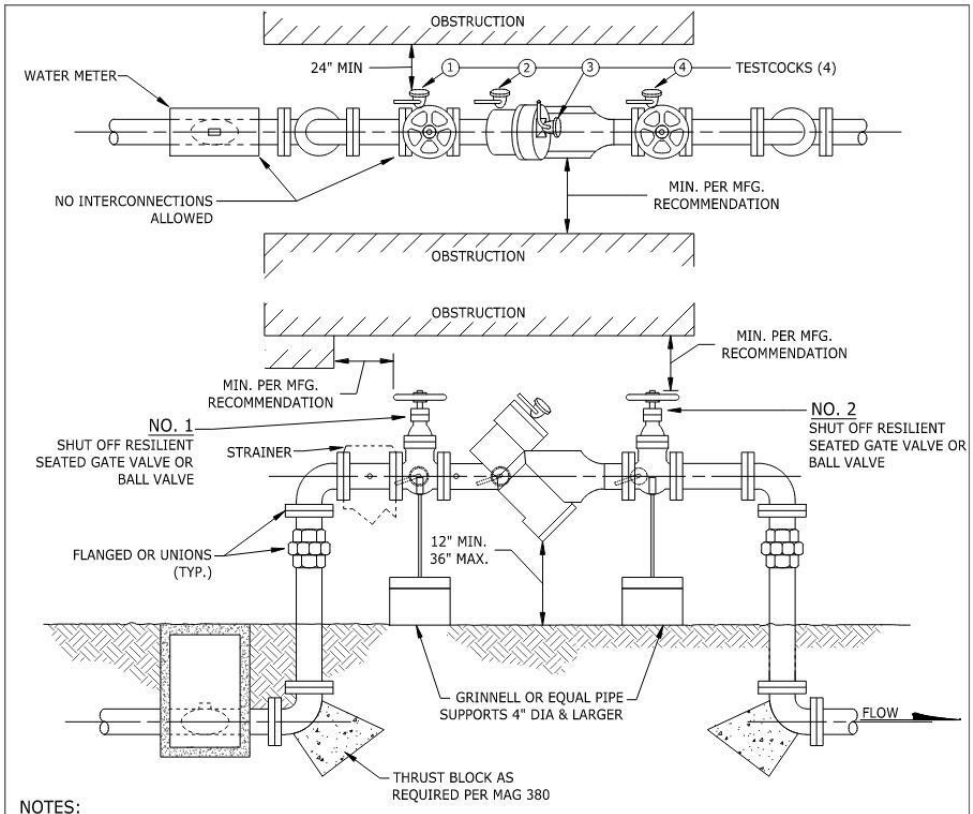
09-06-071: Double Check Valve Assembly Installation

Section 50. 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

Justification:

The drain is not required for a double check valve assembly and the notes language was wrong for this detail.

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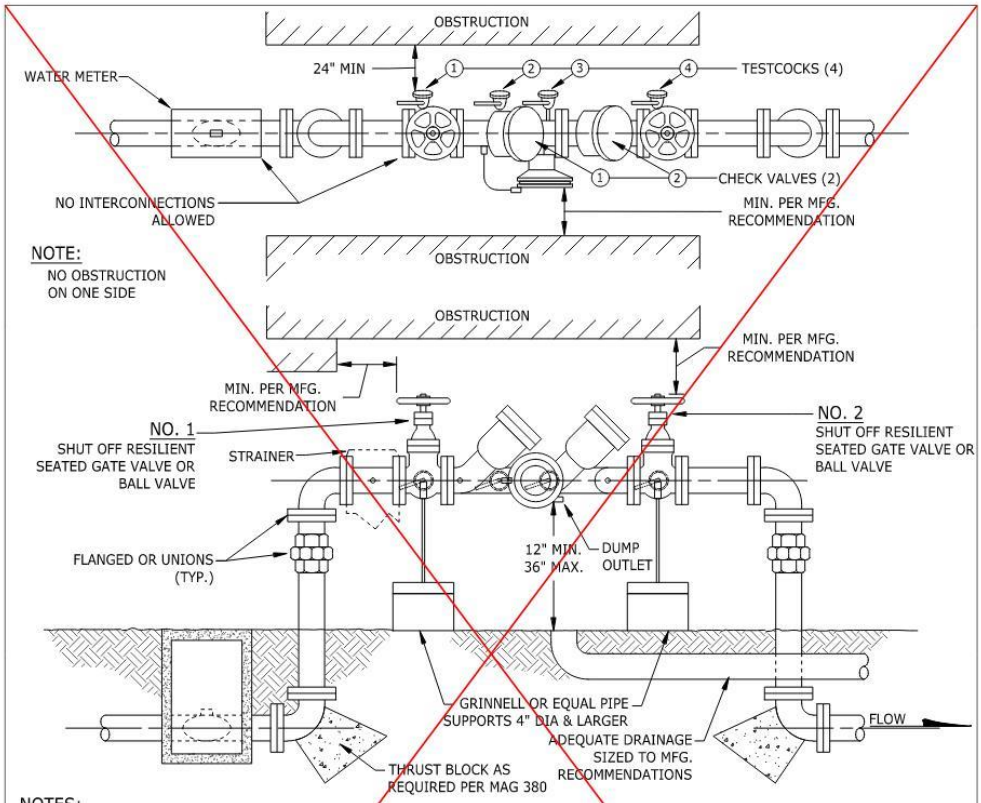
09-06-072: Reduced Pressure Assembly (RPA) Installation

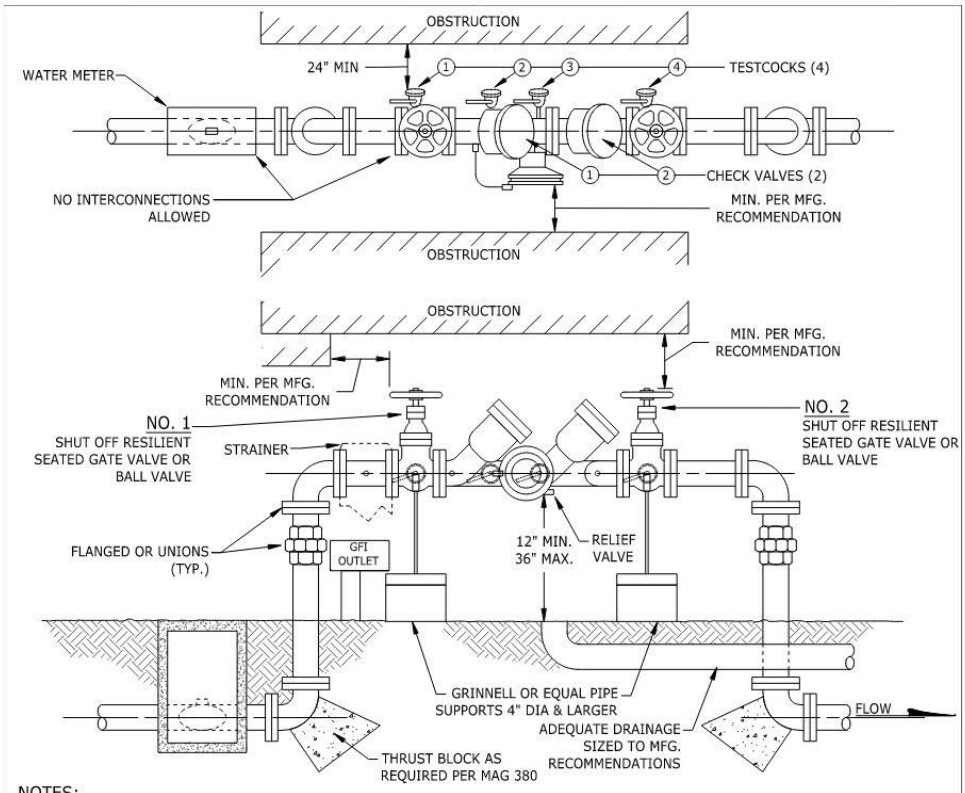
Section 51. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 09-06-072: Reduced Pressure Assembly (RPA) Installation, delete existing standard drawing 09-06-072 and replace with standard drawing 09-06-072 below:



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) 213-211
13. THREE SETS OF PLANS SHALL BE SUBMITTED TO CITY UTILITIES DEPARTMENT FOR APPROVAL BY SIGNATURE PRIOR TO INSTALLATION

City of Flagstaff ENGINEERING DETAIL	REDUCED PRESSURE ASSEMBLY (RPA) INSTALLATION	NTS
	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

Justification:

Addition of GFI was due to construction site visits where contactors were putting it directly under relief valve. The language in the notes was cleaned up.

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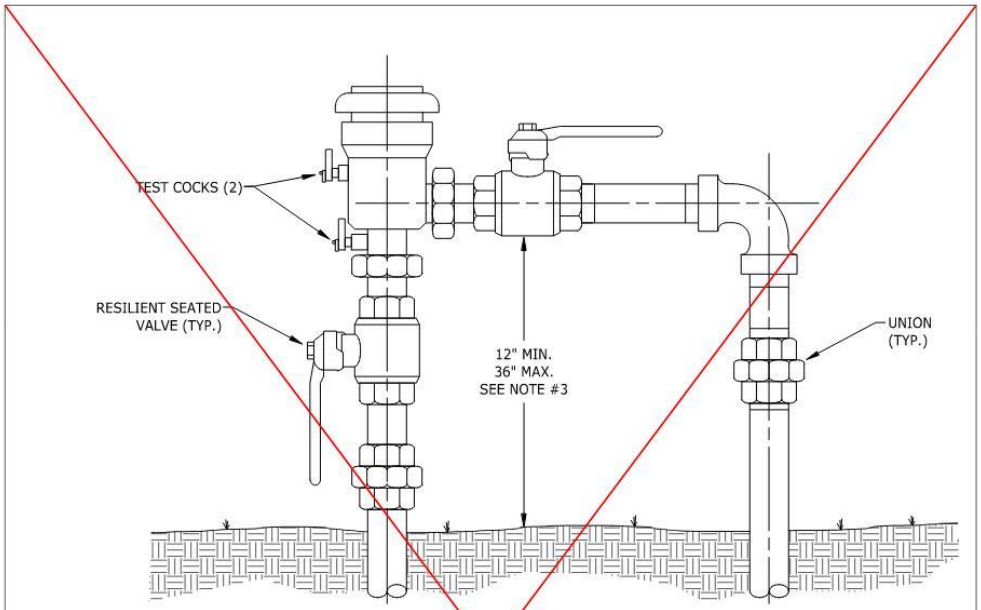
09-06-073: Pressure Vacuum Breaker Assembly (PVBA) Installation

Section 52. 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:



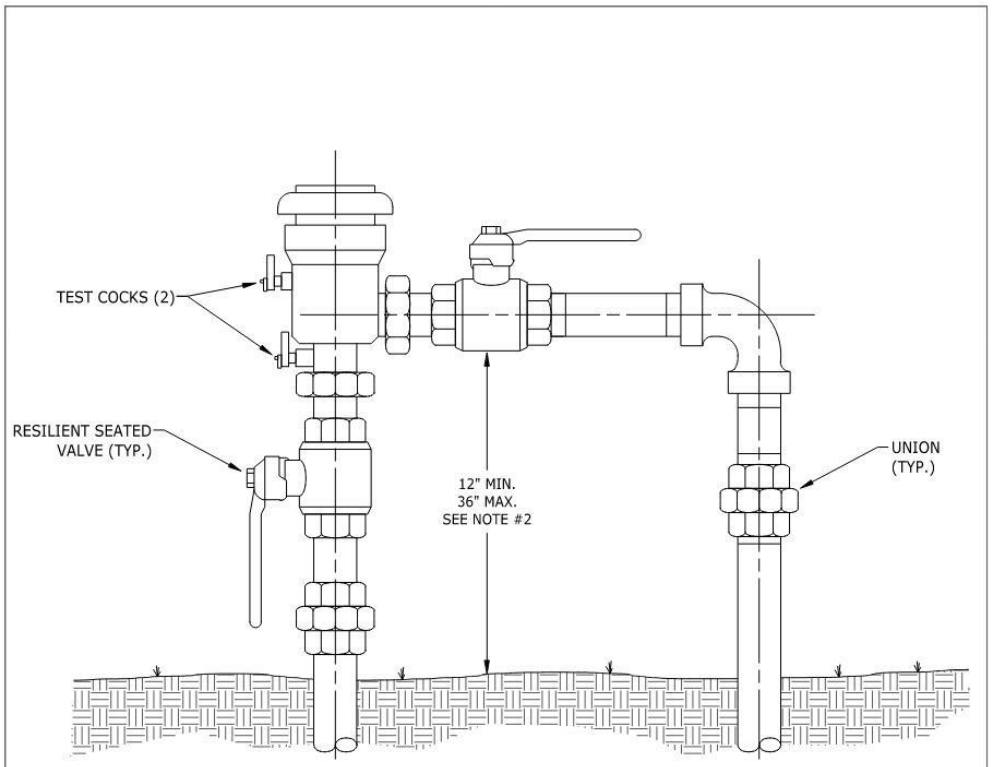
NOTES:

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

Justification:

The language in the notes was cleaned up.

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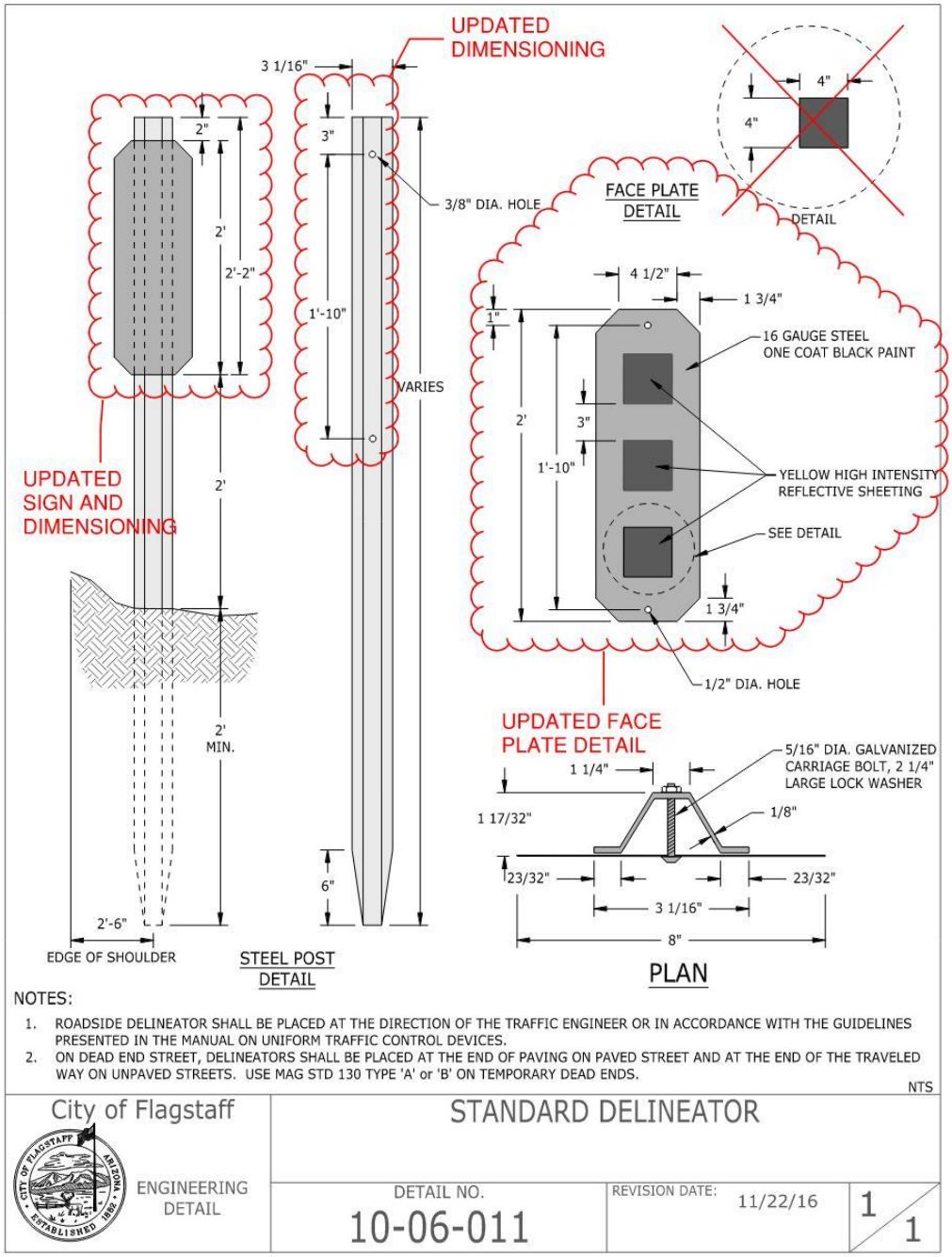
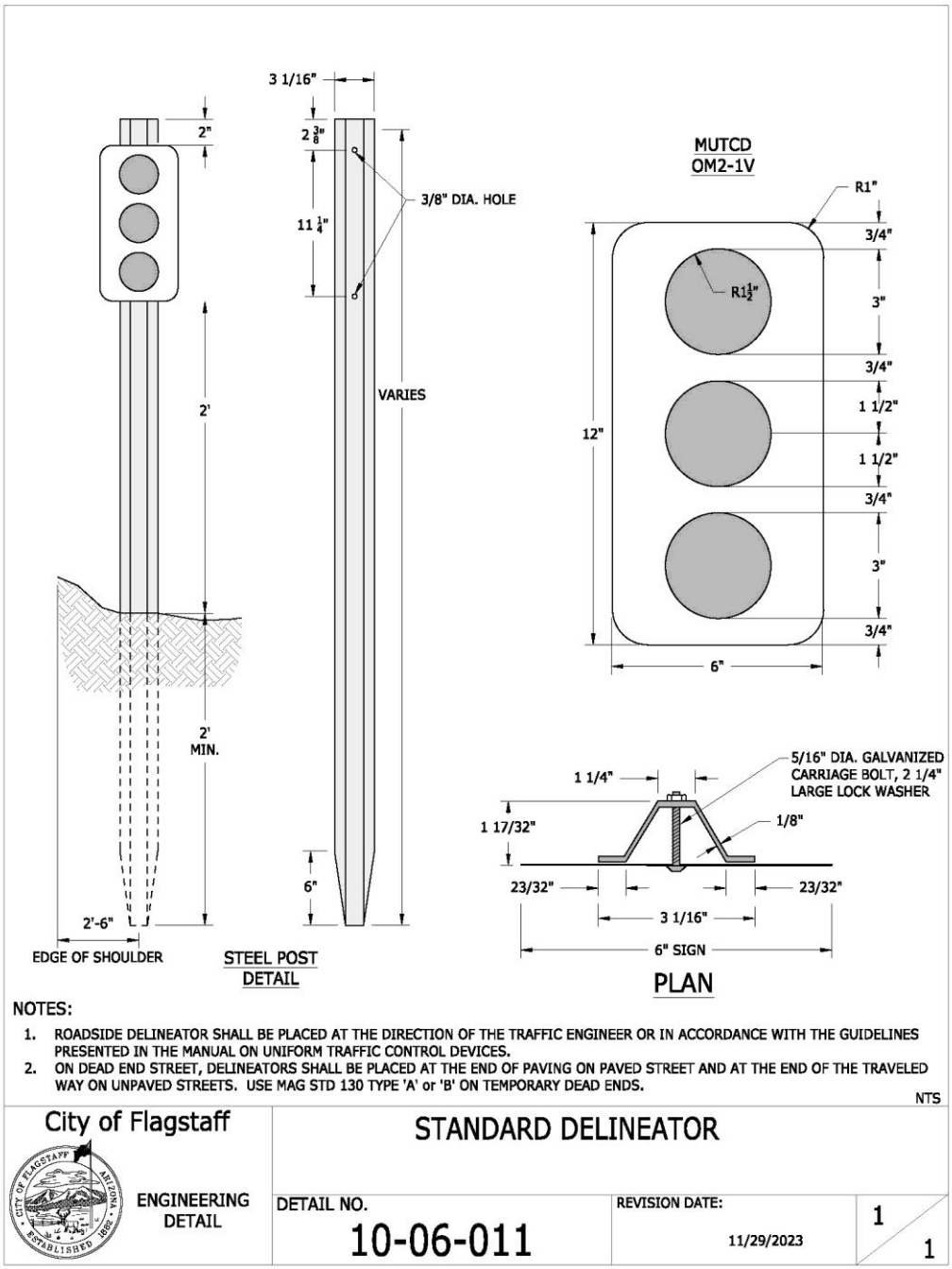
10-06-011: Standard Delineator

Section 53. 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:





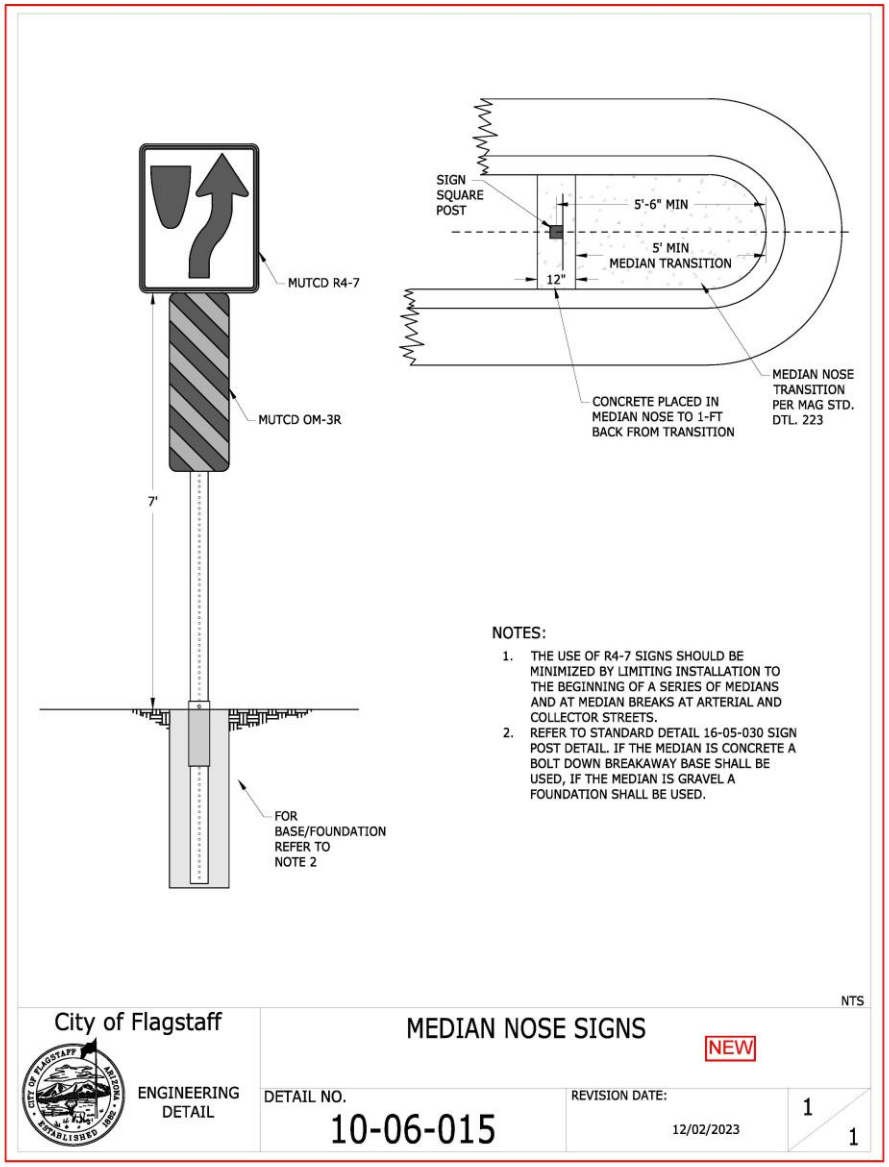
Justification:

The delineator sign was out of date. It has been updated it to MUTCD OM2-1V.

([Back to top](#))

10-06-015: Median Nose Signs

Section 54. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-06-015: Median Nose Signs, to read as follows:



Justification:

Added a new standard that provides clarity and consistency for median nose signage utilizing MUTCD signs R4-7 and OM-3R.

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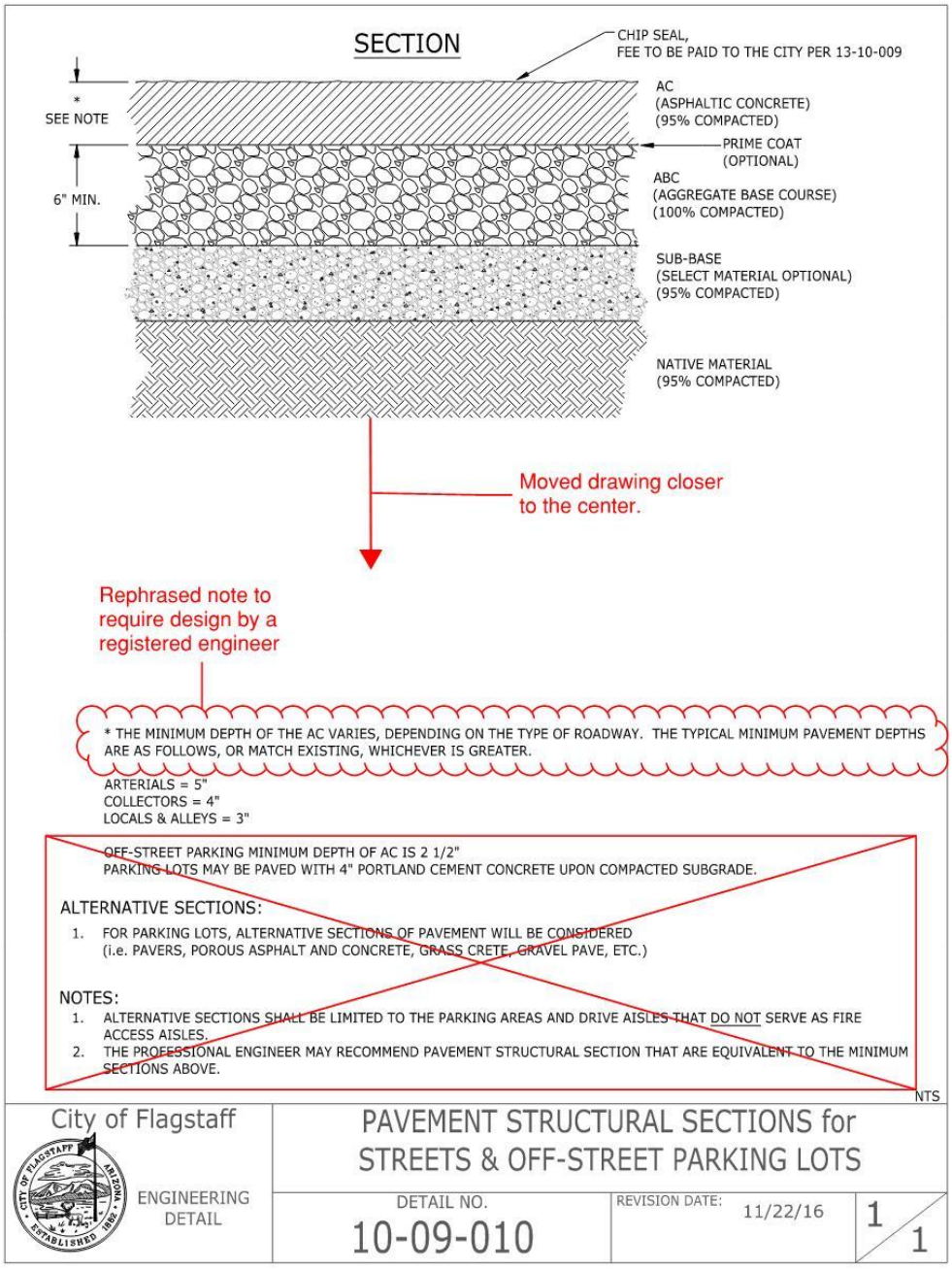
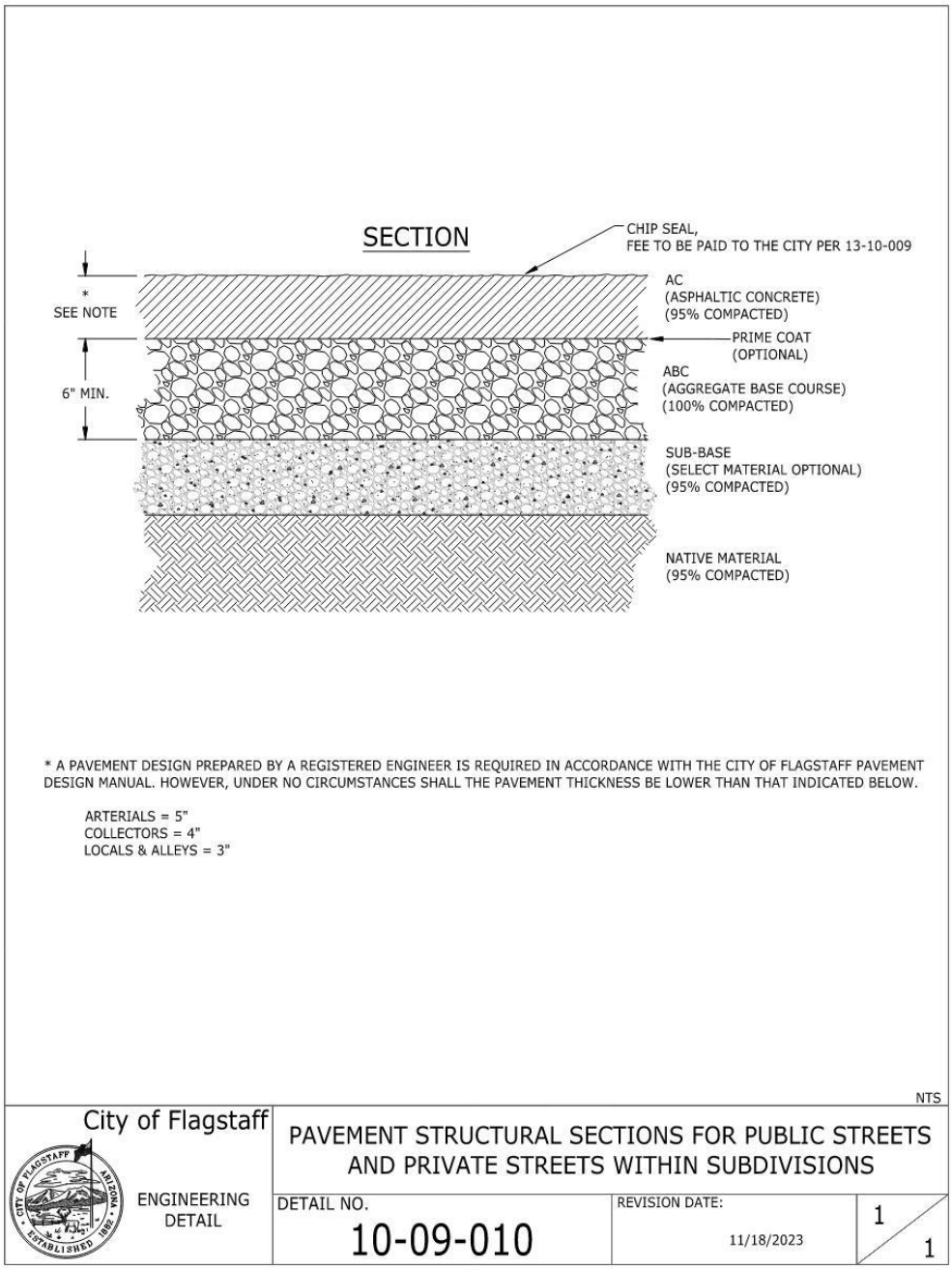
10-09-010: Pavement Structural Section for Streets and Off-Street Parking Lots

Section 55. 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:





Justification:

A separate detail drawing has been created for parking lots and private drive aisles.

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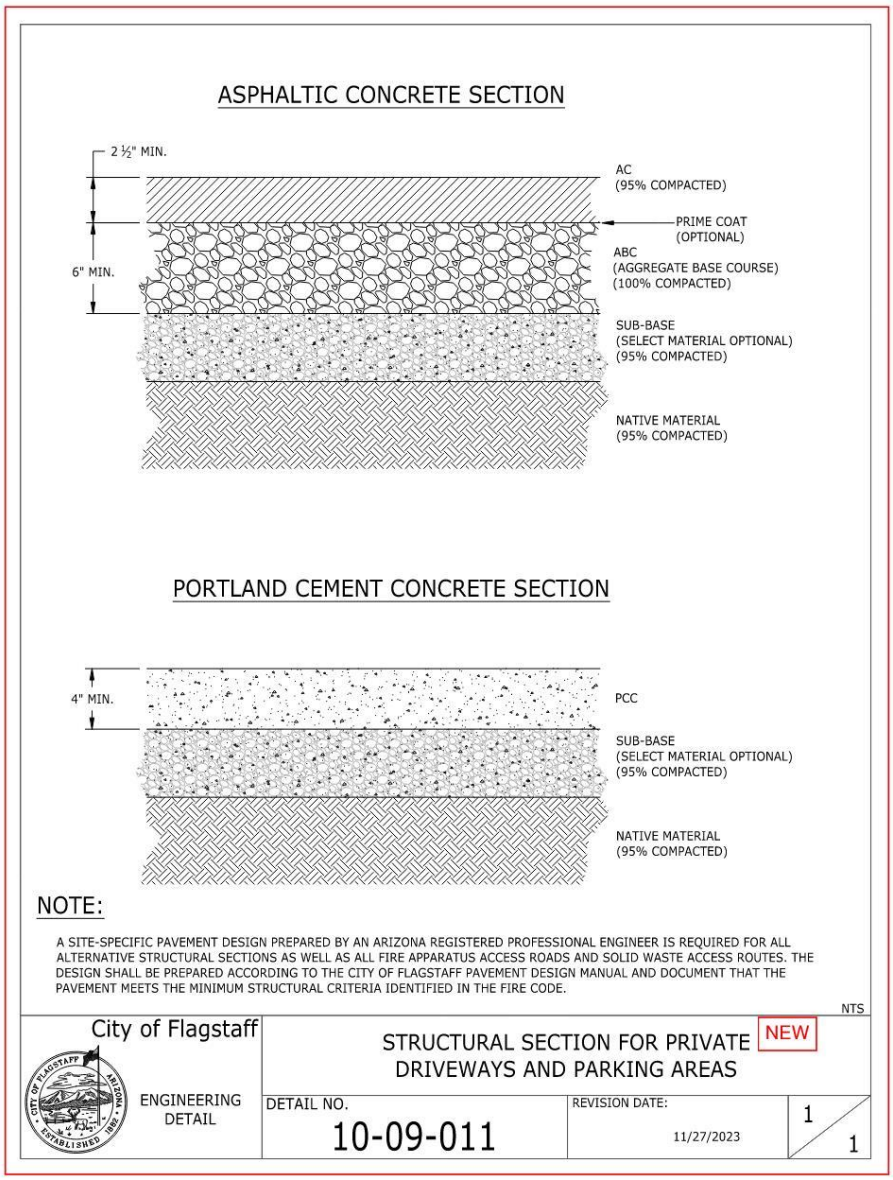
10-09-011: Structural Section for Private Driveways and Parking Areas

Section 56. 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:



Justification:

Separating this information into a separate drawing will help eliminate confusion.

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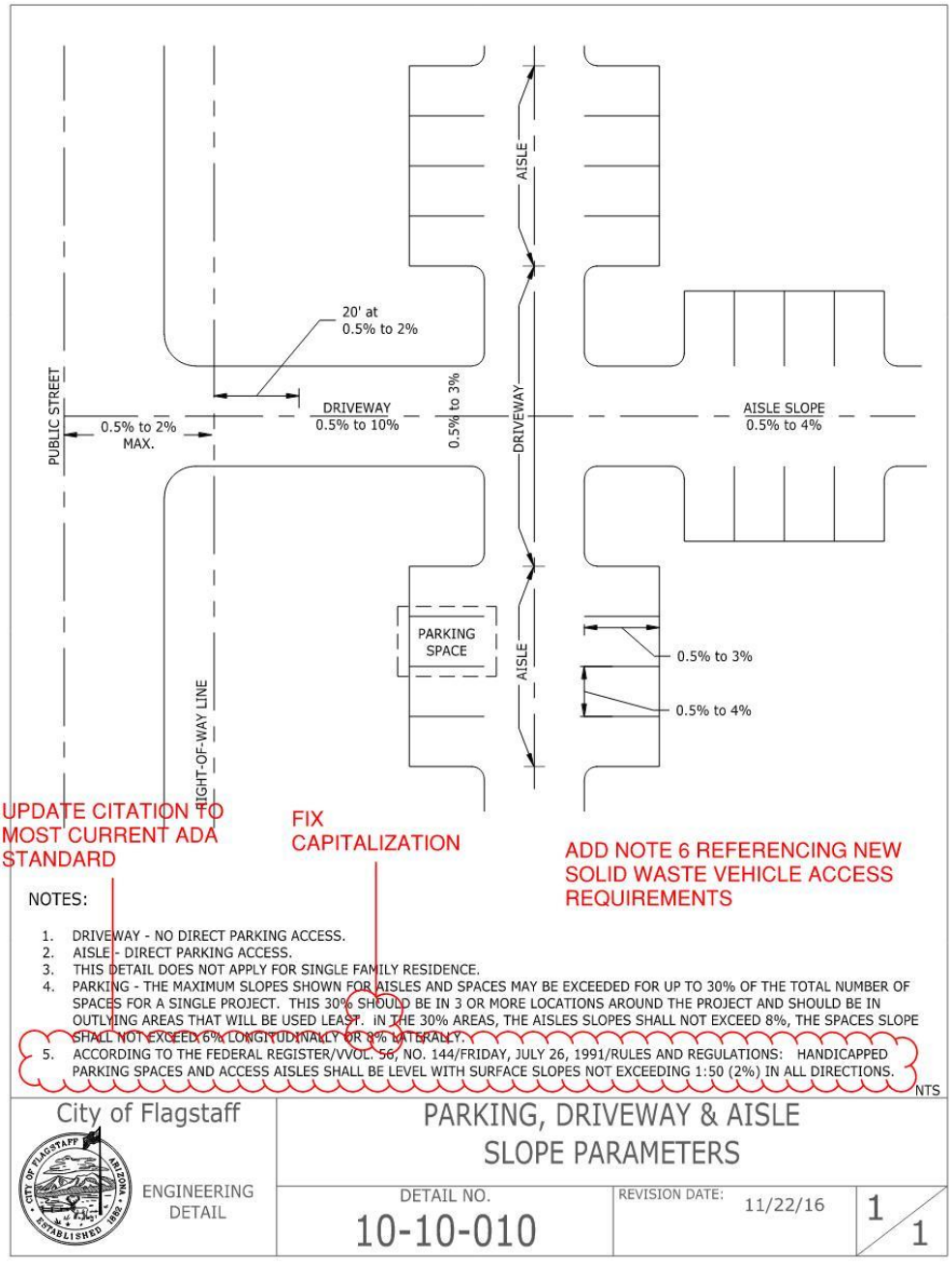
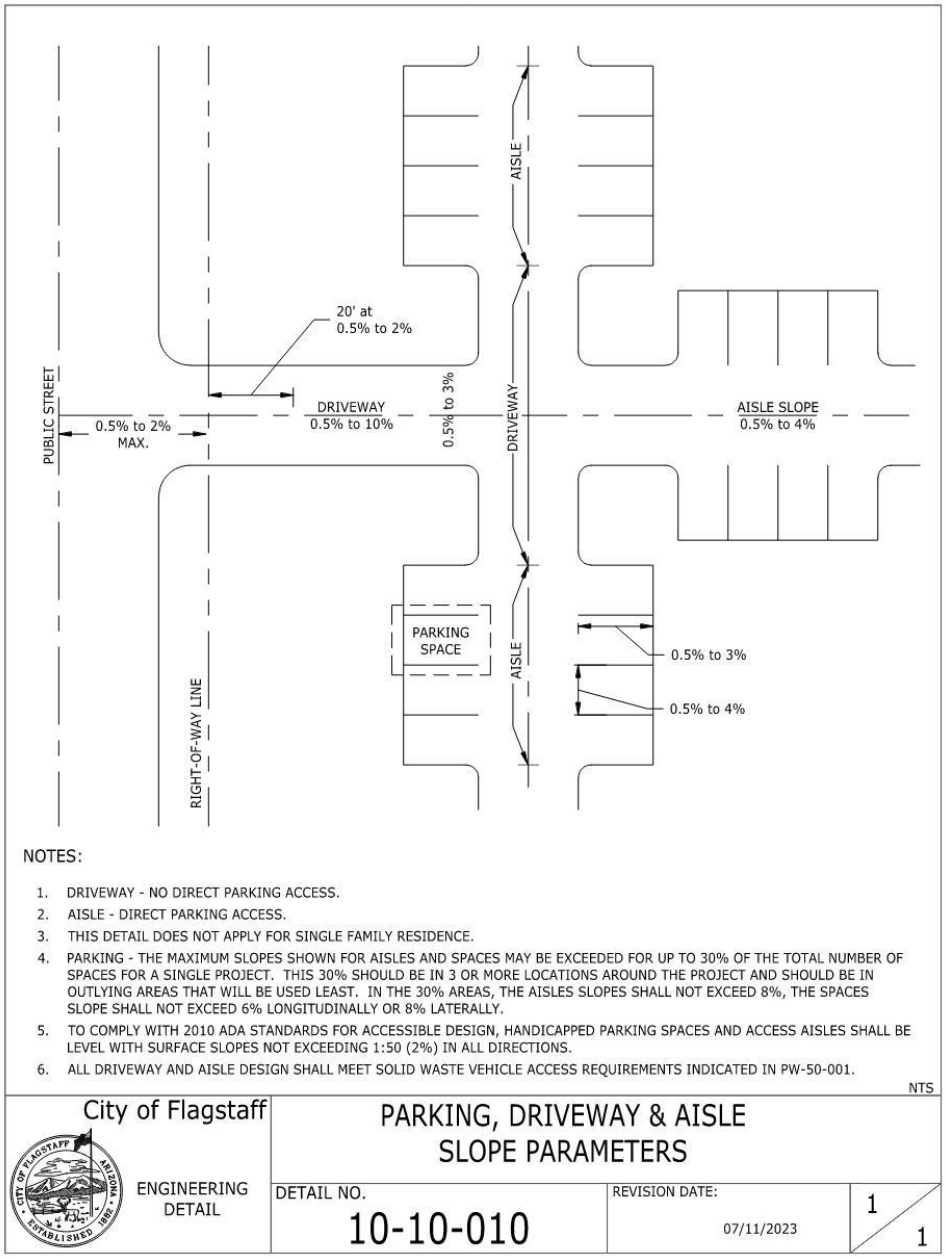
10-10-010: Parking, Driveway & Aisle Slope Parameters

Section 57. 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:





Justification:

The ADA citation was referring to the 1991 standard which has since been superseded by the 2010 standard. 2010 ADA standards allow for a 1:48 cross slope, but our standard is more restrictive and so is not required to be changed. Note 6 was added to highlight the new vehicle access requirements.

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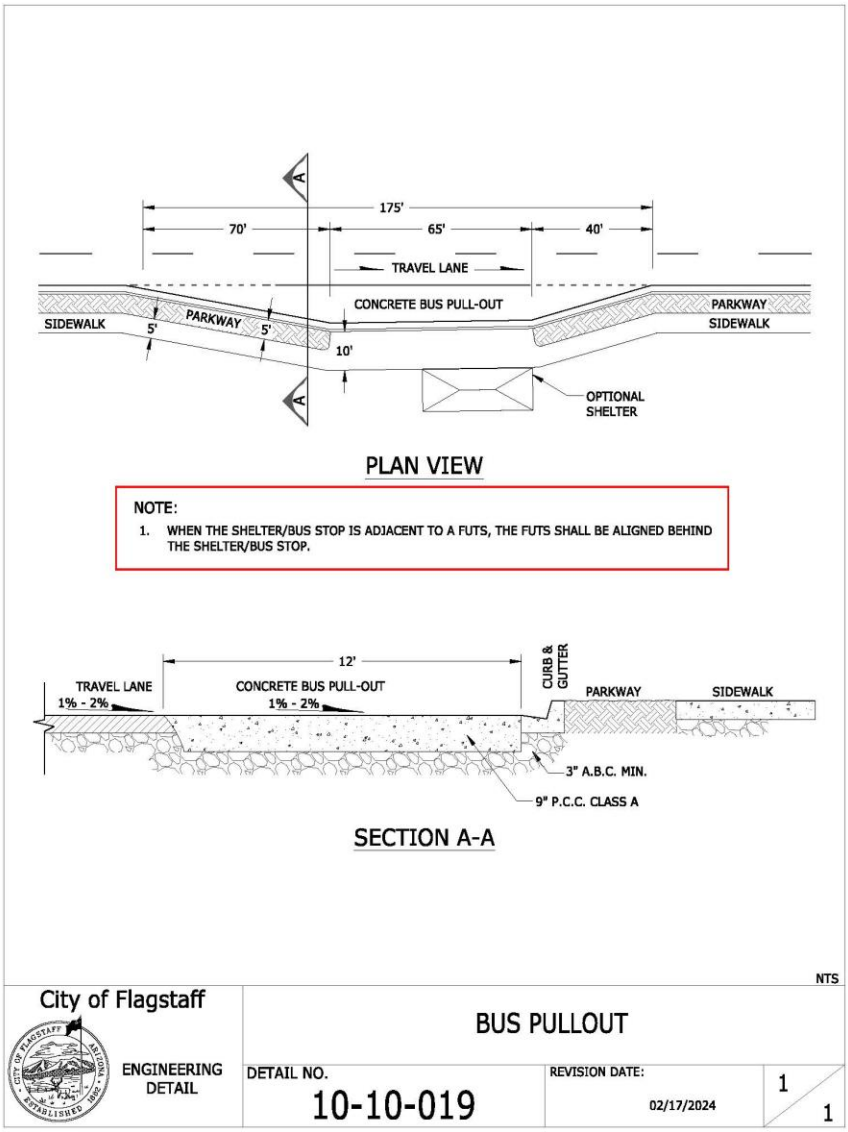
10-10-019: Bus Pullout

Section 58. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-10-019: Bus Pullout, as follows:



Justification:

Added a note stating that when a shelter/bus stop is adjacent to a FUTS, the FUTS shall be aligned behind the shelter/bus stop.

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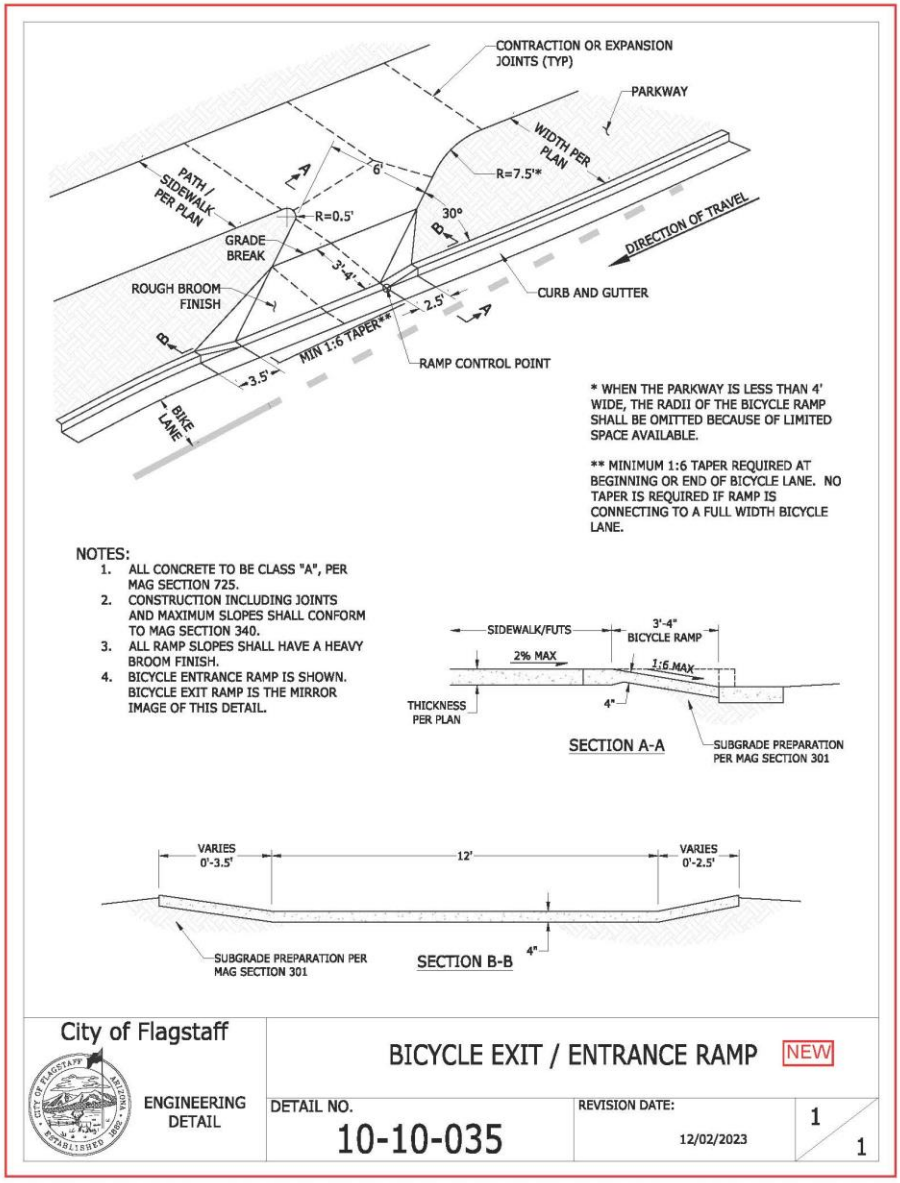
10-10-035: Bicycle Exit / Entrance Ramp

Section 59. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 10-10-035: Bicycle Exit / Entrance Ramp, to read as follows:



Justification:

Added a new standard that provides clarity and consistency for bicycle exit and entrance ramps. The City has designed these ramps many different ways and this is the one we have decided to standardize.

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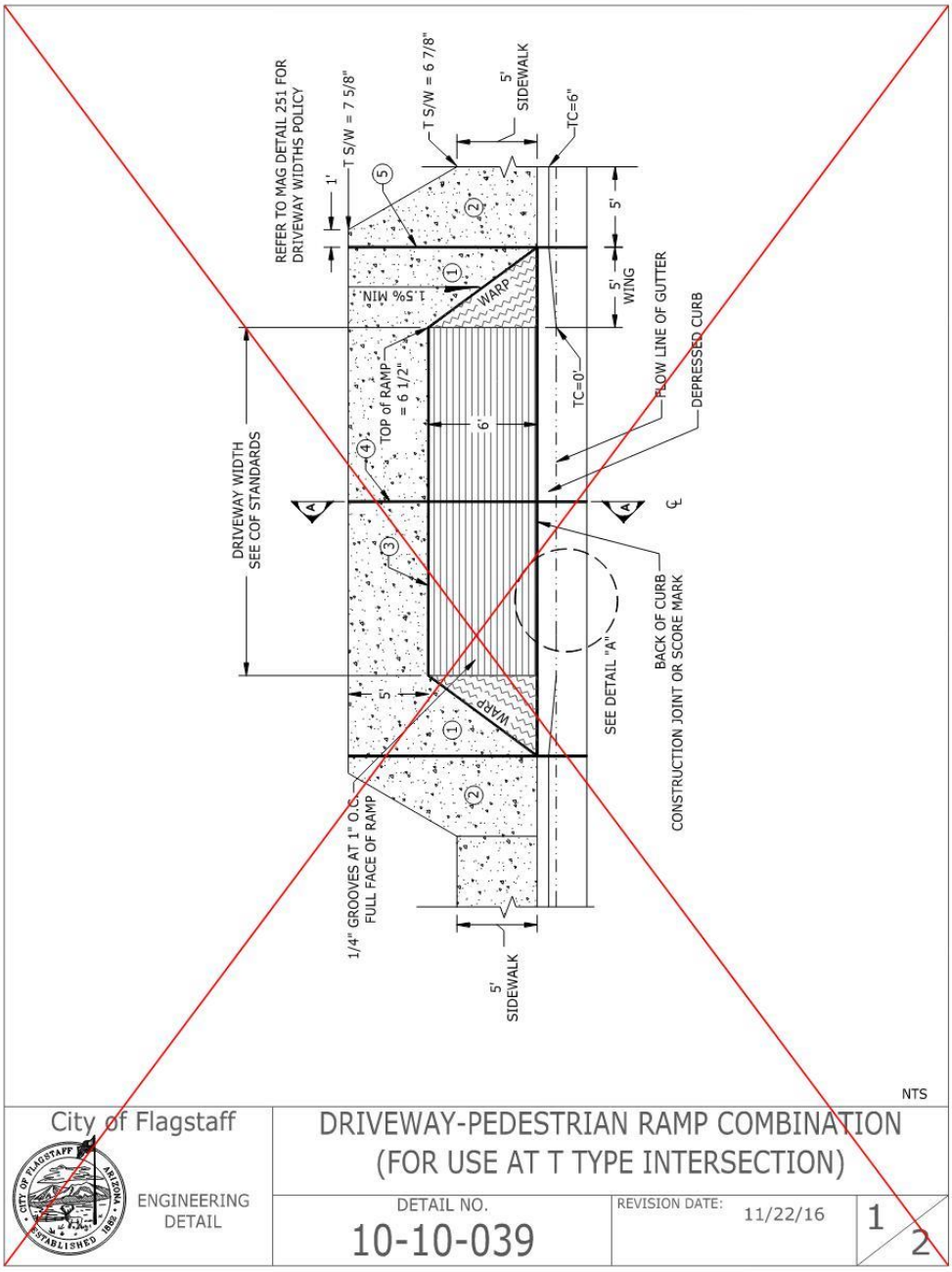
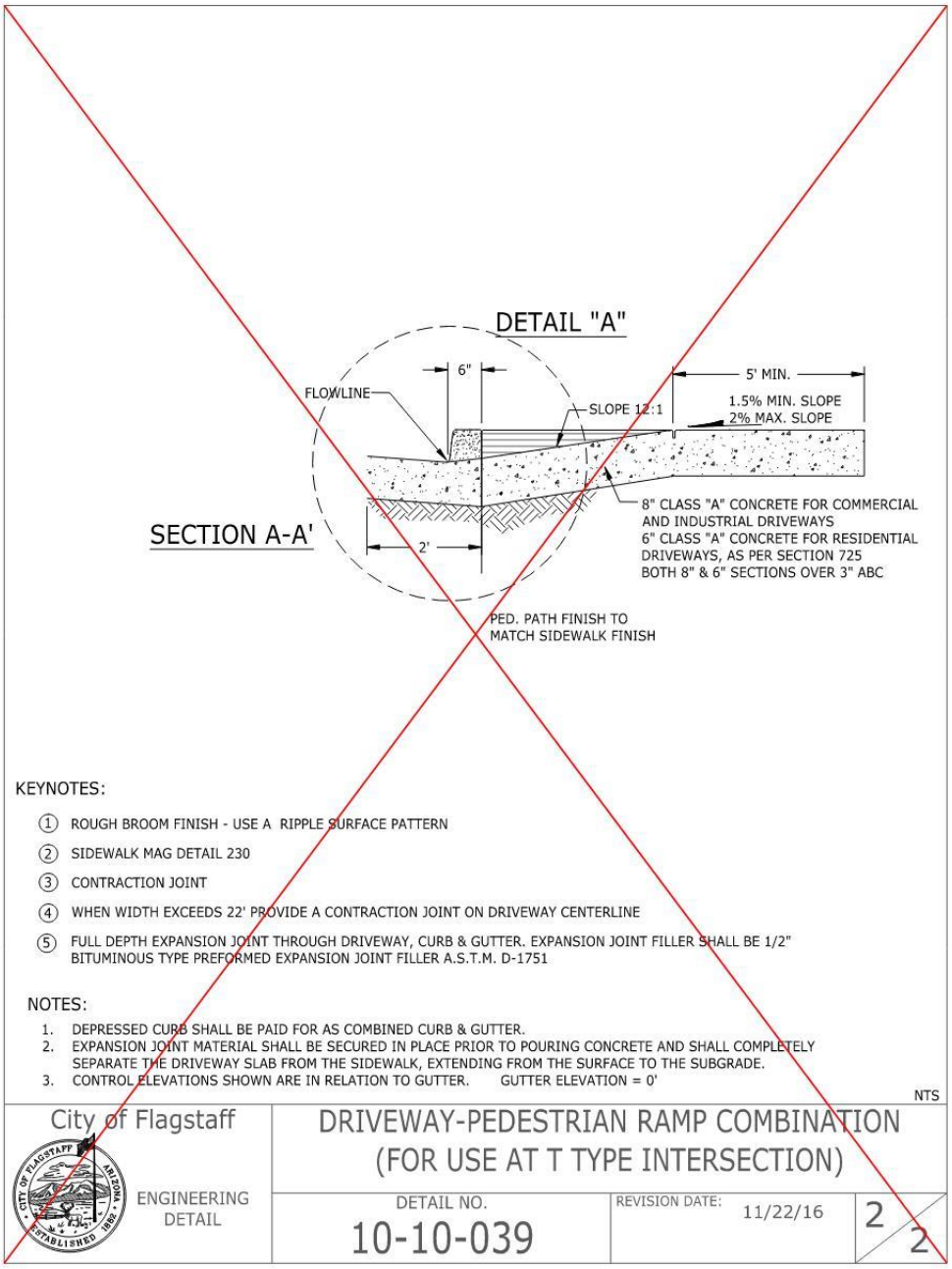
10-10-039: Driveway-Pedestrian Ramp Combination (For Use at T-Type Intersection)

Section 60. 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)





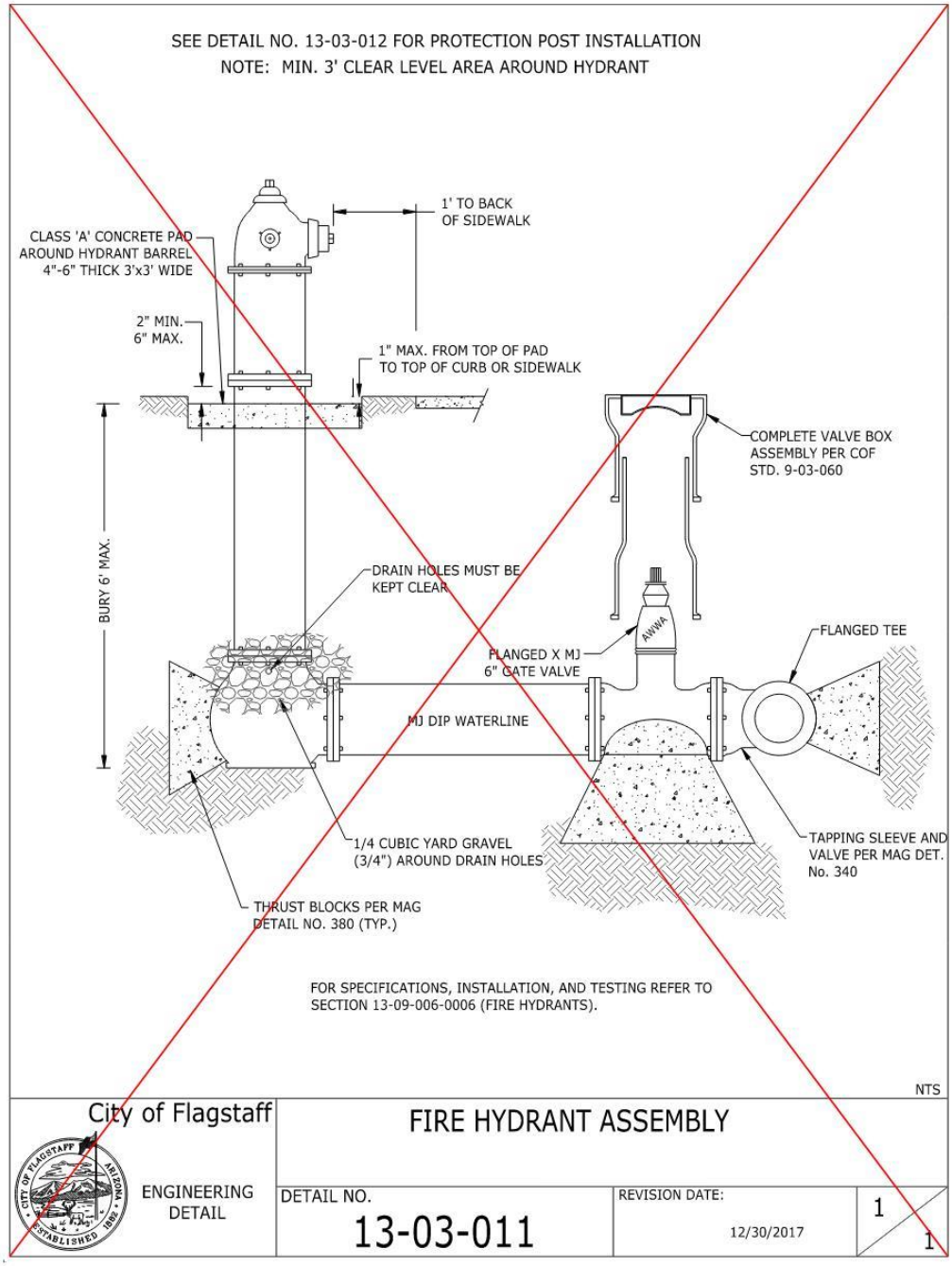
Justification:

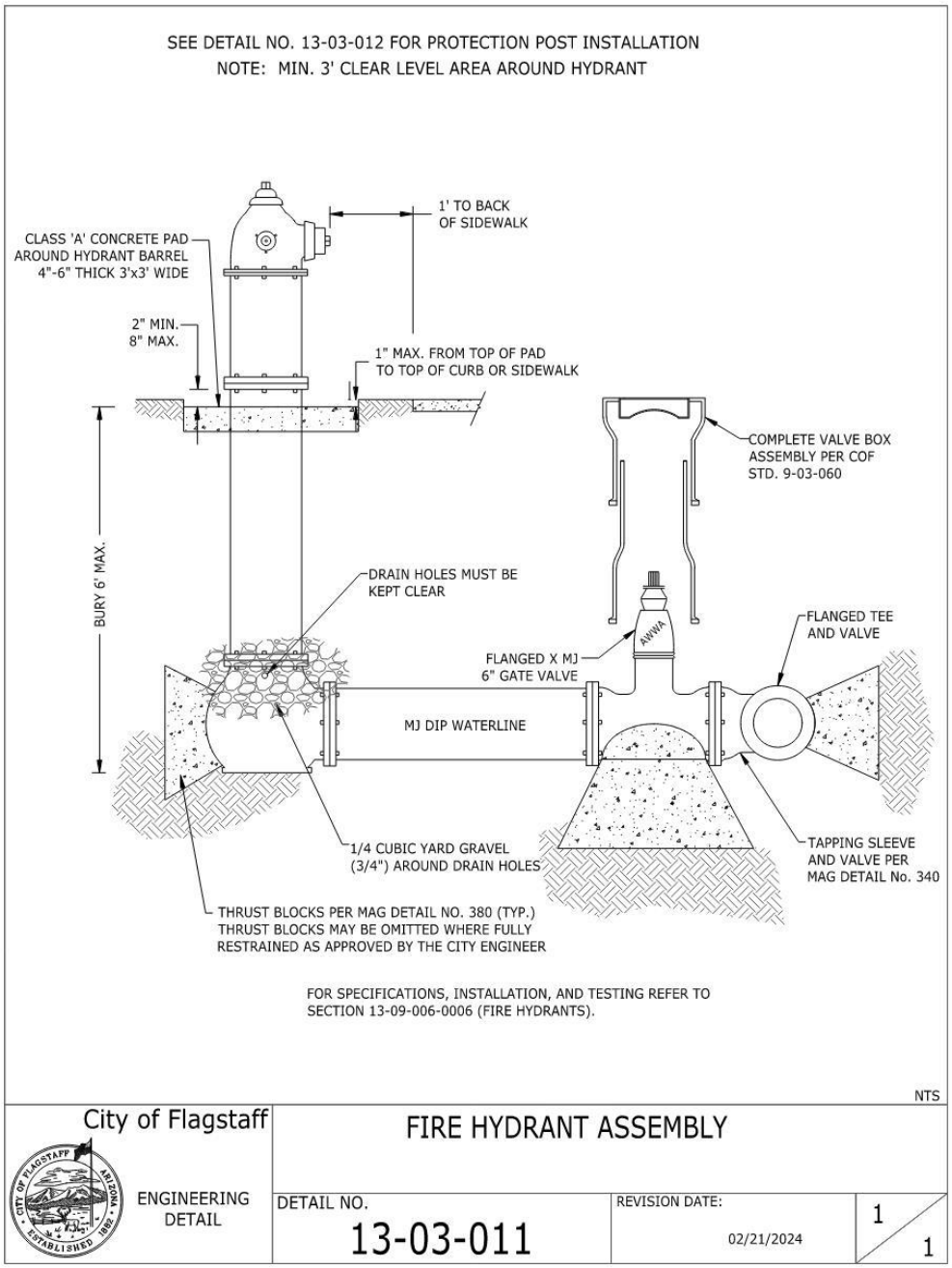
The current standard does not meet the intent of ADA, and reflects an outdated method of construction.

([Back to top](#))

13-03-011: Fire Hydrant Assembly

Section 61. 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:





Justification:

Revised to match the proposed change in Section 13-09-006-0006.2.R

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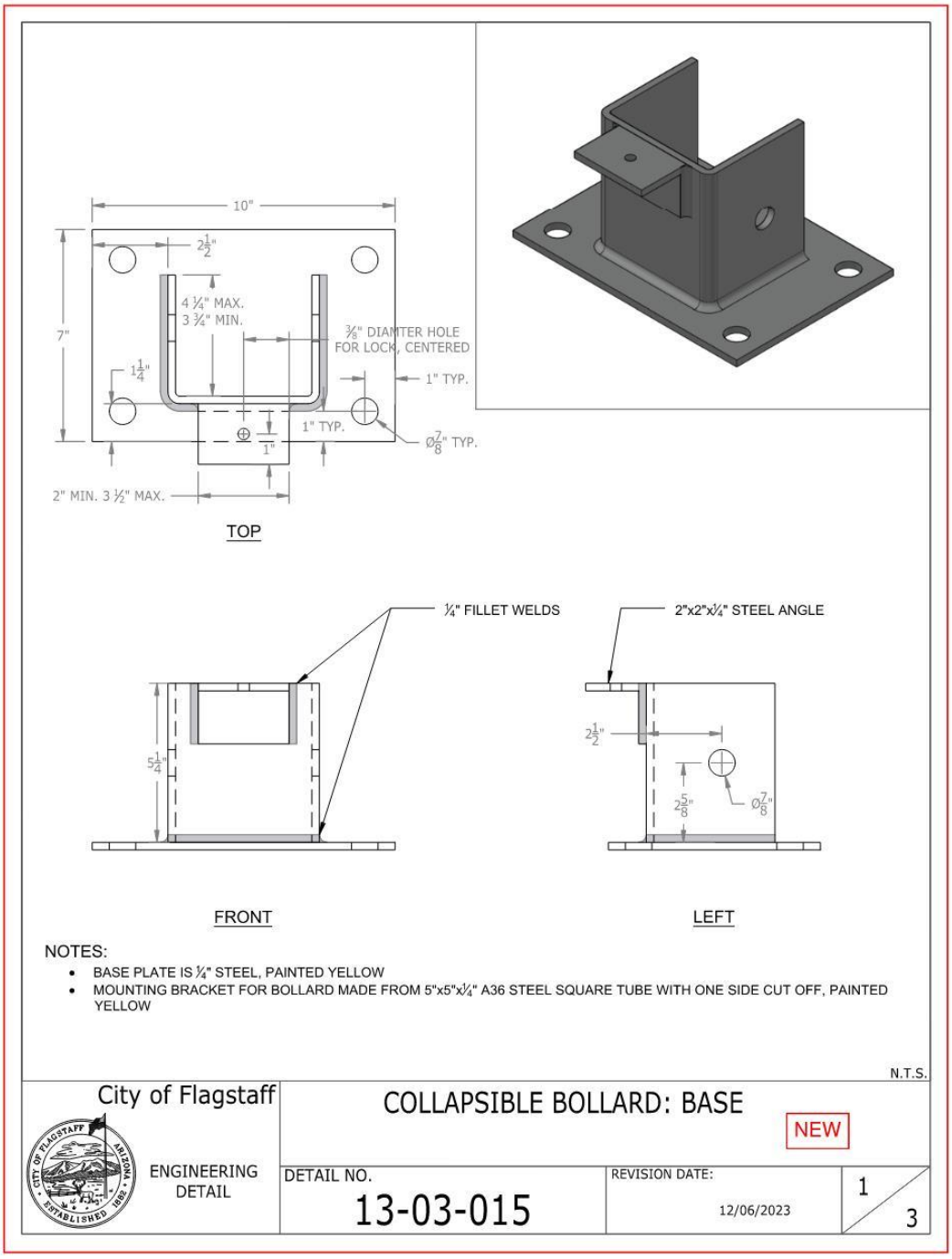
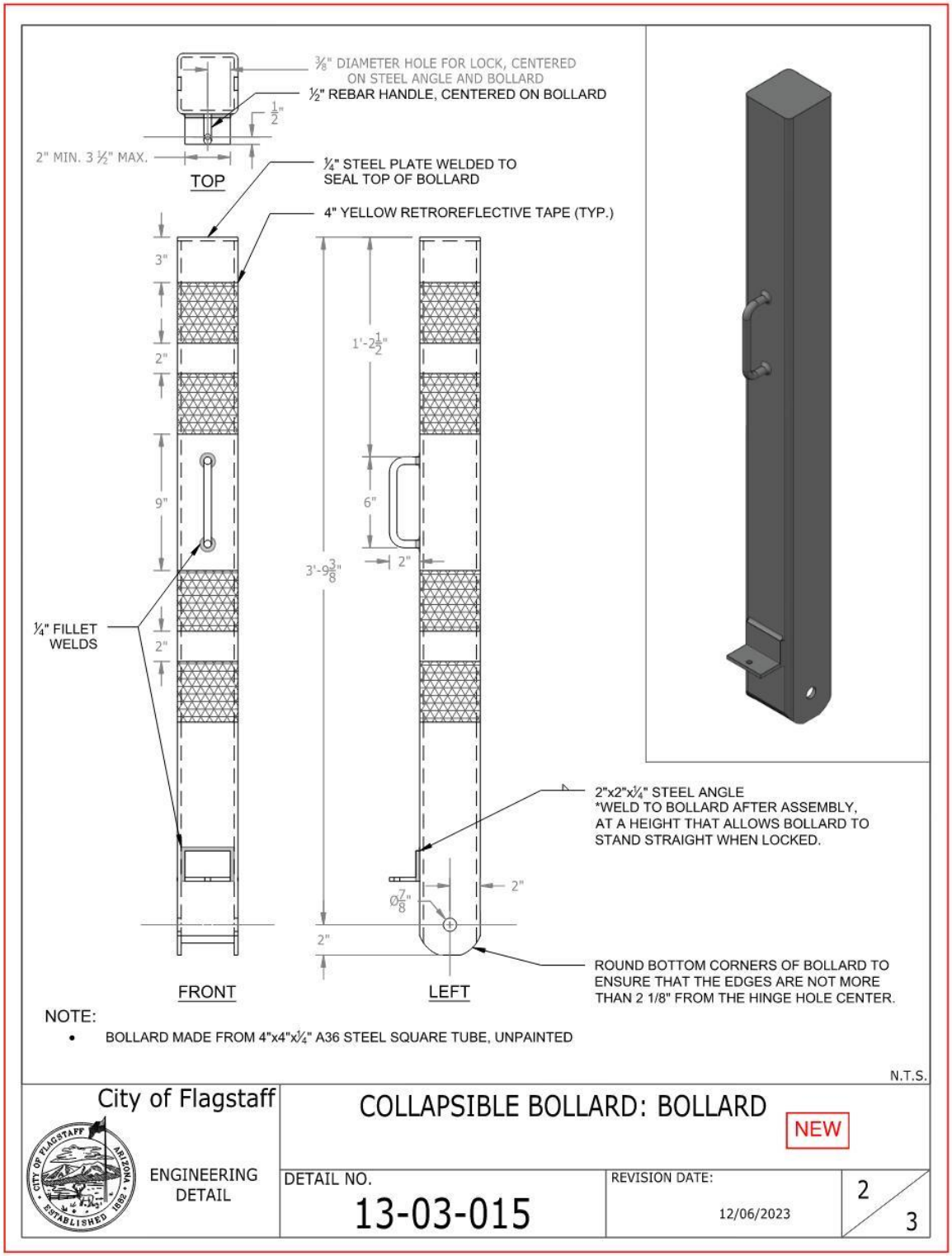
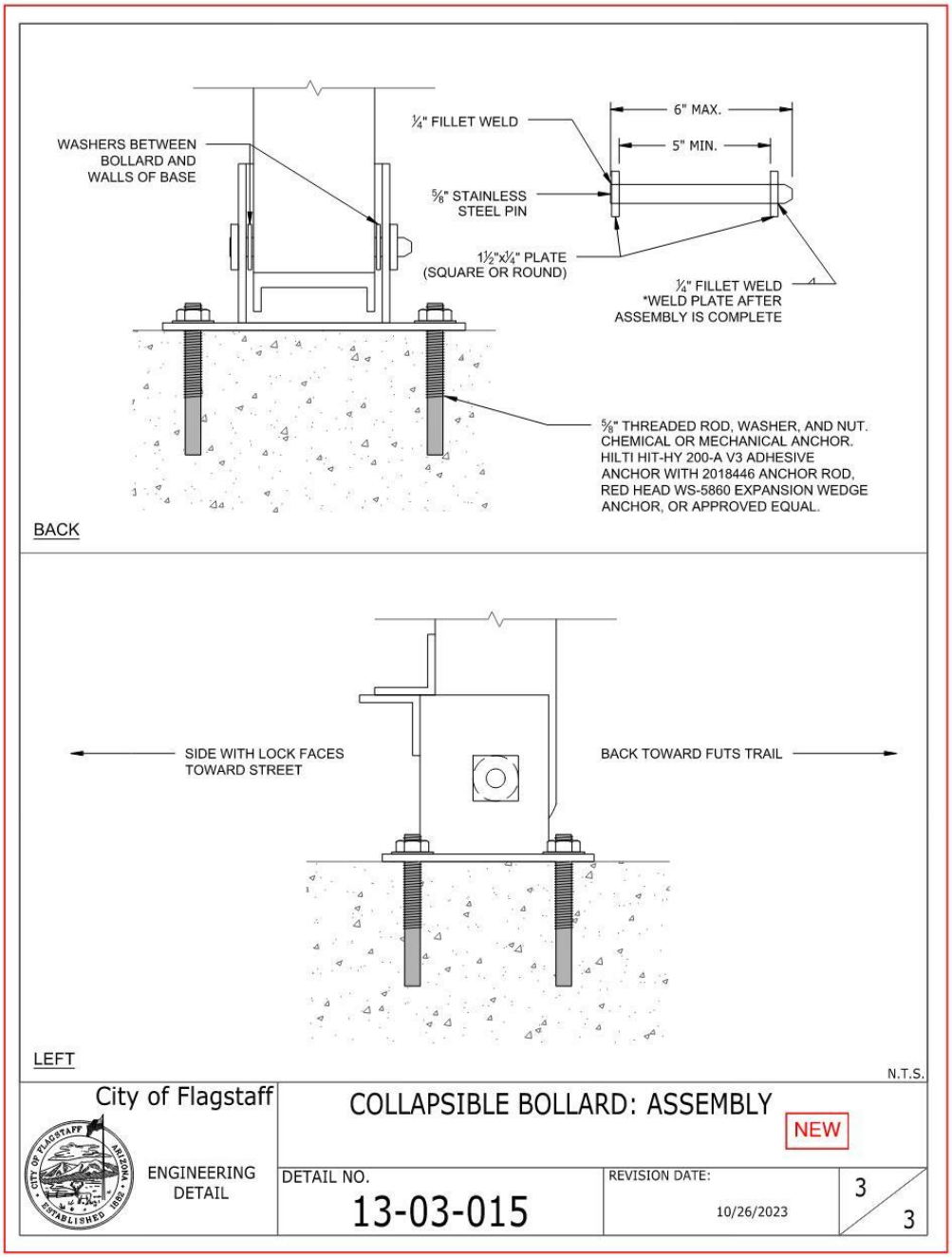
13-03-015: Collapsible Bollard

Section 62. 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"
Ø⅞"
2"
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.
FRONT
LEFT
NOTE:
• BOLLARD MADE FROM 4"x4"x¼" A36 STEEL SQUARE TUBE, UNPAINTED
N.T.S.
City of Flagstaff
ENGINEERING DETAIL
COLLAPSIBLE BOLLARD: BOLLARD
NEW
DETAIL NO.
13-03-015
REVISION DATE:
12/06/2023
2
3



Justification:

Removable bollards often freeze or jam in place and are too difficult to remove. Collapsible bollards will make it easier for plows to access FUTS trails for snow removal.

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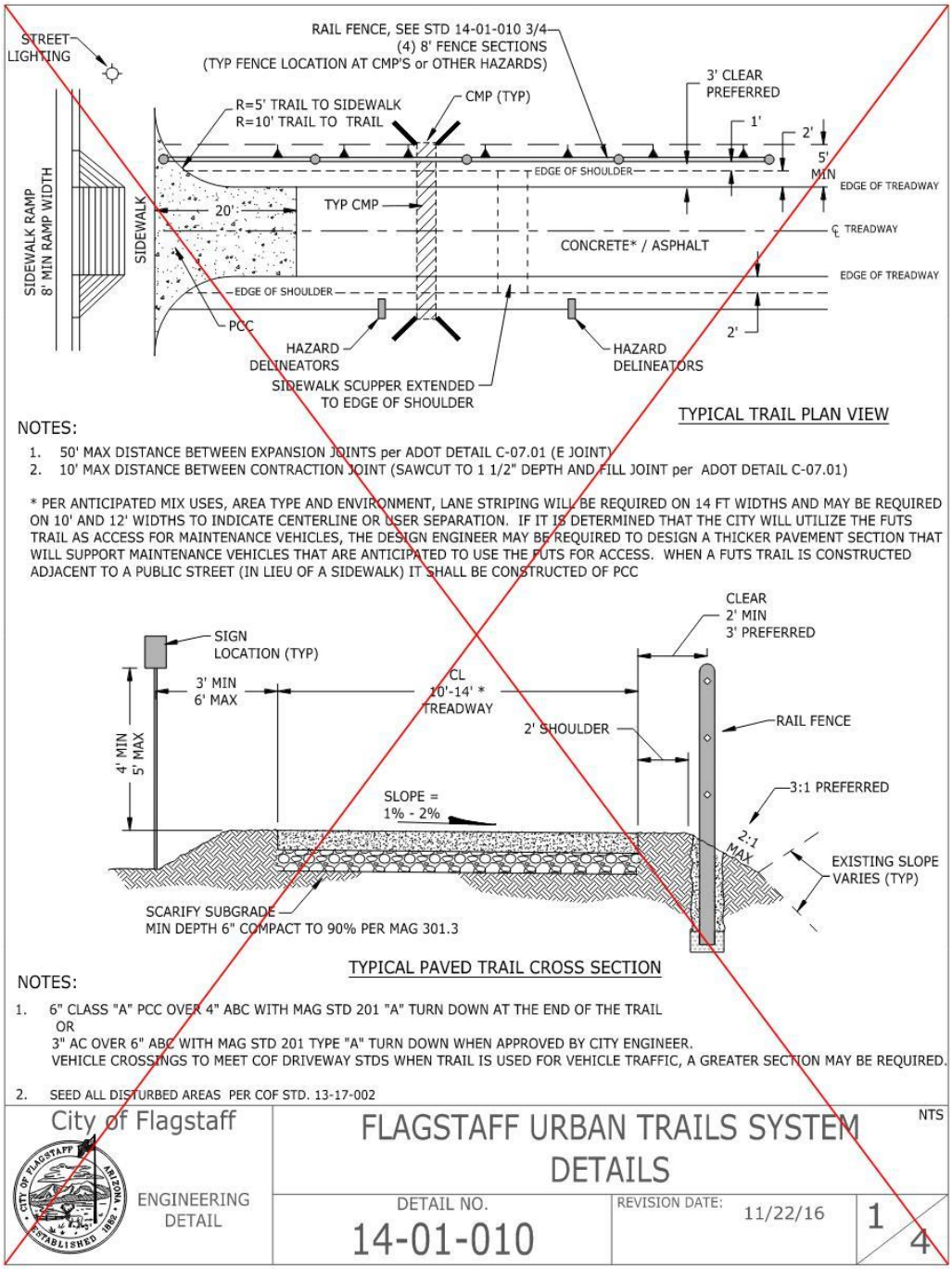
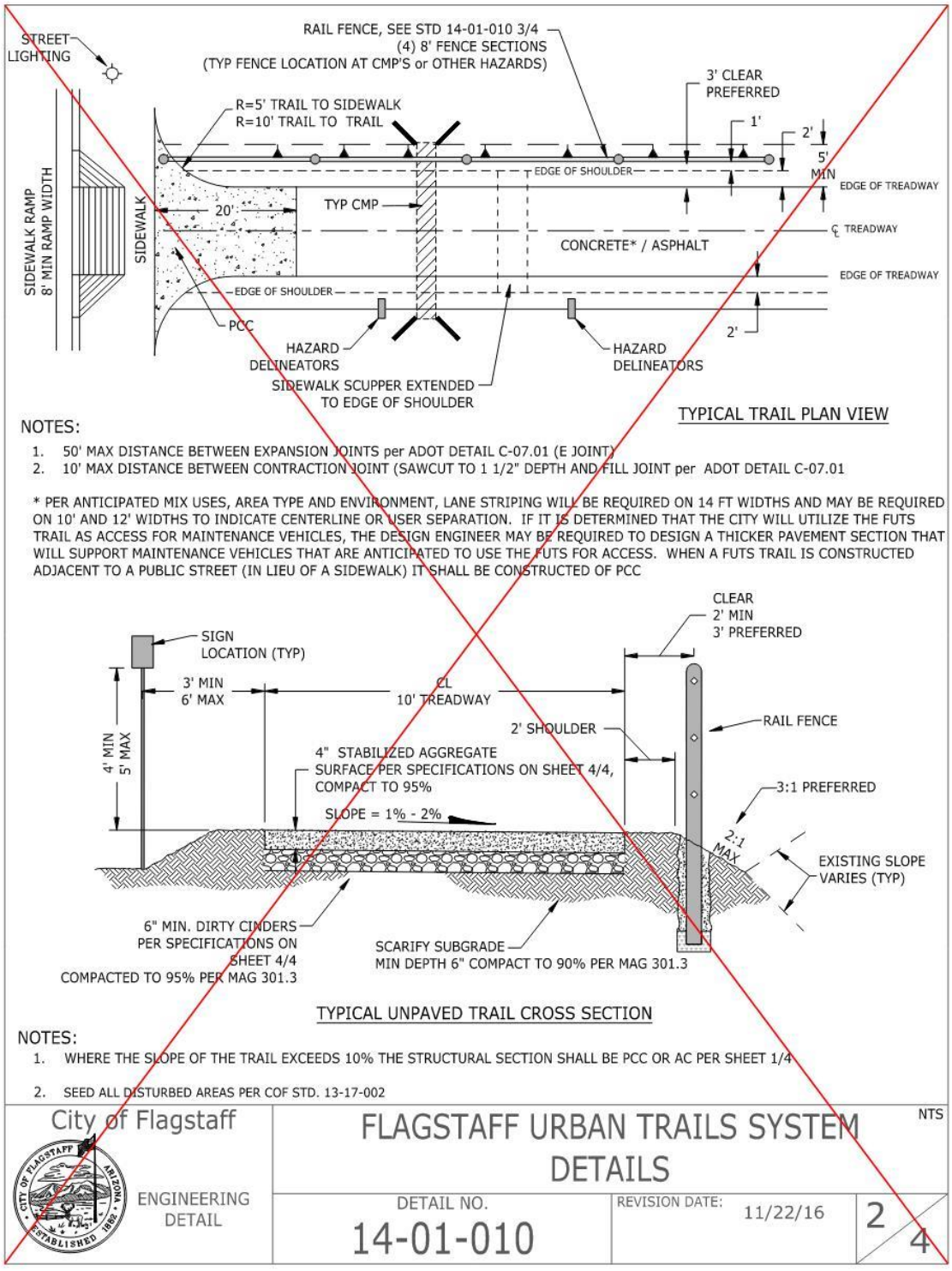
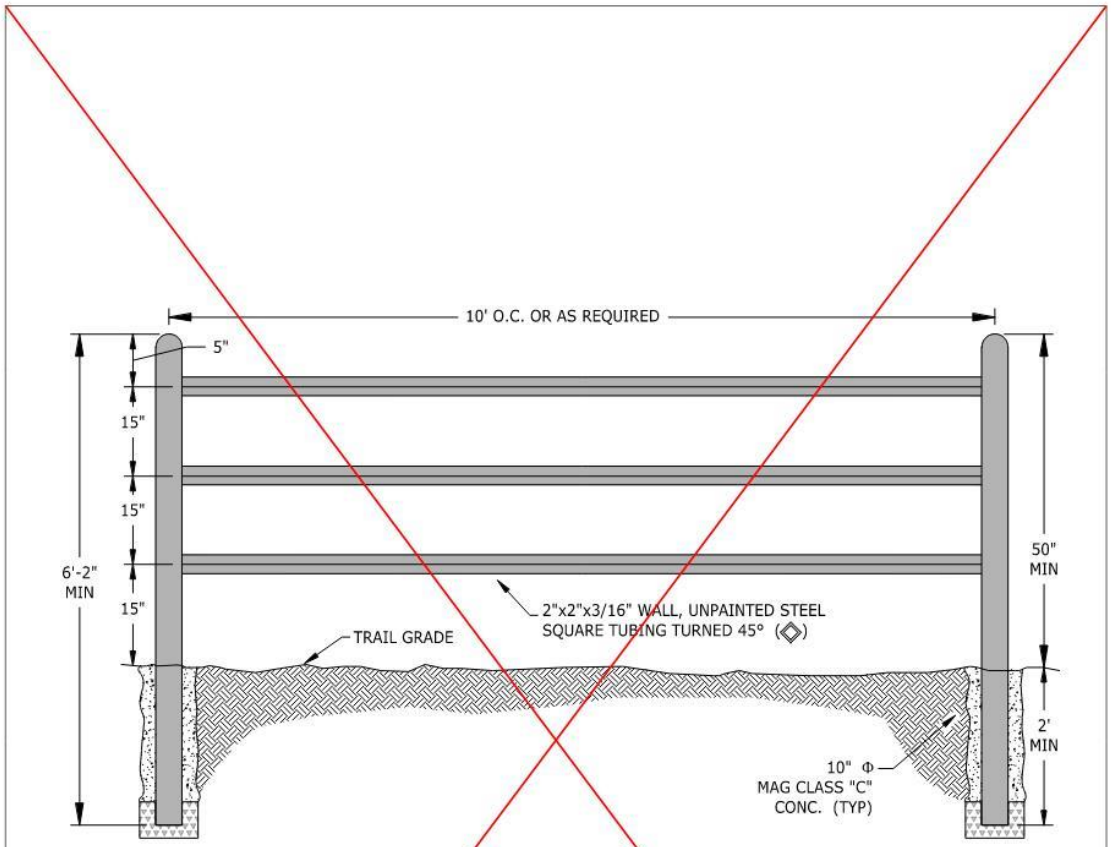
14-01-010: Flagstaff Urban Trails System Details

Section 63. 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
CLEAR
2' MIN
3' PREFERRED
SIGN LOCATION (TYP)
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%
SLOPE = 1% - 2%
3:1 PREFERRED
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



RAIL FENCE

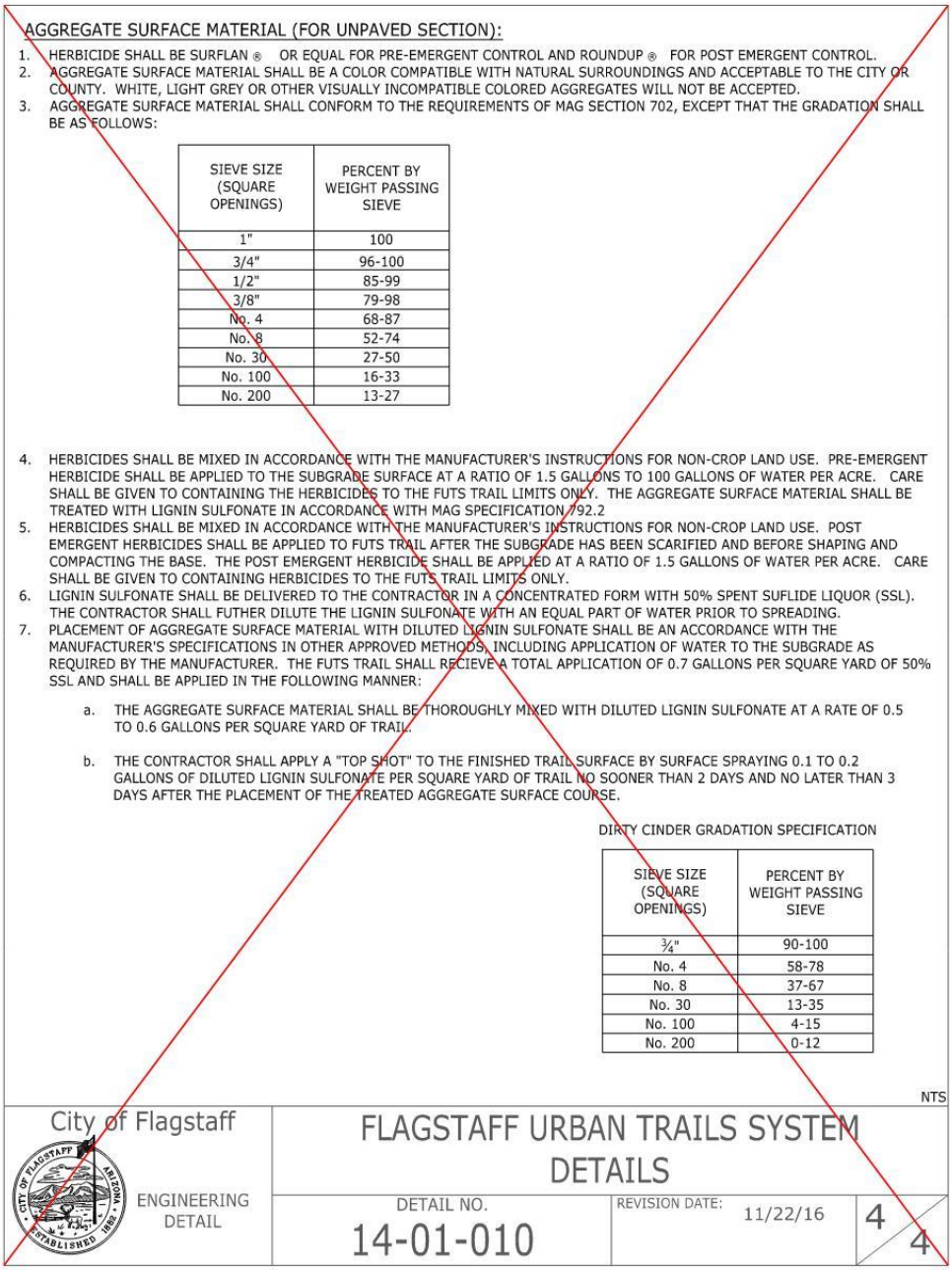
NOTES:

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

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Justification:

These drawings are being restructured and updated to correspond with the proposed revisions to Division 13-14-001.

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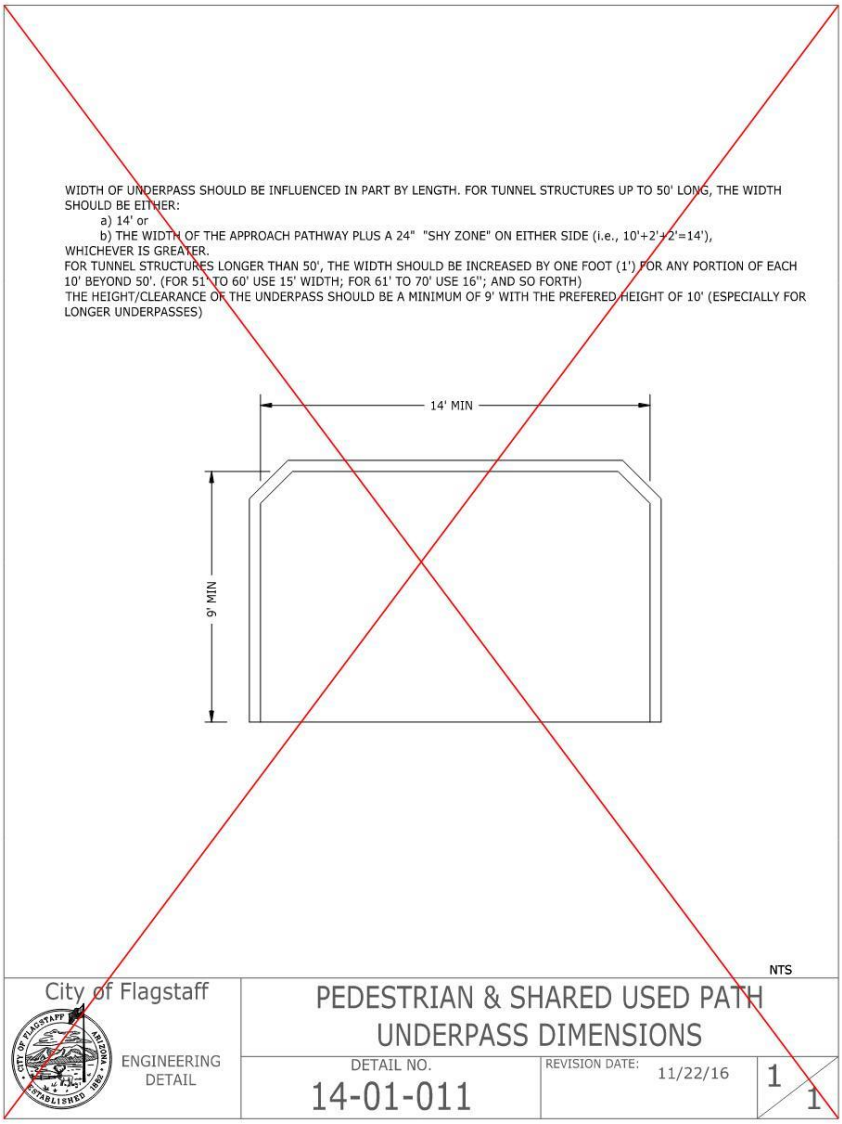
14-01-011: Pedestrian and Shared Use Path Underpass Dimensions

Section 64. Delete Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-01-011: Pedestrian and Shared Use Path Underpass Dimensions



Justification:

A full detail drawing is not needed to describe required underpass dimensions. The dimensions will be added to 13-14-001-0001.

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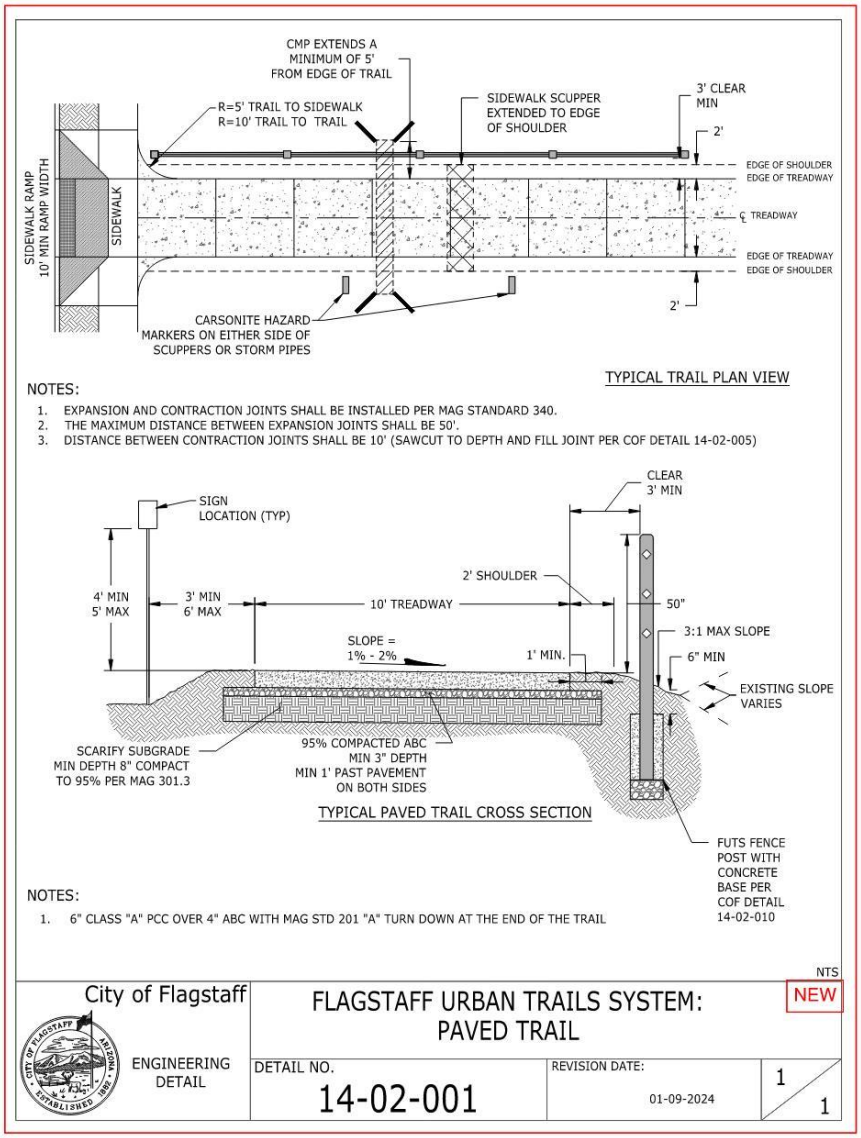
14-02-001: Flagstaff Urban Trails System: Paved Trail

Section 65. 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:



Justification:

These drawings are being restructured and updated to correspond with the proposed revisions to Division 13-14-001.

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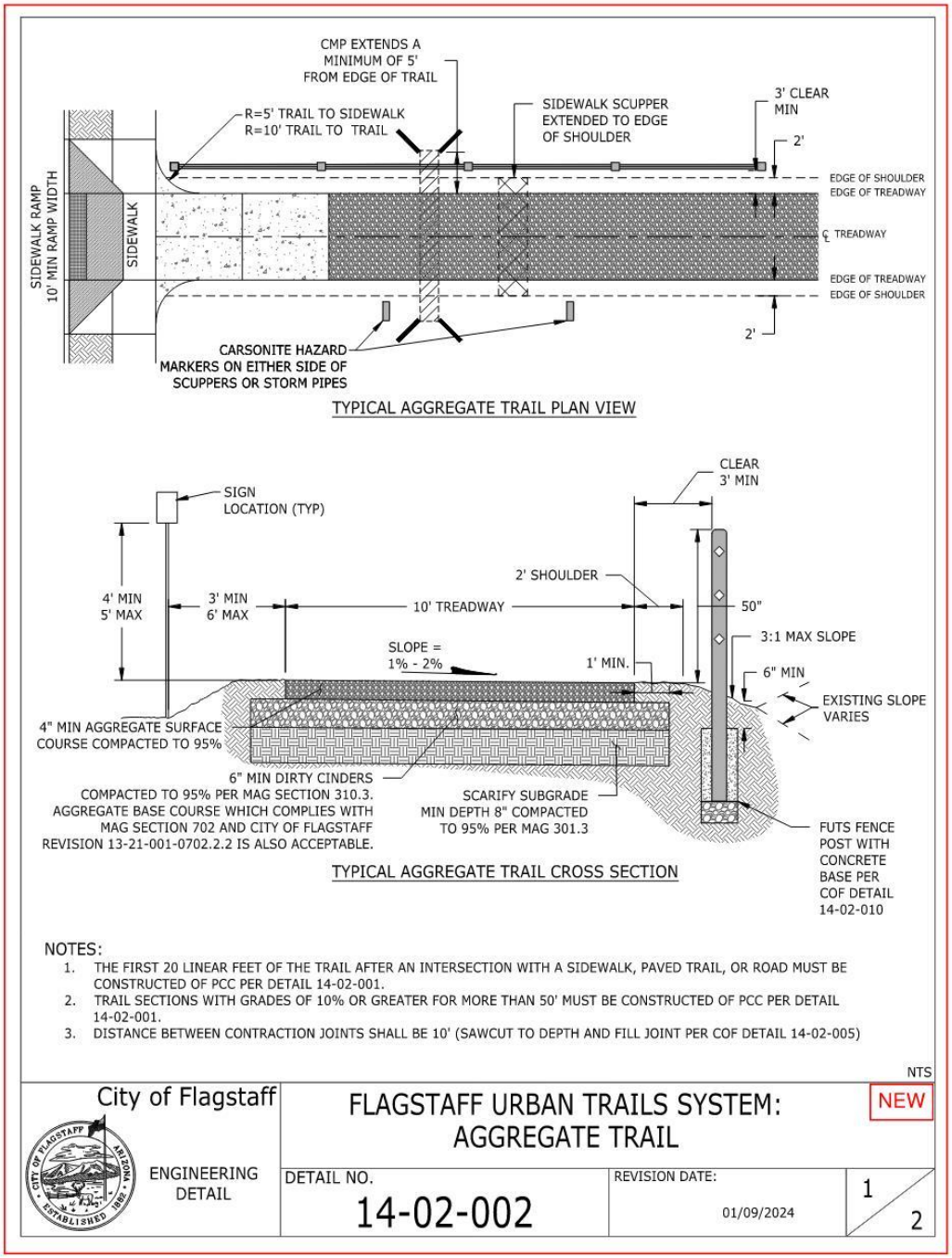
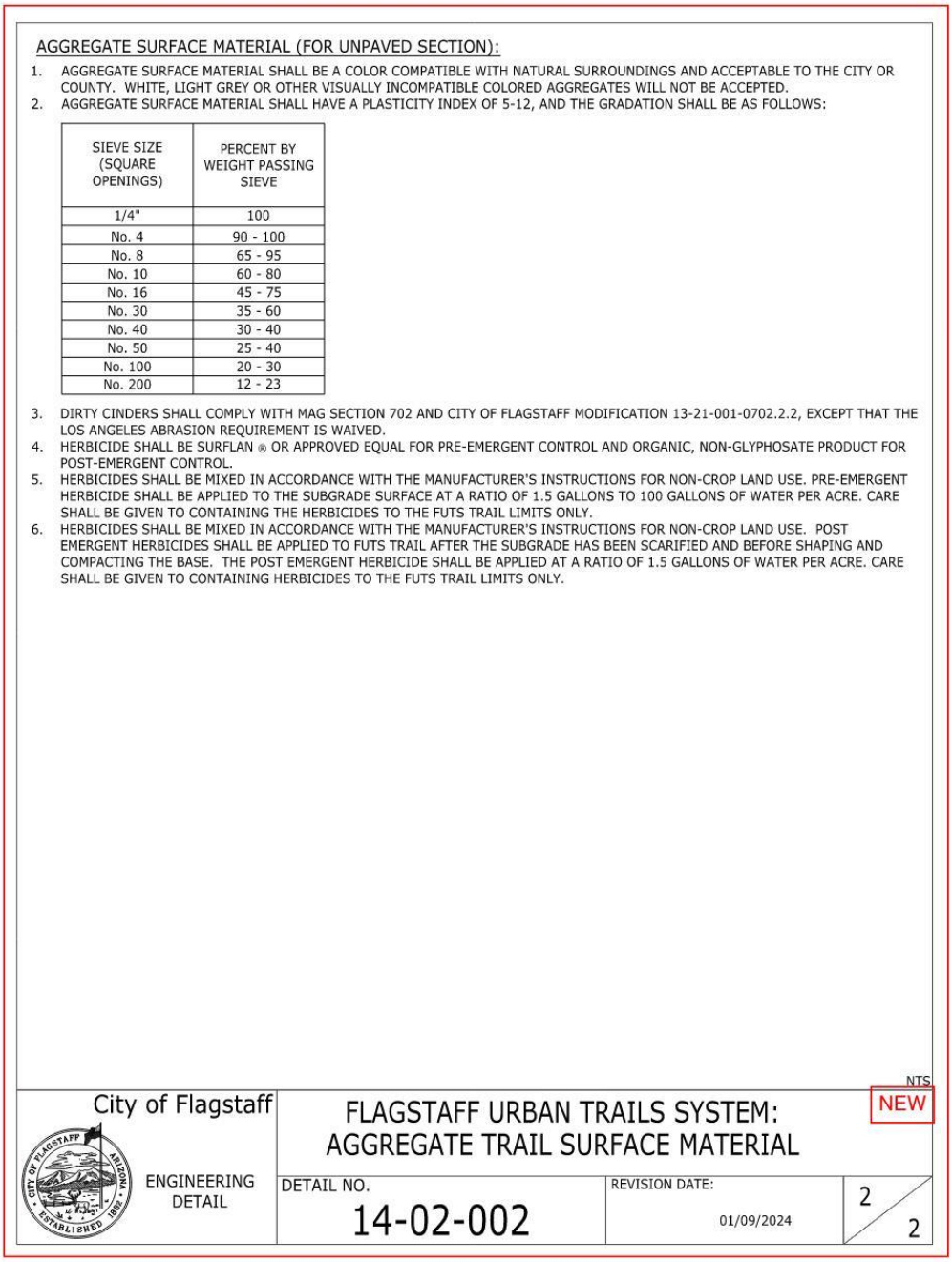
14-02-002: Flagstaff Urban Trails System: Aggregate Trail

Section 66. 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

NEW

City of Flagstaff

ENGINEERING DETAIL

FLAGSTAFF URBAN TRAILS SYSTEM:
AGGREGATE TRAIL SURFACE MATERIAL

DETAIL NO. 14-02-002

REVISION DATE: 01/09/2024

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Justification:

These drawings are being restructured and updated to correspond with the proposed revisions to Division 13-14-001.

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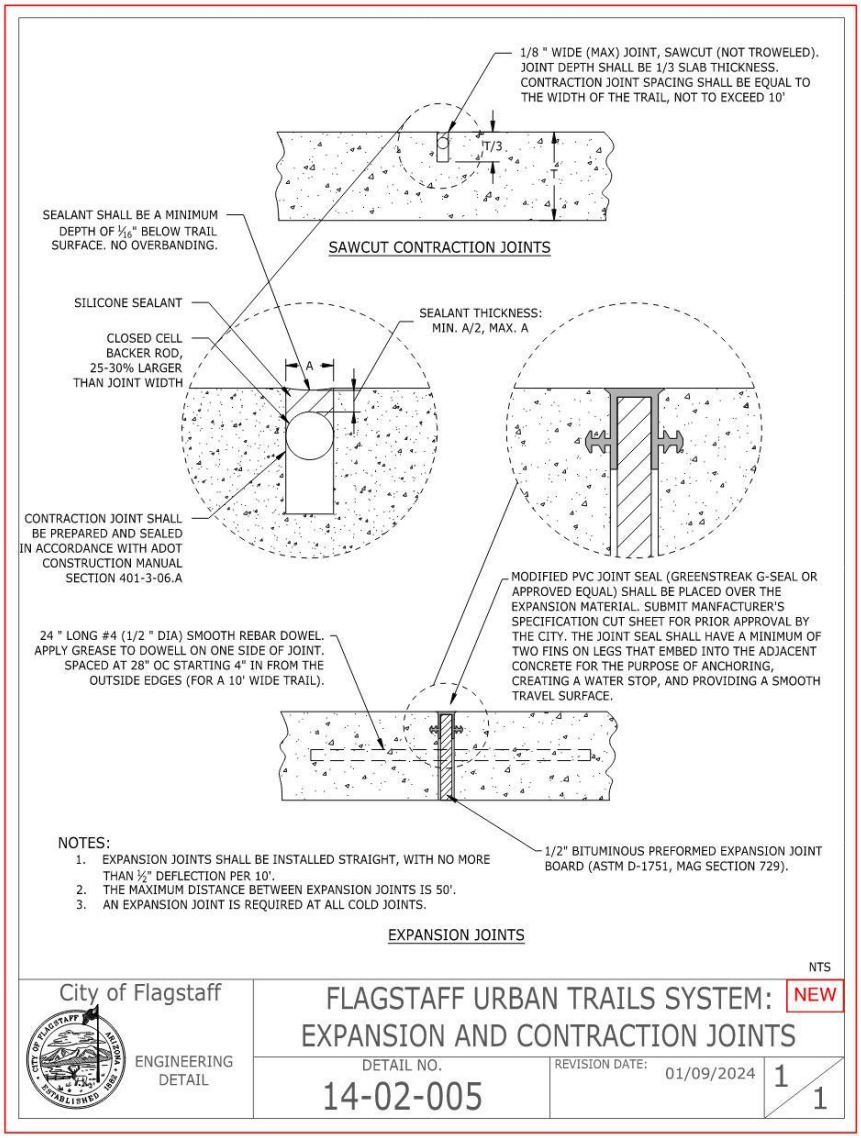
14-02-005: Flagstaff Urban Trails System: Expansion and Contraction Joints

Section 67. 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:



Justification:

This detail is intended to clarify concrete joint construction requirements to improve consistency and quality.

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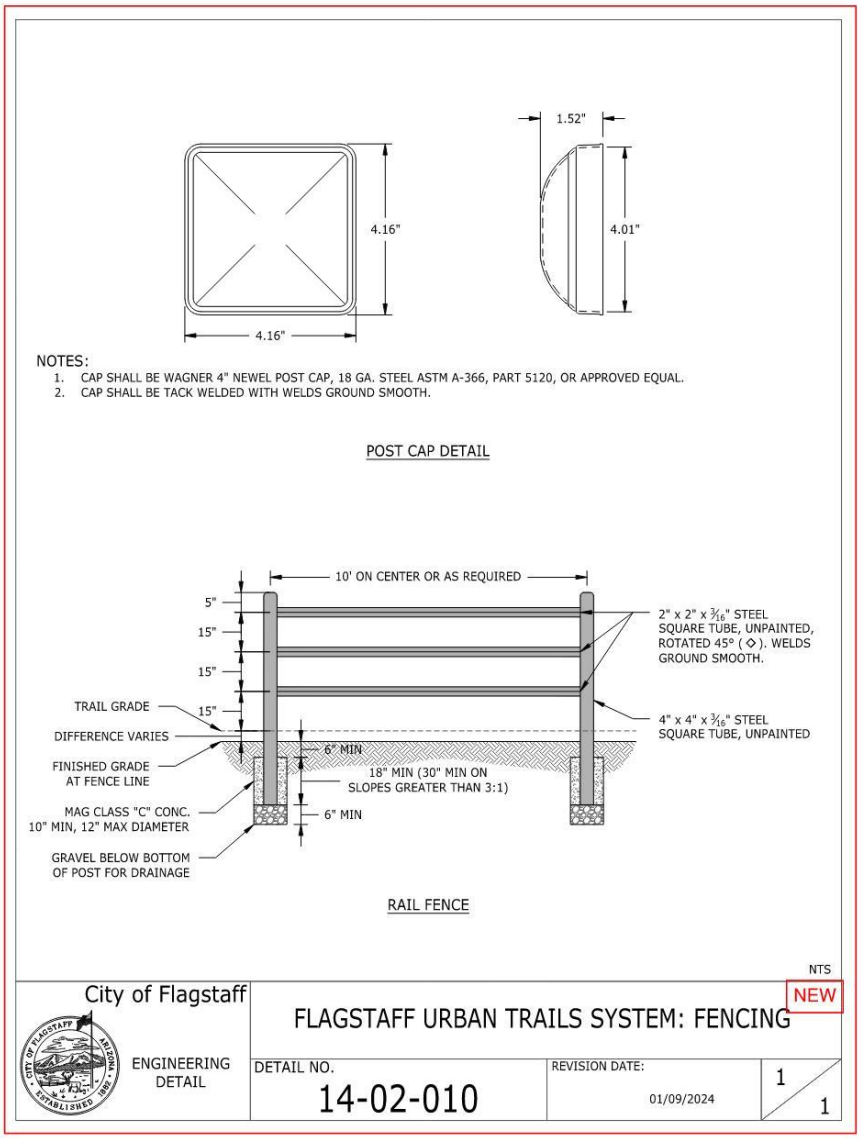
14-02-010: Flagstaff Urban Trails System: Fencing

Section 68. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 14-02-010: Flagstaff Urban Trails System: Fencing, to read as follows:



Justification:

These drawings are being restructured and updated to correspond with the proposed revisions to Division 13-14-001.

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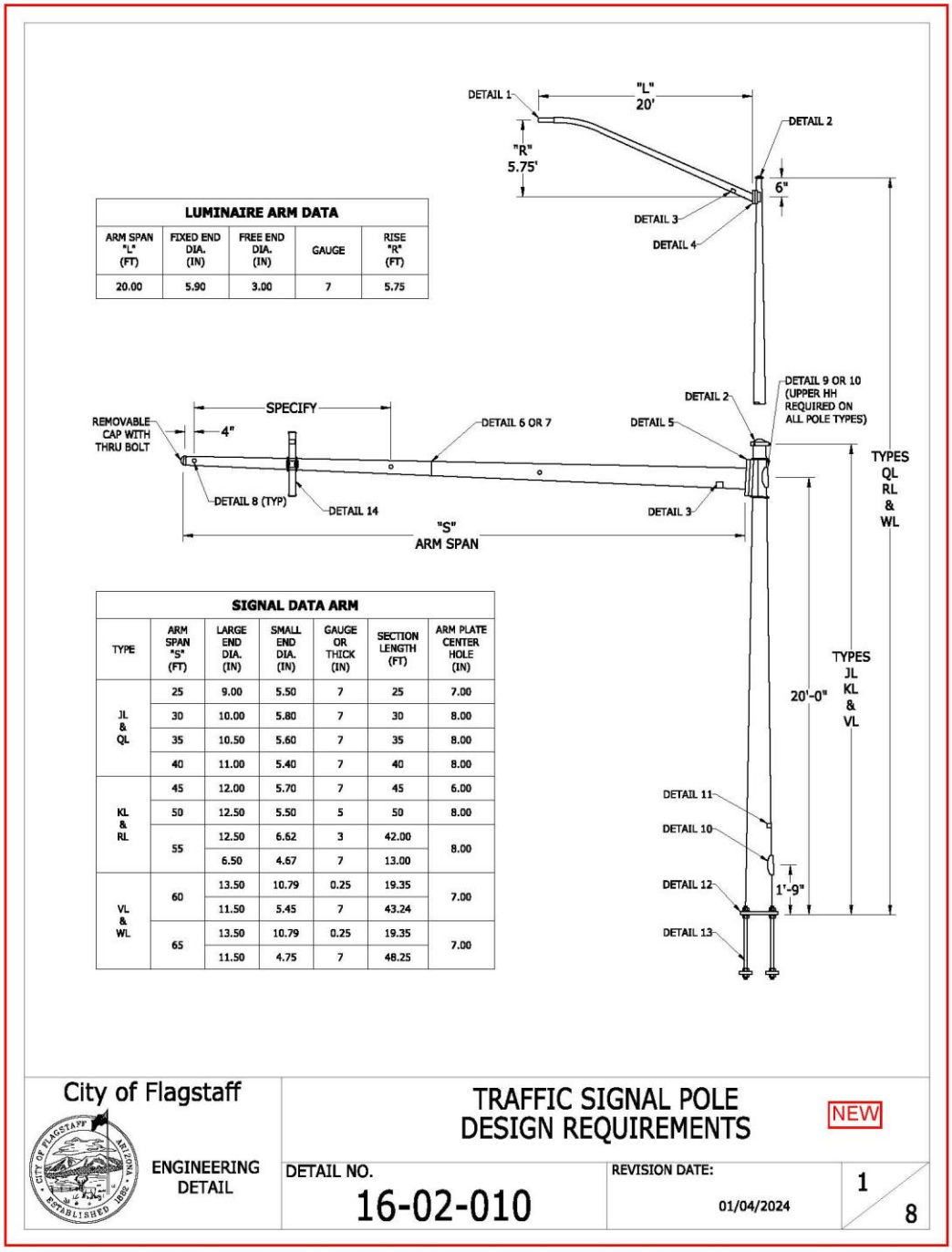
16-02-010: Traffic Signal Pole Design

Section 69. 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	

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	

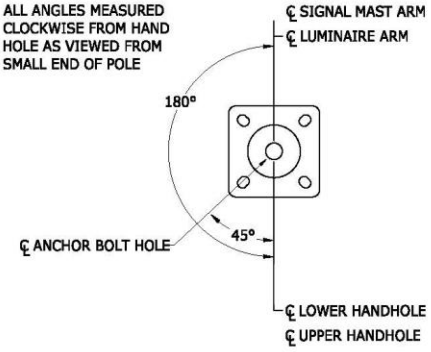
POLE, BASE PLATE, ANCHOR BOLT DATA												
	POLE TUBE				POLE BASE					ANCHOR BOLT		
POLE TYPE	LENGTH (FT)	BASE DIA. (IN)	TOP DIA. (IN)	WALL GA/THK	SQUARE "B" (IN)	BOLT CENTER "C" (IN)	CENTER HOLE DIA. (IN)	THK. "D" (IN)	SLOT/HOLE SIZE "Z" (IN)	DIA. (IN)	LENGTH (IN)	PLATE SIZE "e" X "f" X "g" (IN)
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

ALL ANGLES MEASURED CLOCKWISE FROM HAND HOLE AS VIEWED FROM SMALL END OF POLE



RADIAL INDEX

City of Flagstaff

ENGINEERING DETAIL

TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS

NEW

DETAIL NO. 16-02-010

REVISION DATE: 01/04/2024

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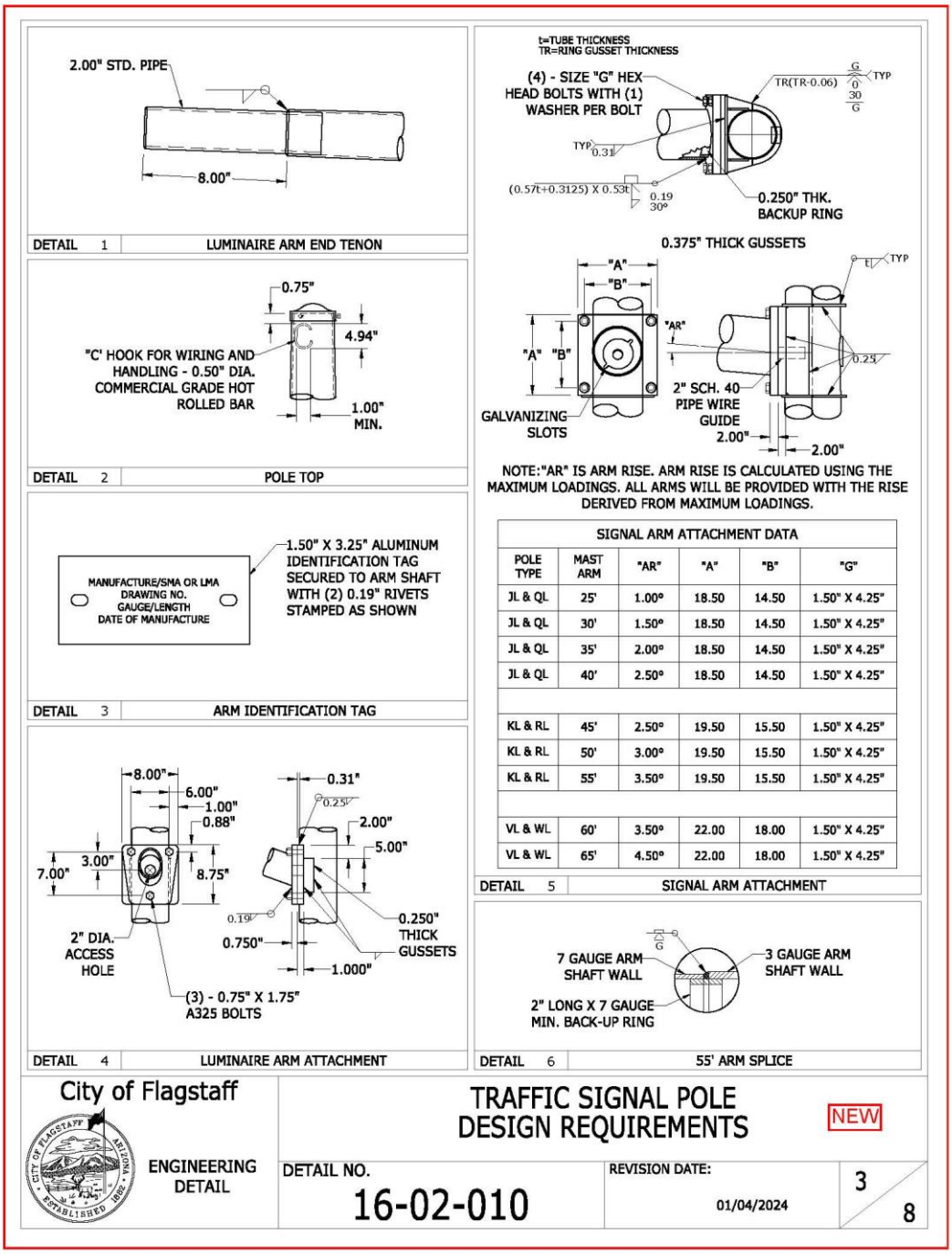
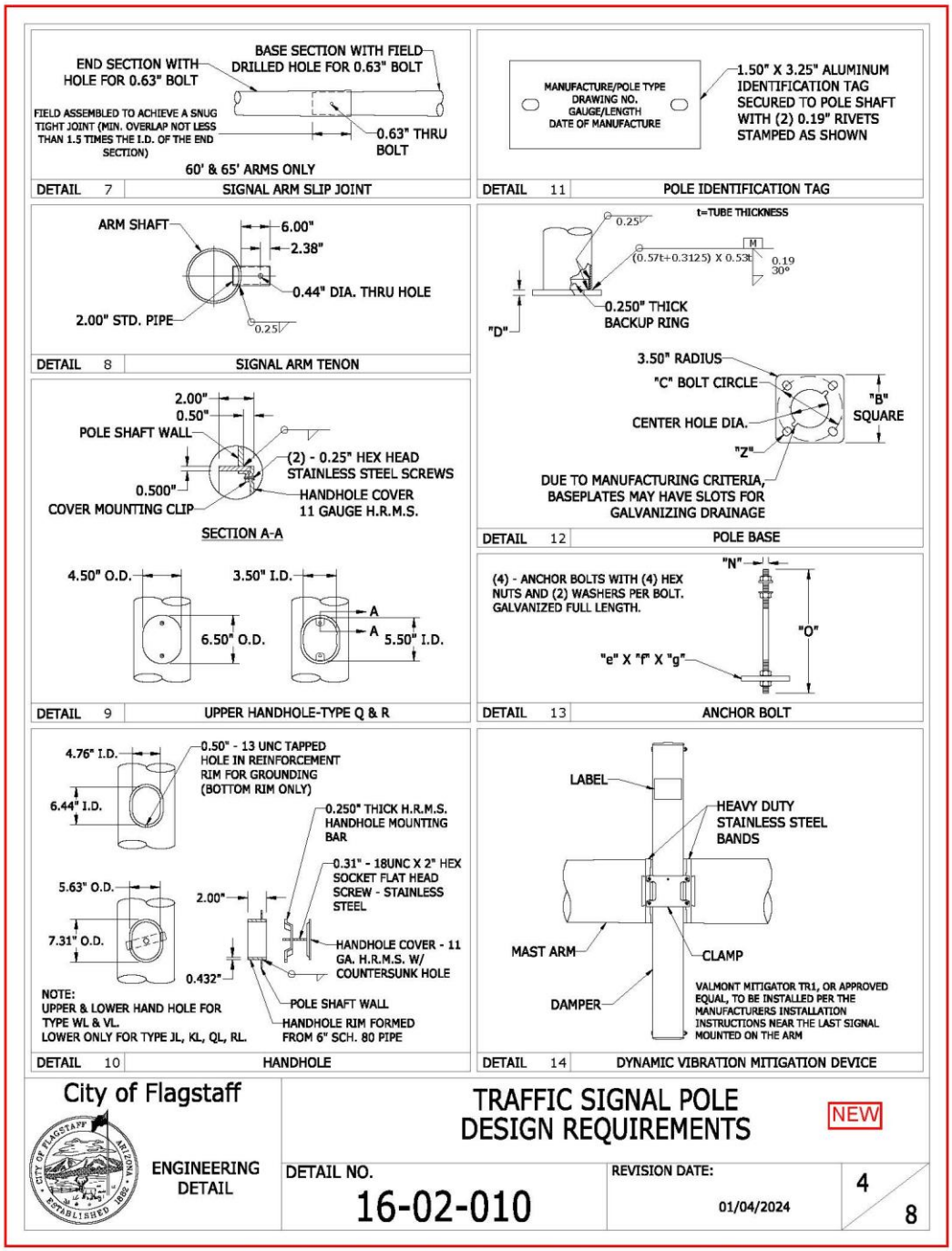
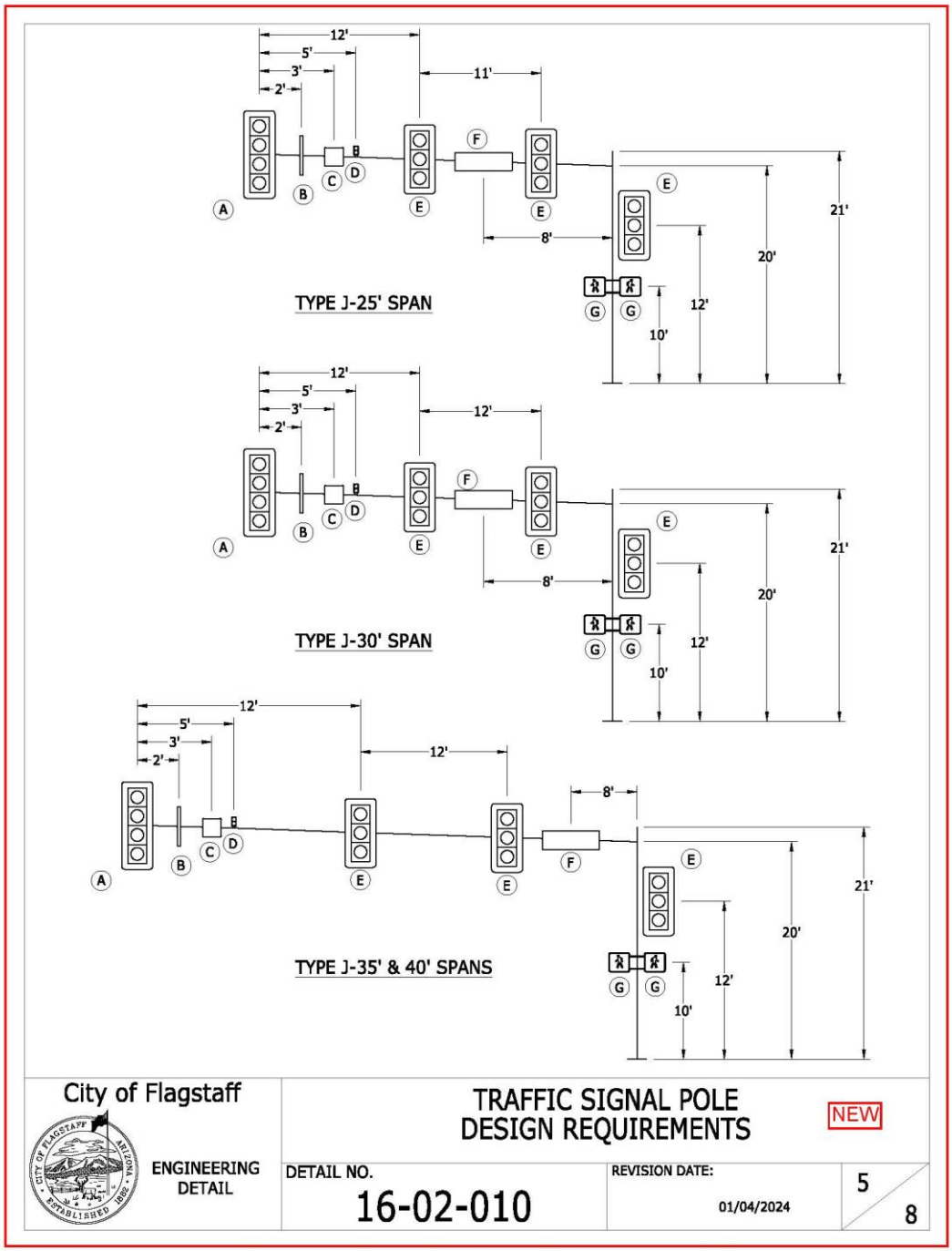

2.00" STD. PIPE
8.00"
DETAIL 1 LUMINAIRE ARM END TENON
0.75"
4.94"
"C' HOOK FOR WIRING AND HANDLING - 0.50" DIA. COMMERCIAL GRADE HOT ROLLED BAR
1.00" MIN.
DETAIL 2 POLE TOP
MANUFACTURE/SMA OR LMA
DRAWING NO.
GAUGE/LENGTH
DATE OF MANUFACTURE
1.50" X 3.25" ALUMINUM IDENTIFICATION TAG SECURED TO ARM SHAFT WITH (2) 0.19" RIVETS STAMPED AS SHOWN
DETAIL 3 ARM IDENTIFICATION TAG
8.00"
6.00"
1.00"
0.88"
3.00"
7.00"
8.75"
2" DIA. ACCESS HOLE
0.31"
0.25"
2.00"
5.00"
0.19"
0.750"
0.250" THICK GUSSETS
1.000"
(3) - 0.75" X 1.75" A325 BOLTS
DETAIL 4 LUMINAIRE ARM ATTACHMENT
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"
GALVANIZING SLOTS
2" SCH. 40 PIPE WIRE GUIDE
2.00"
0.25
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
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
NEW
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
3
8


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 0.53
0.19
30°
"D"
0.250" THICK BACKUP RING
3.50" RADIUS
"C" BOLT CIRCLE
"B" SQUARE
CENTER HOLE DIA.
"Z"
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.
0.50" - 13 UNC TAPPED HOLE IN REINFORCEMENT RIM FOR GROUNDING (BOTTOM RIM ONLY)
6.44" I.D.
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.
2.00"
7.31" O.D.
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
NEW
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
4
8


12'
5'
3'
2'
11'
8'
21'
20'
12'
10'
TYPE J-25' SPAN
TYPE J-30' SPAN
TYPE J-35' & 40' SPANS
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS
NEW
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
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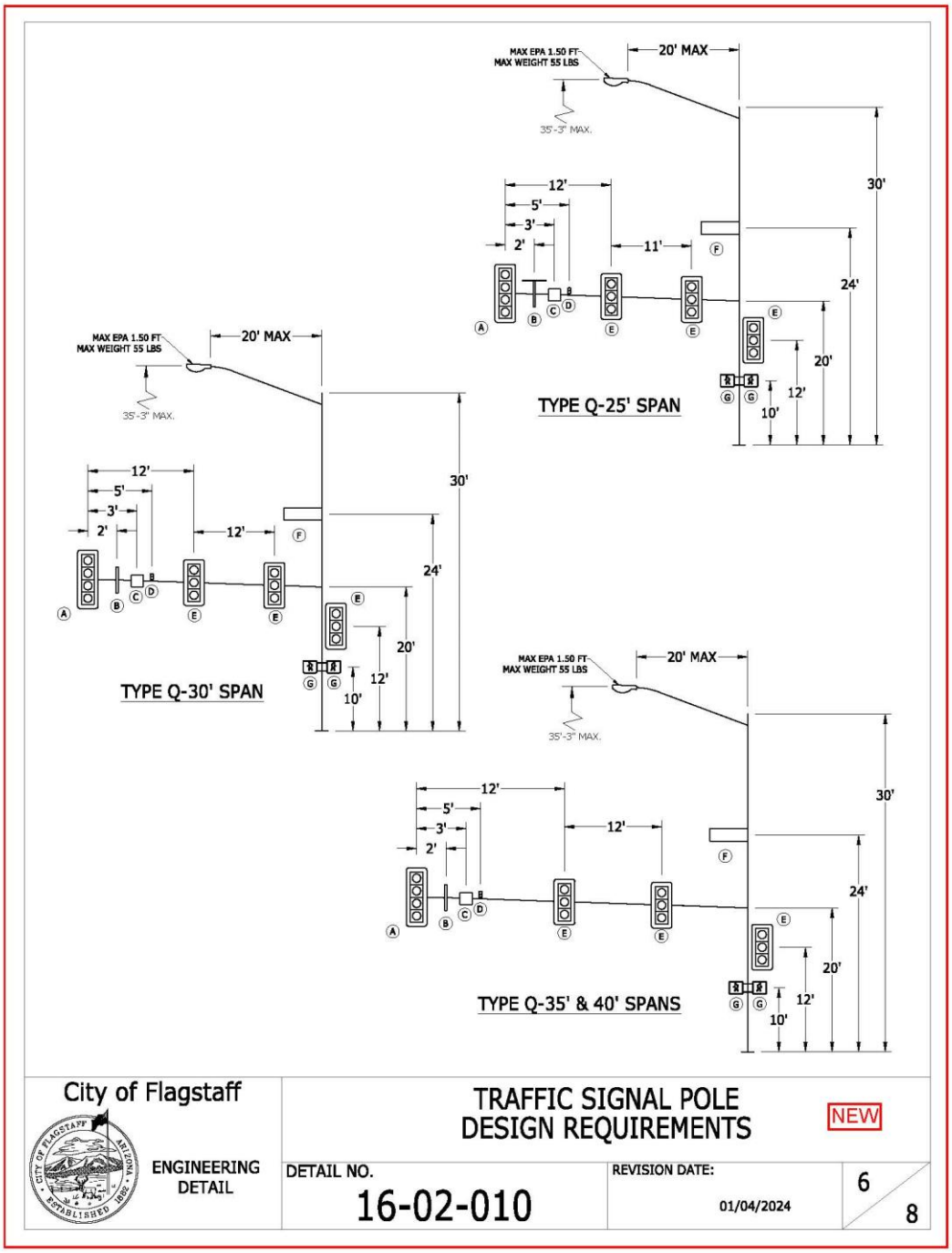
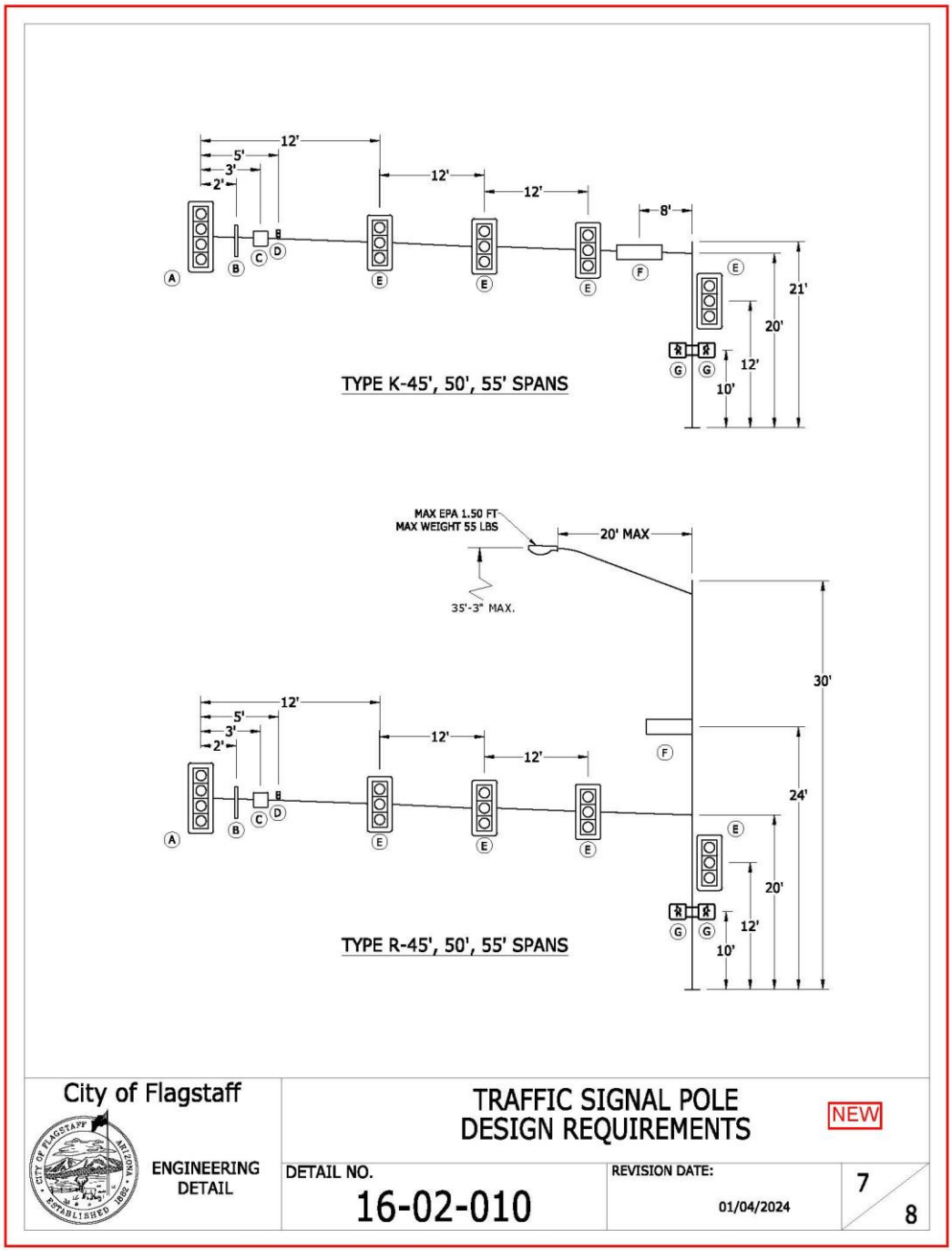
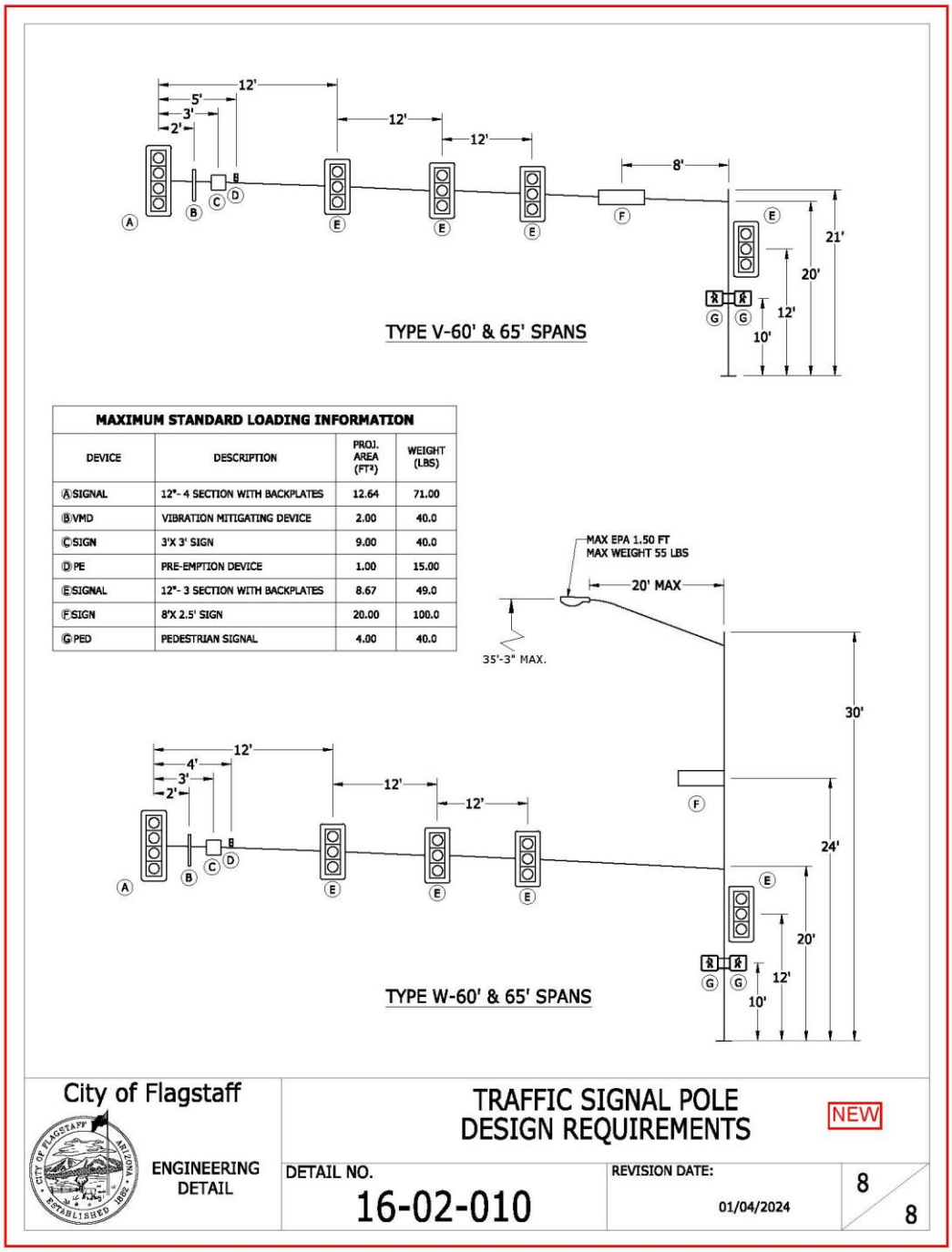
8


MAX EPA 1.50 FT
MAX WEIGHT 55 LBS
35'-3" MAX.
20' MAX
30'
12'
5'
3'
2'
11'
24'
20'
12'
10'
TYPE Q-25' SPAN
MAX EPA 1.50 FT
MAX WEIGHT 55 LBS
35'-3" MAX.
20' MAX
30'
12'
5'
3'
2'
12'
24'
20'
12'
10'
TYPE Q-30' SPAN
MAX EPA 1.50 FT
MAX WEIGHT 55 LBS
35'-3" MAX.
20' MAX
30'
12'
5'
3'
2'
12'
24'
20'
12'
10'
TYPE Q-35' & 40' SPANS
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS
NEW
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
6
8


12'
5'
3'
2'
12'
12'
8'
21'
20'
12'
10'
TYPE K-45', 50', 55' SPANS
MAX EPA 1.50 FT
MAX WEIGHT 55 LBS
20' MAX
35'-3" MAX.
30'
24'
TYPE R-45', 50', 55' SPANS
City of Flagstaff
ENGINEERING DETAIL
TRAFFIC SIGNAL POLE DESIGN REQUIREMENTS
NEW
DETAIL NO.
16-02-010
REVISION DATE:
01/04/2024
7
8



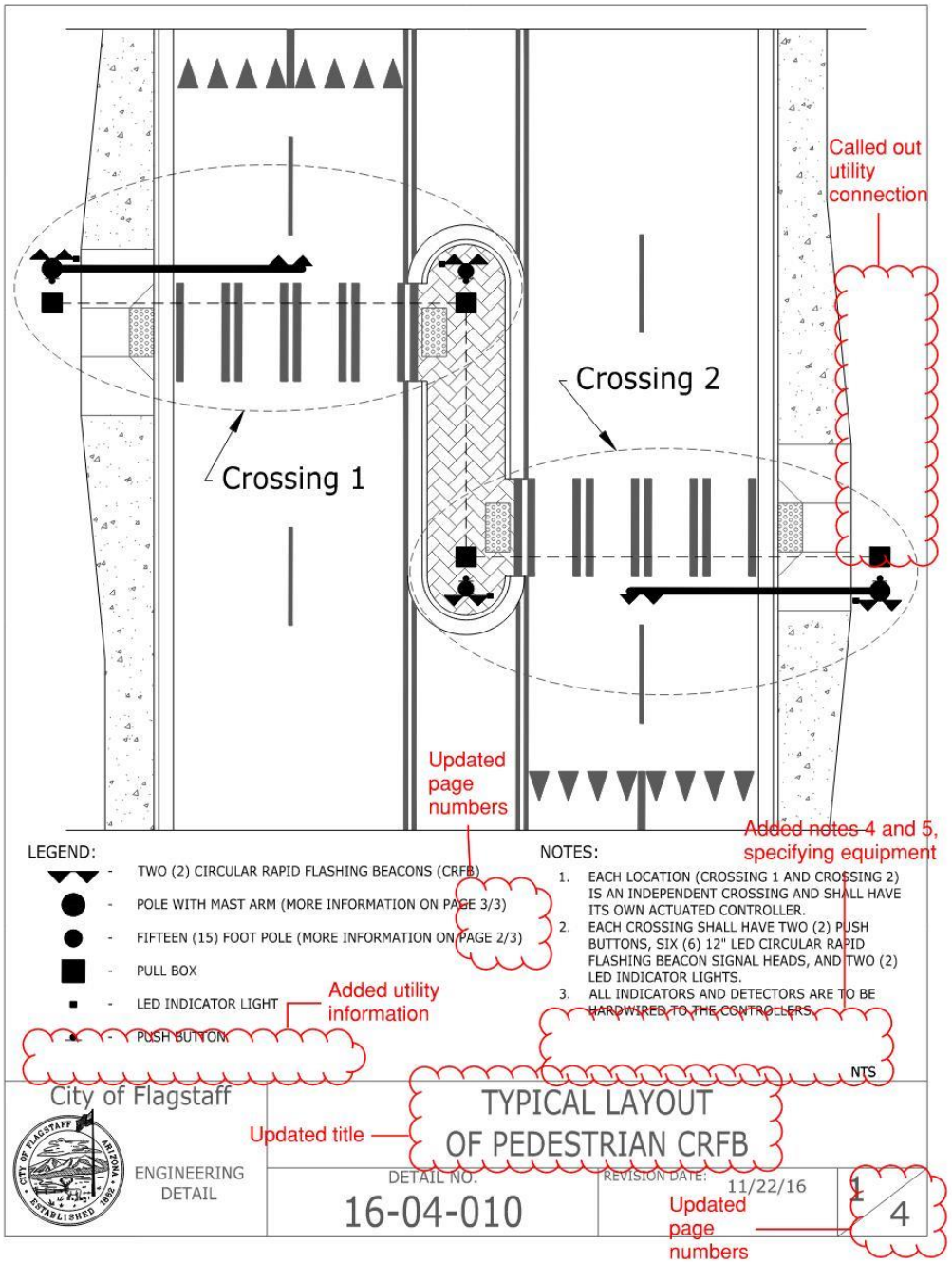
Justification:

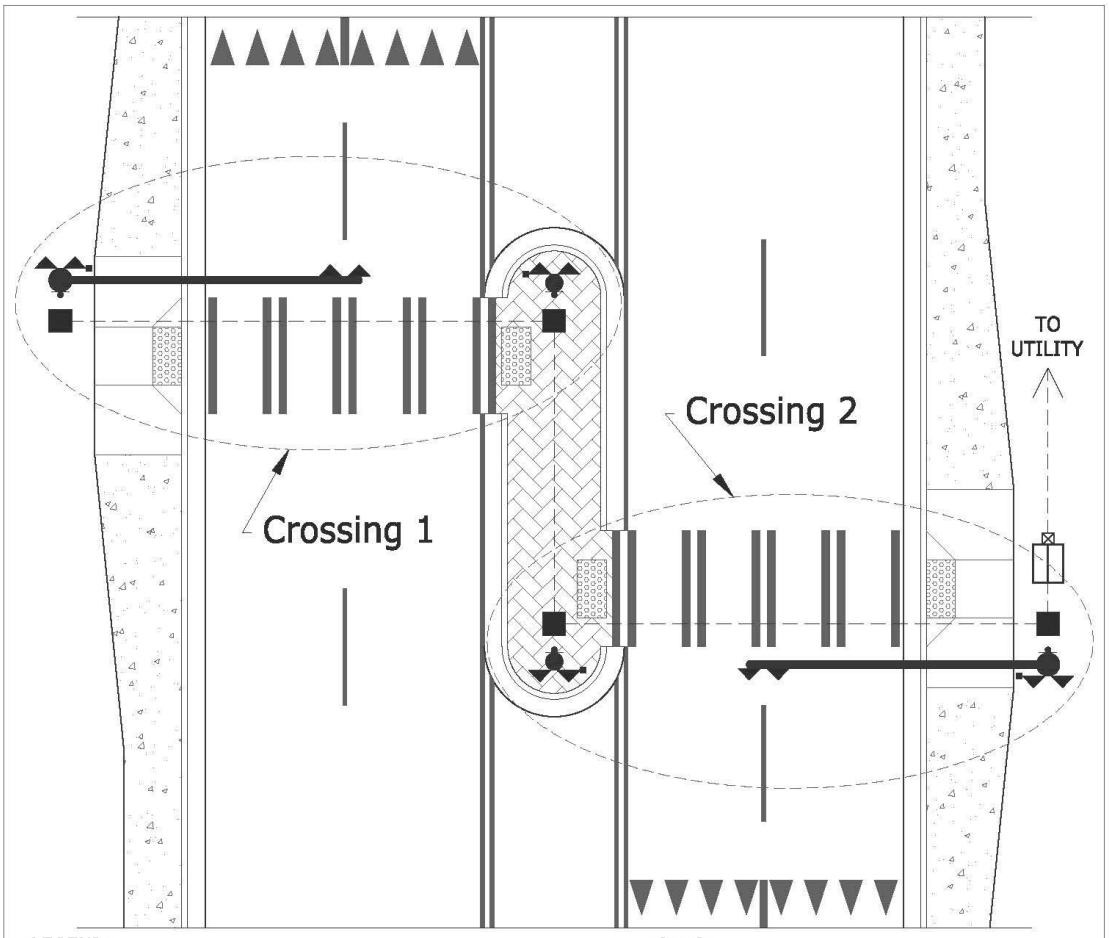
Added a new standard that provides clarity and consistency for design of traffic signal poles.

([Back to top])

16-04-010: Pedestrian Rapid Flashing Beacon

Section 70. 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:

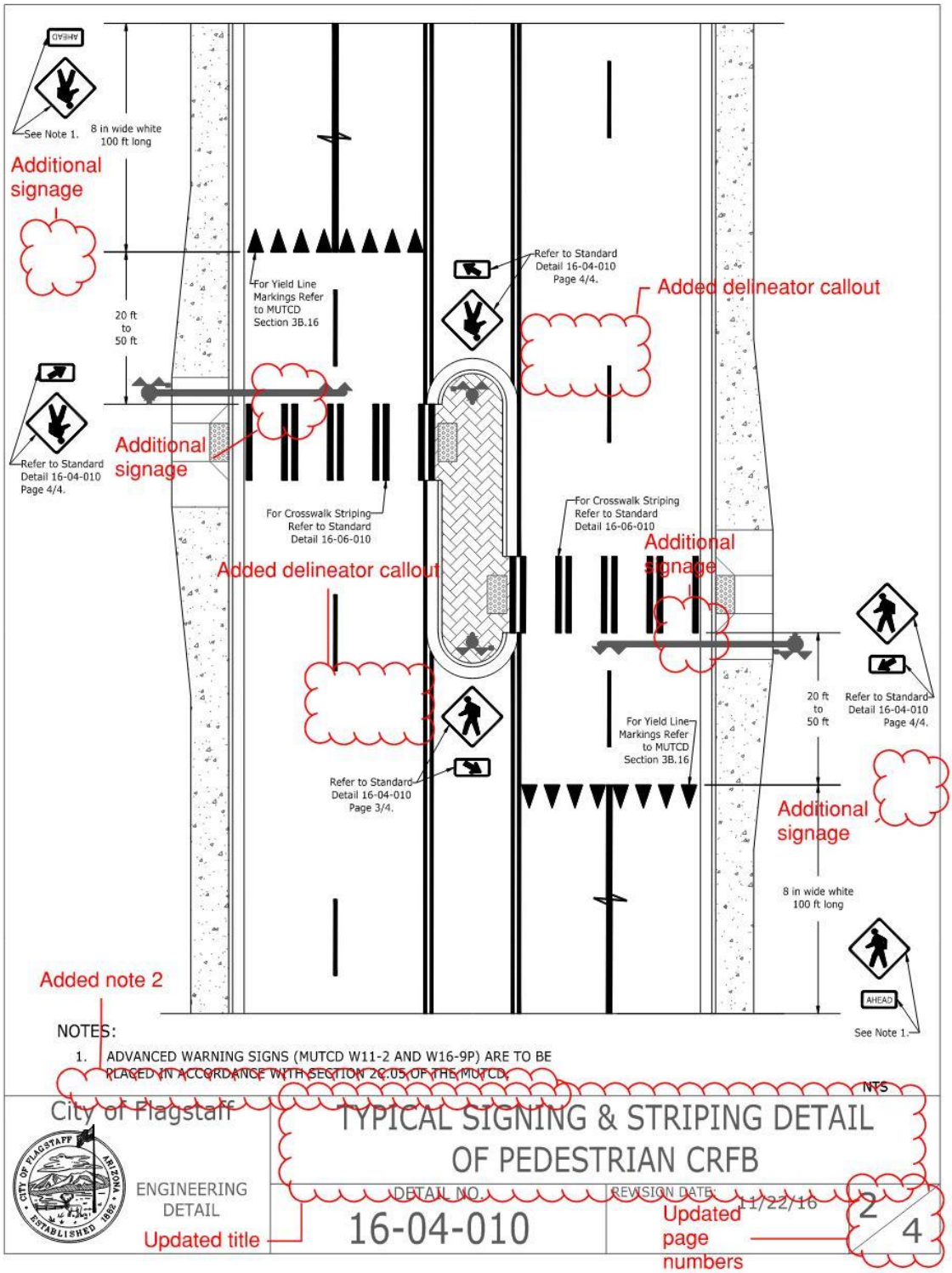
- TWO (2) CIRCULAR RAPID FLASHING BEACONS (CRFB)
- POLE WITH MAST ARM (MORE INFORMATION ON PAGE 3/5)
- FIFTEEN (15) FOOT POLE (MORE INFORMATION ON PAGE 2/5)
- PULL BOX
- LED INDICATOR LIGHT
- PUSH BUTTON
- ELECTRIC SERVICE
- SIGNAL CABINET / BBS

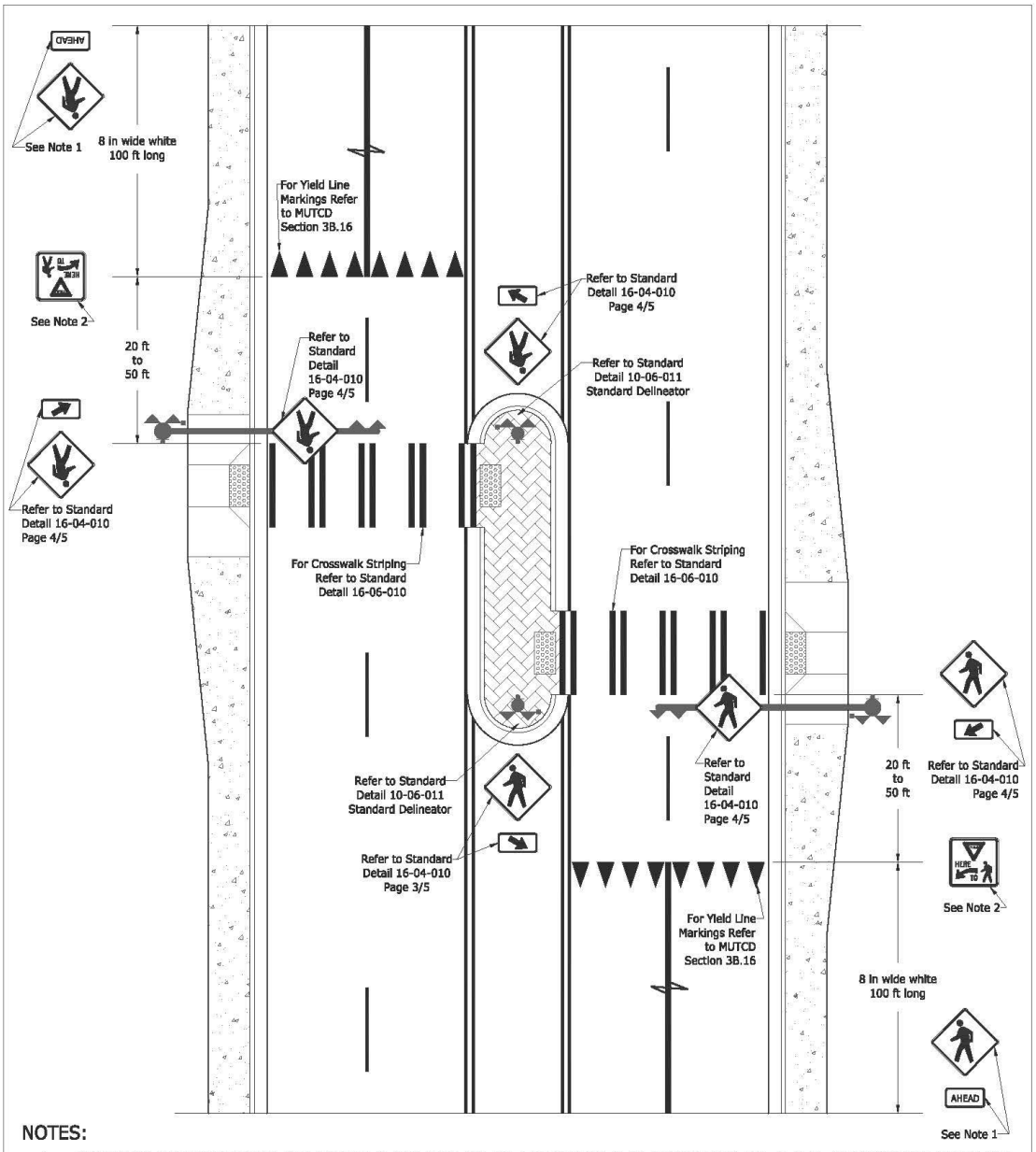
NOTES:

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	PEDESTRIAN RAPID FLASHING BEACON TYPICAL LAYOUT		
ENGINEERING DETAIL	DETAIL NO. 16-04-010	REVISION DATE: 12/02/2023	1 / 5


AHEAD
See Note 1.
8 in wide white 100 ft long
Additional signage
20 ft to 50 ft
Refer to Standard Detail 16-04-010 Page 4/4.
For Yield Line Markings Refer to MUTCD Section 3B.16
Refer to Standard Detail 16-04-010 Page 4/4.
Added delineator callout
Additional signage
For Crosswalk Striping Refer to Standard Detail 16-06-010
For Crosswalk Striping Refer to Standard Detail 16-06-010
Added delineator callout
Additional signage
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.
Additional signage
8 in wide white 100 ft long
AHEAD
See Note 1.
Added note 2
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
2
4
Updated title
Updated page numbers

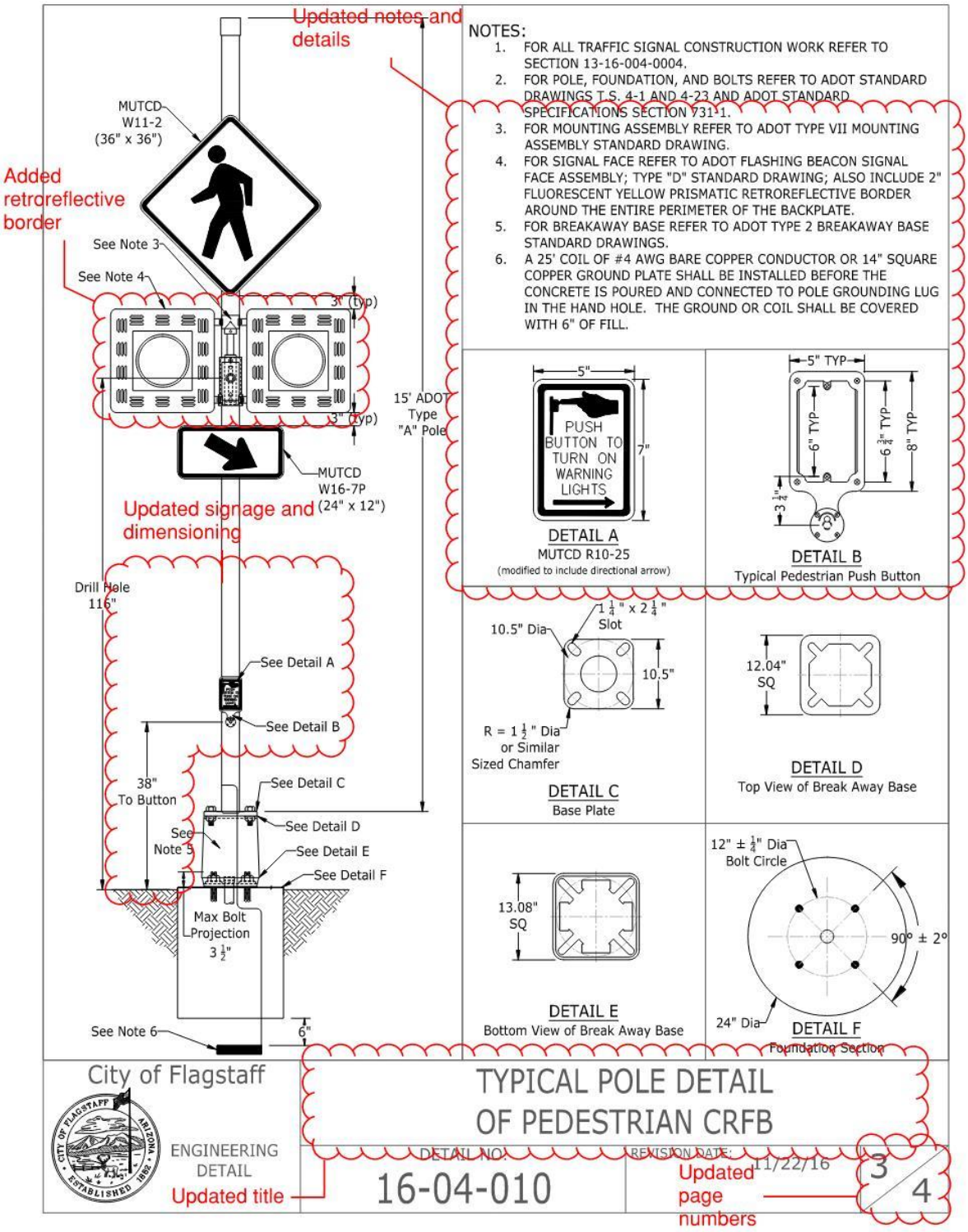


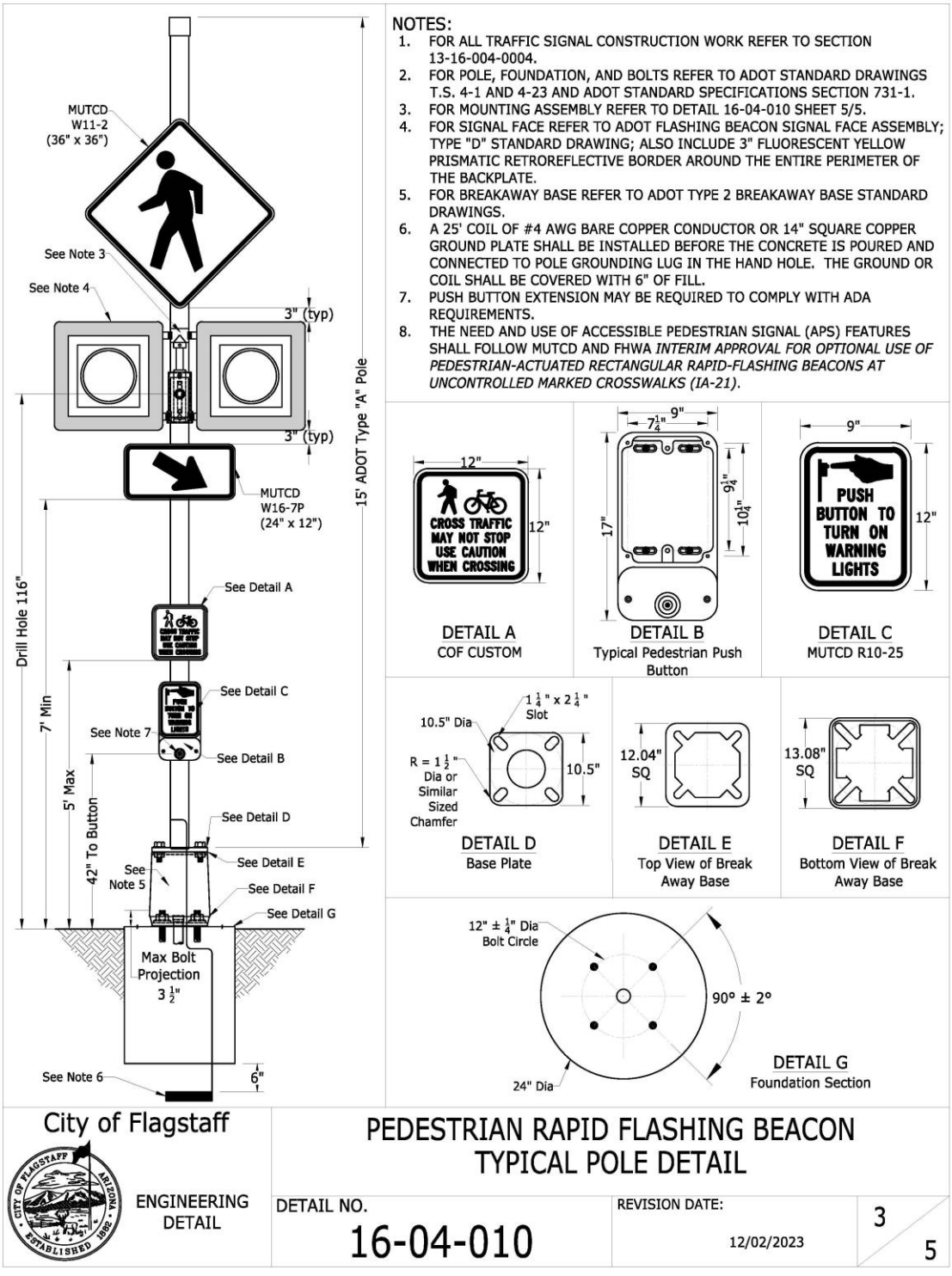
NOTES:

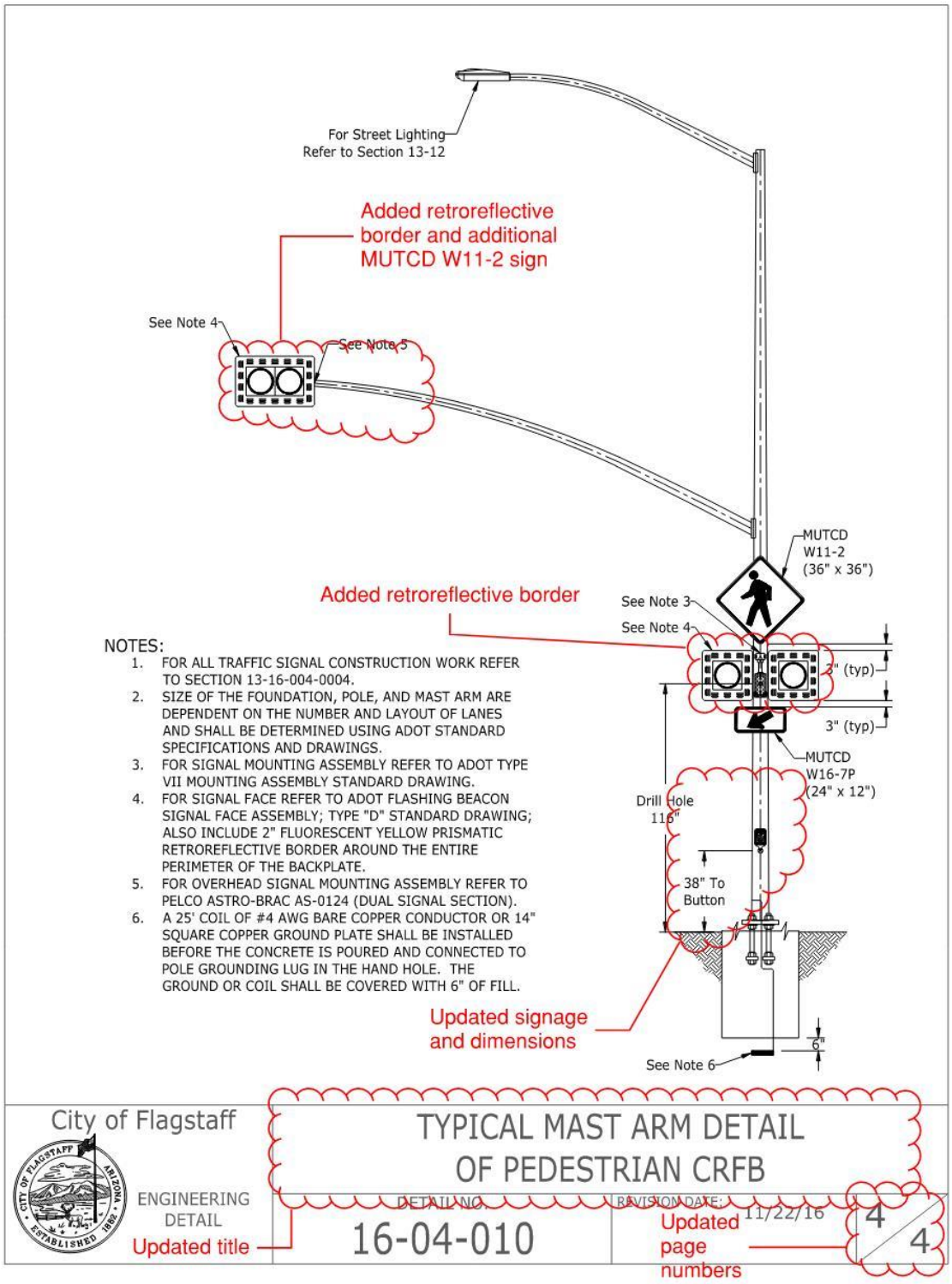
1. ADVANCED WARNING SIGNS (MUTCD W11-2 AND W16-9P) ARE TO BE PLACED IN ACCORDANCE WITH SECTION 2C.05 OF THE MUTCD.
2. MUTCD R1-5L (36" X 36") SIGN TO BE PLACED IN LINE WITH YIELD LINE MARKINGS.

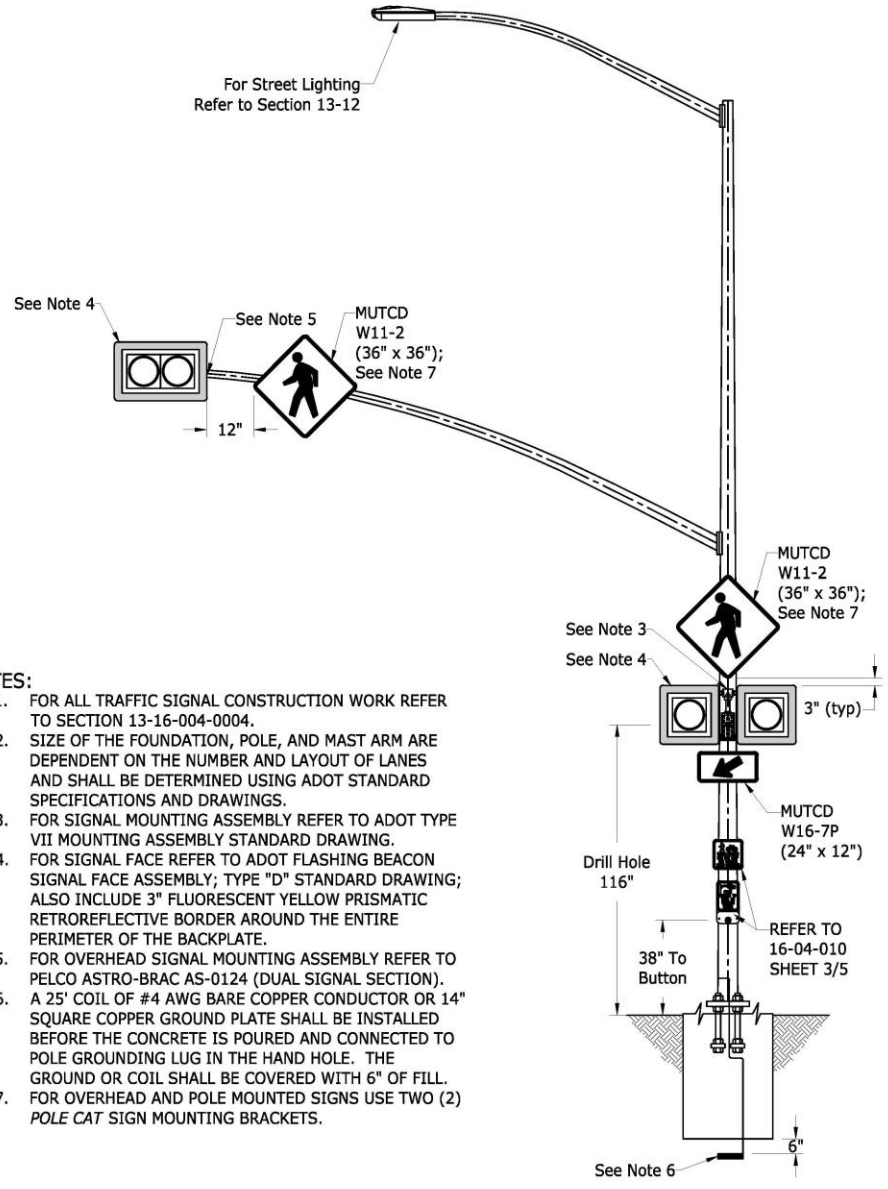
NTS

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


Updated notes and details
MUTCD W11-2 (36" x 36")
Added retroreflective border
See Note 3
See Note 4
3" (typ)
3" (typ)
15' ADOT Type "A" Pole
MUTCD W16-7P (24" x 12")
Updated signage and dimensioning
Drill Hole 116"
See Detail A
See Detail B
38" To Button
See Detail C
See Detail D
See Note 5
See Detail E
See Detail F
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 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.
5"
7"
PUSH BUTTON TO TURN ON WARNING LIGHTS
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
Updated title
TYPICAL POLE DETAIL OF PEDESTRIAN CRFB
DETAIL NO.
16-04-010
REVISION DATE:
11/22/16
Updated page numbers
3
4


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 Detail E
See Note 5
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

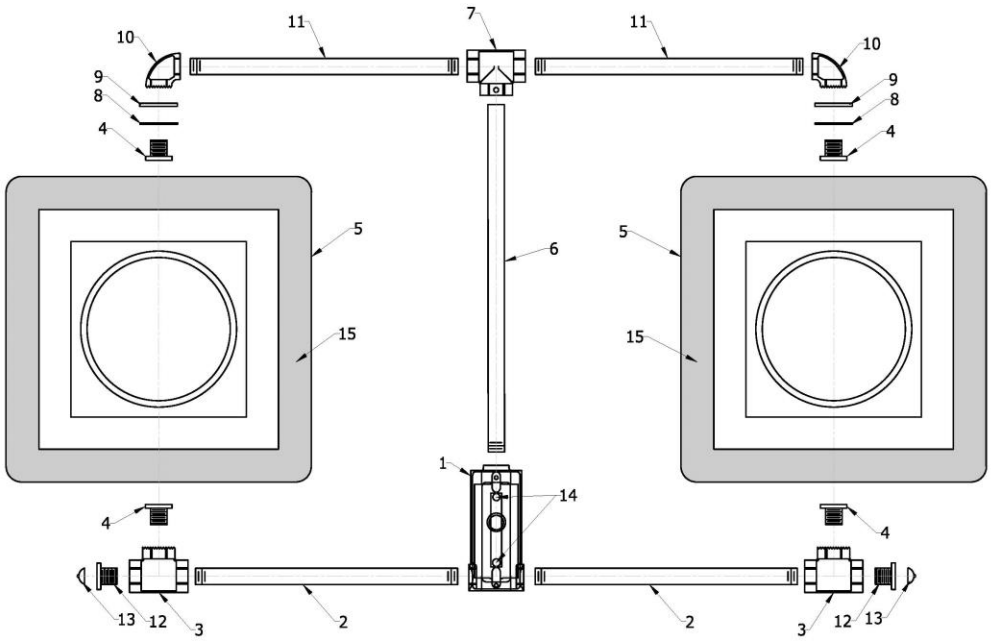

For Street Lighting
Refer to Section 13-12
Added retroreflective
border and additional
MUTCD W11-2 sign
See Note 4
See Note 5
MUTCD
W11-2
(36" x 36")
Added retroreflective border
See Note 3
See Note 4
2" (typ)
3" (typ)
MUTCD
W16-7P
(24" x 12")
Drill Hole
11/16"
38" To
Button
NOTES:
1. FOR ALL TRAFFIC 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.
Updated signage
and dimensions
6"
See Note 6
City of Flagstaff
ENGINEERING
DETAIL
Updated title
TYPICAL MAST ARM DETAIL
OF PEDESTRIAN CRFB
DETAIL NO.
16-04-010
REVISION DATE:
11/22/16
Updated
page
numbers
4
4



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	PEDESTRIAN RAPID FLASHING BEACON TYPICAL MAST ARM DETAIL		
ENGINEERING 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	1½" pipe, length varies dependent on manufacturer
3	2	1½" Tee with locking serrations (ADOT T.S. 10-1-1)
4	4	1½" lock nipple, 1¾" long
5	2	Signal, Type D, see notes sheet 3/5
6	1	1½" Center pipe, threaded one end, length varies dependent on manufacturer
7	1	1½" Tee, drill & tap for setscrew

LIST OF MATERIALS		
Itm	Qty	Description
8	2	Neoprine washer or gasket
9	2	Flat washer
10	2	1½" 90° elbow with locking serrations (ADOT T.S. 10-1-2)
11	2	1½" pipe, length varies dependent on manufacturer
12	2	1½" PVC pipe cap (supplied by City)
13	2	LED indication (supplied by City)
14	2	1½" 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

NEW

DETAIL NO. 16-04-010

REVISION DATE: 11/29/2023

5 / 5

Justification:

Changed the title of this standard.

Page 1/5:

- Added the location of the electric service and signal cabinet/BBS.
- Added notes on the specific cabinet, battery backup system, and electric service required for this set up.

Page 2/5:

- Added MUTCD R1-5L signs and a note that includes the location of the signs.
- Added MUTCD W11-2 sign to each mast arm.
- Added references to other standard pages.

Page 3/5:

- Added a new custom sign which states “Cross Traffic May Not Stop Use Caution When Crossing.”
- Updated the pedestrian push button and size of the MUTCD R10-25 sign that is mounted to it.
- Changed the dimension of the fluorescent yellow prismatic retroreflective border from 2” to 3”.
- Added notes to align with ADA requirements.
- Updated the signal heads to not include louvers.
- Added height dimensions to signs.
- Updated the height to the pedestrian push button from 38” to 42”.
- Added references to other standard pages.

Page 4/5:

- Updated the signal heads to not include louvers.
- Added MUTCD W11-2 sign to the mast arm.
- Changed the dimension of the fluorescent yellow prismatic retroreflective border from 2” to 3”.
- Added note to specify mounting bracket for the overhead MUTCD W11-2 sign.
- Added references to other standard pages.
- Updated the height to the pedestrian push button from 38” to 42”.

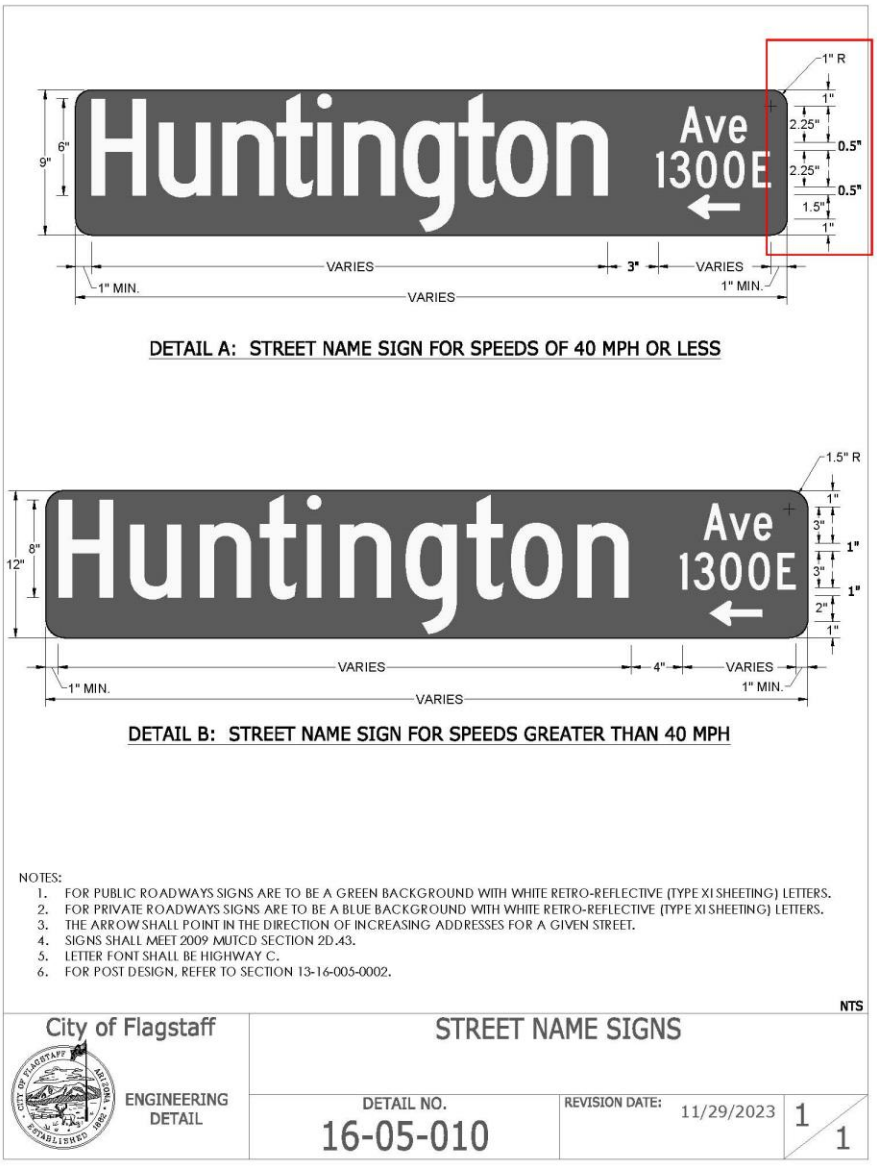
Page 5/5:

- Added new page with detailed information on the mechanics and material list for the signal heads.

(Back to top)

16-05-010: Street Name Signs

Section 71. 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:



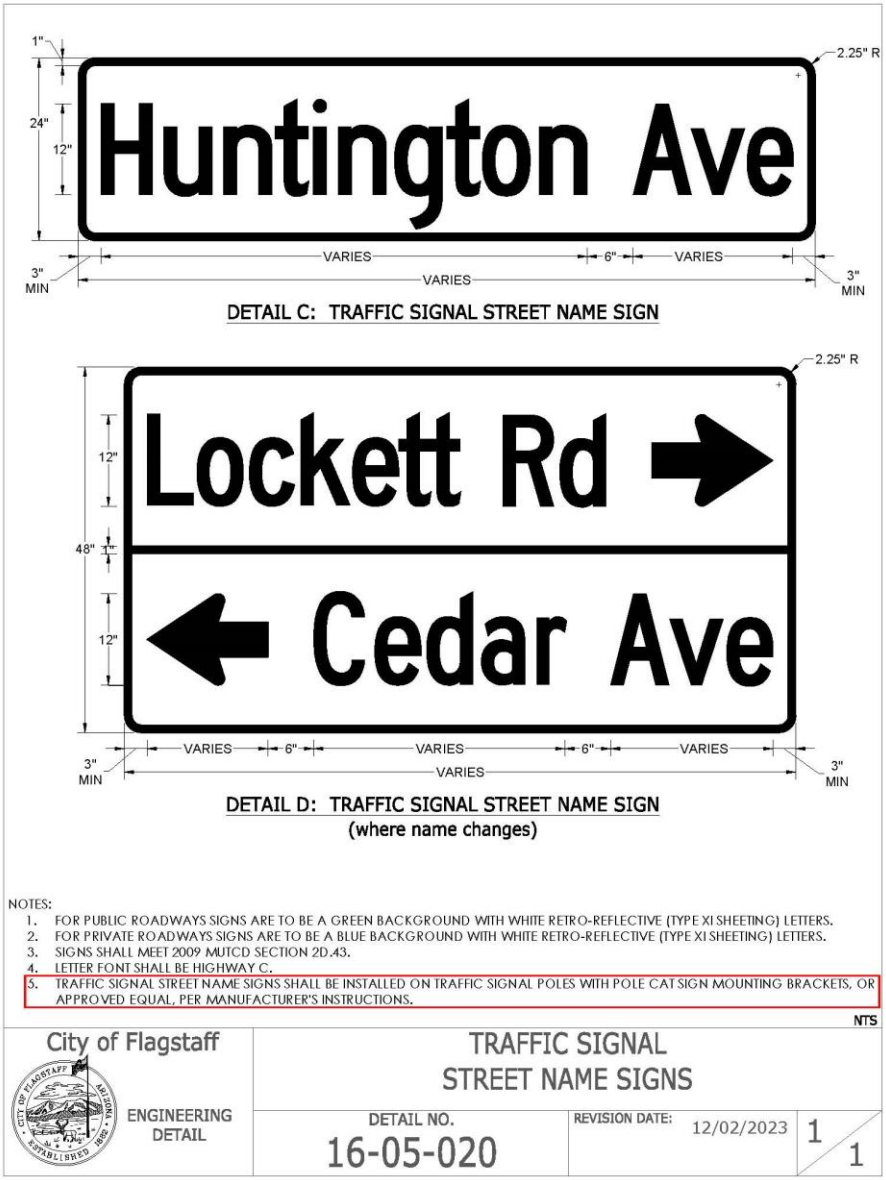
Justification:

Updated an error with dimensioning of the height of the letters on Detail A.

(Back to top)

16-05-020: Traffic Signal Street Name Signs

Section 72. Amend Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section 16-05-020: Traffic Signal Street Name Signs, as follows:



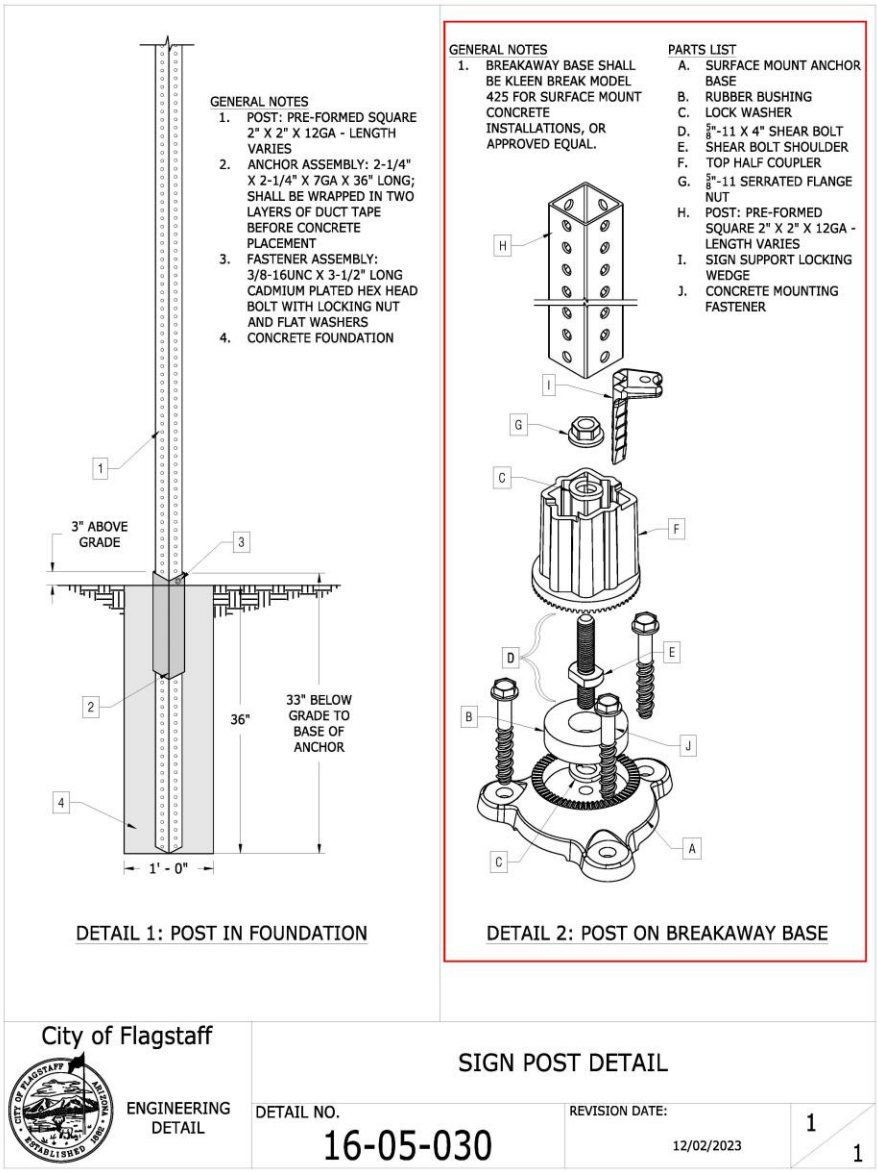
Justification:

Added a note to specify the mounting brackets.

(Back to top)

16-05-030: Sign Post Detail

Section 73. 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:



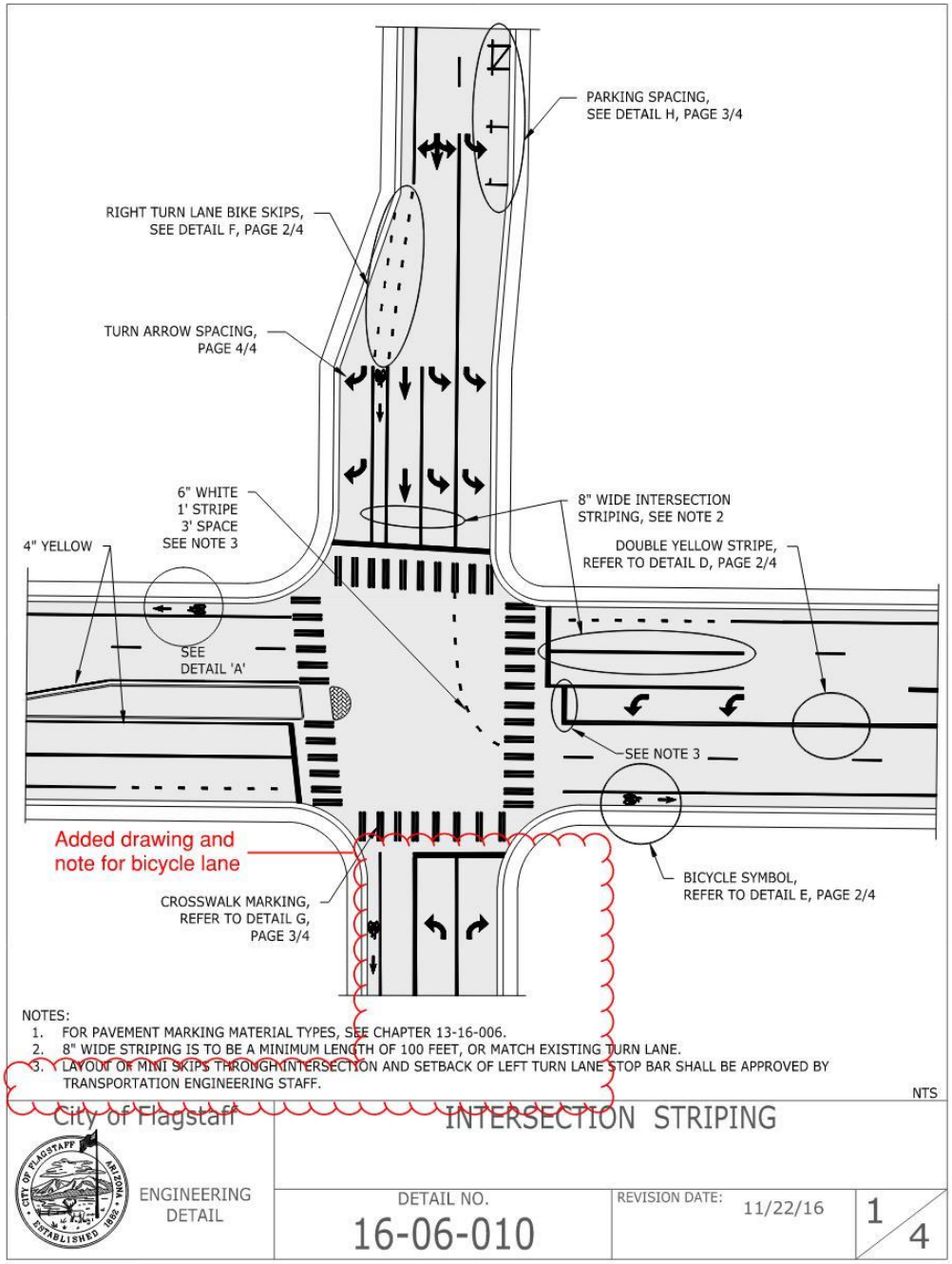
Justification:

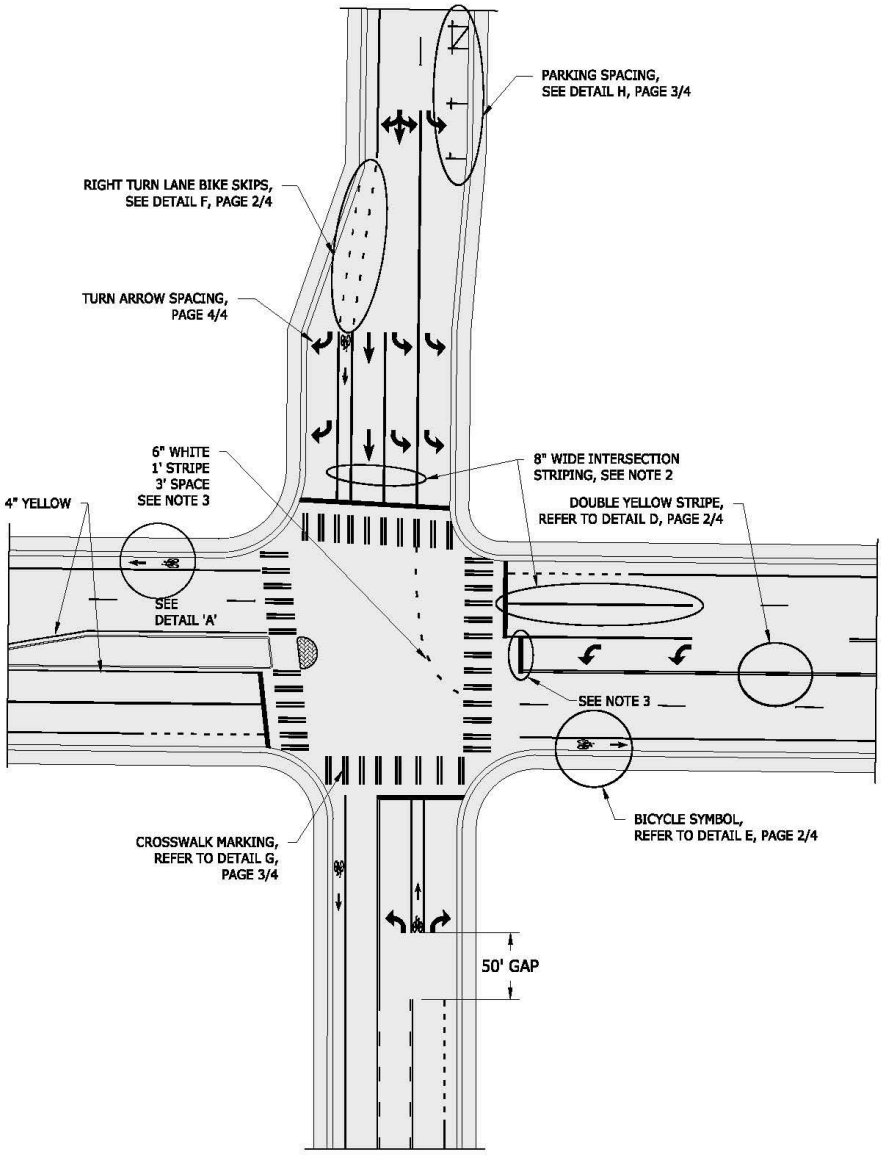
Added a separate detail for the specific breakaway base.

(Back to top)

16-06-010: Intersection Striping

Section 74. 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:

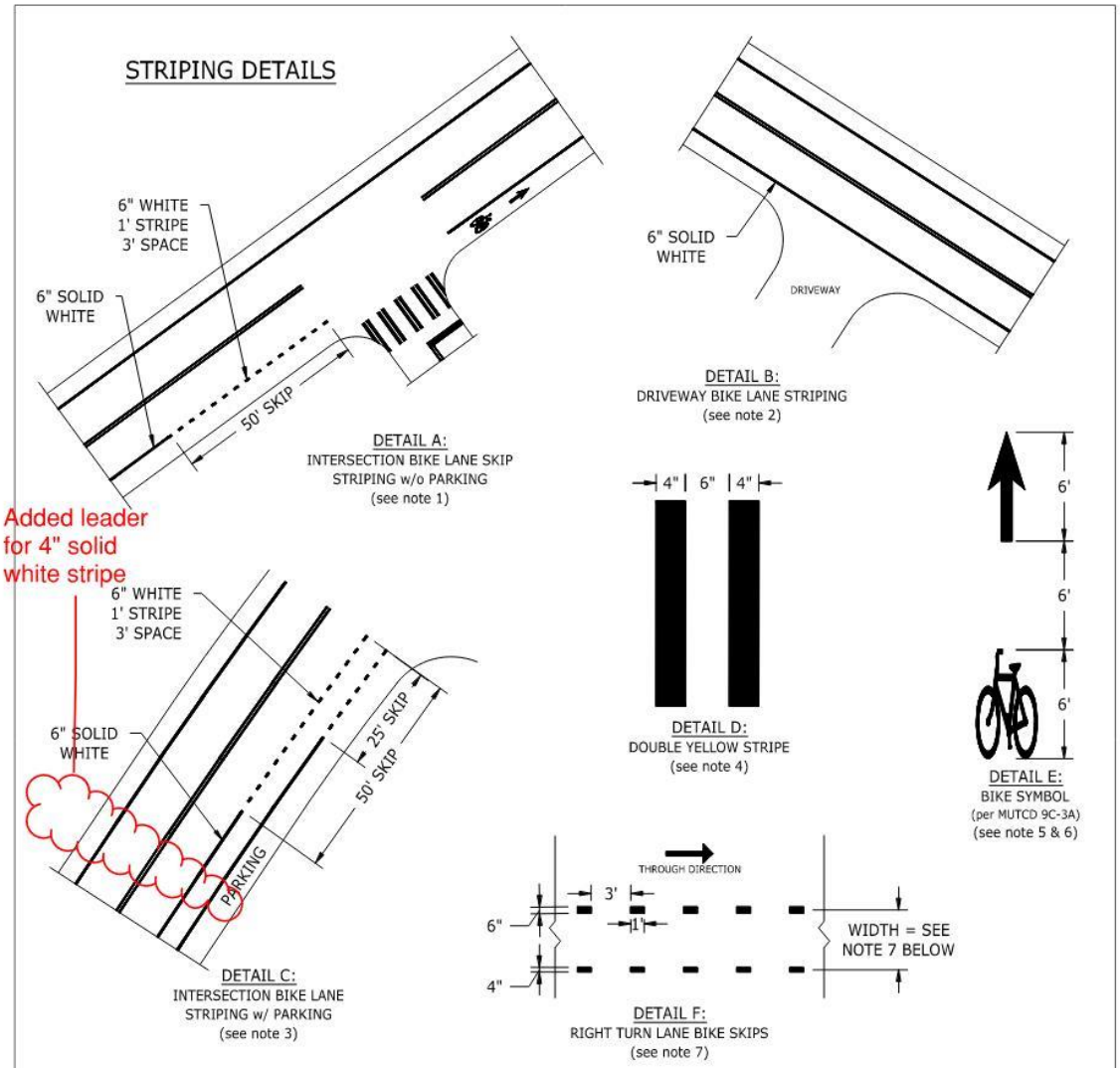




NOTES:
1. FOR PAVEMENT MARKING MATERIAL TYPES, SEE CHAPTER 13-16-006.
2. 8" WIDE STRIPING IS TO BE A MINIMUM LENGTH OF 100 FEET, OR MATCH EXISTING TURN LANE.
3. LAYOUT OF MINI SKIPS THROUGH INTERSECTION AND SETBACK OF LEFT TURN LANE STOP BAR SHALL BE APPROVED BY TRANSPORTATION ENGINEERING STAFF.
4. FOR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

NTS

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

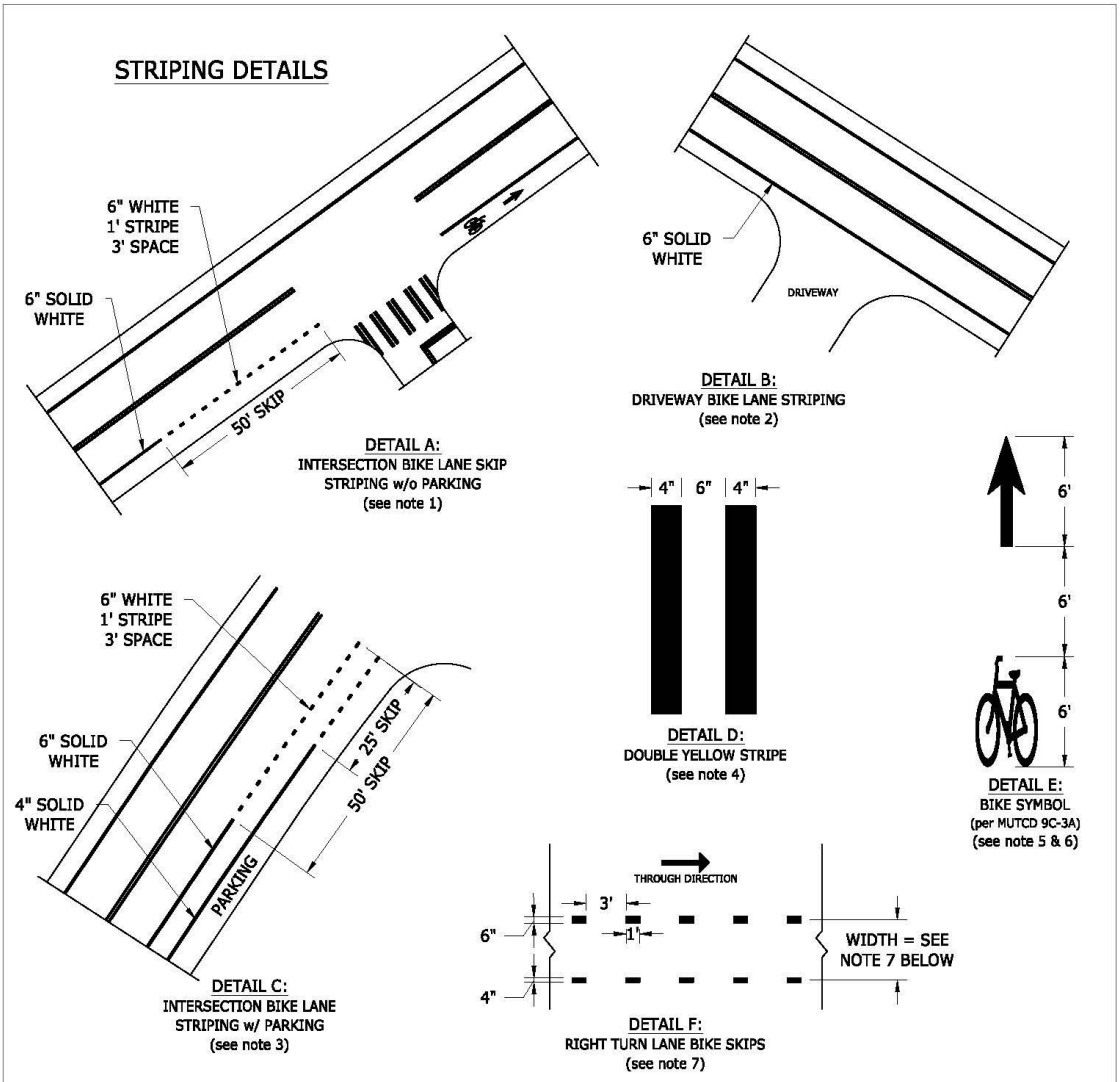


NOTES:

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 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

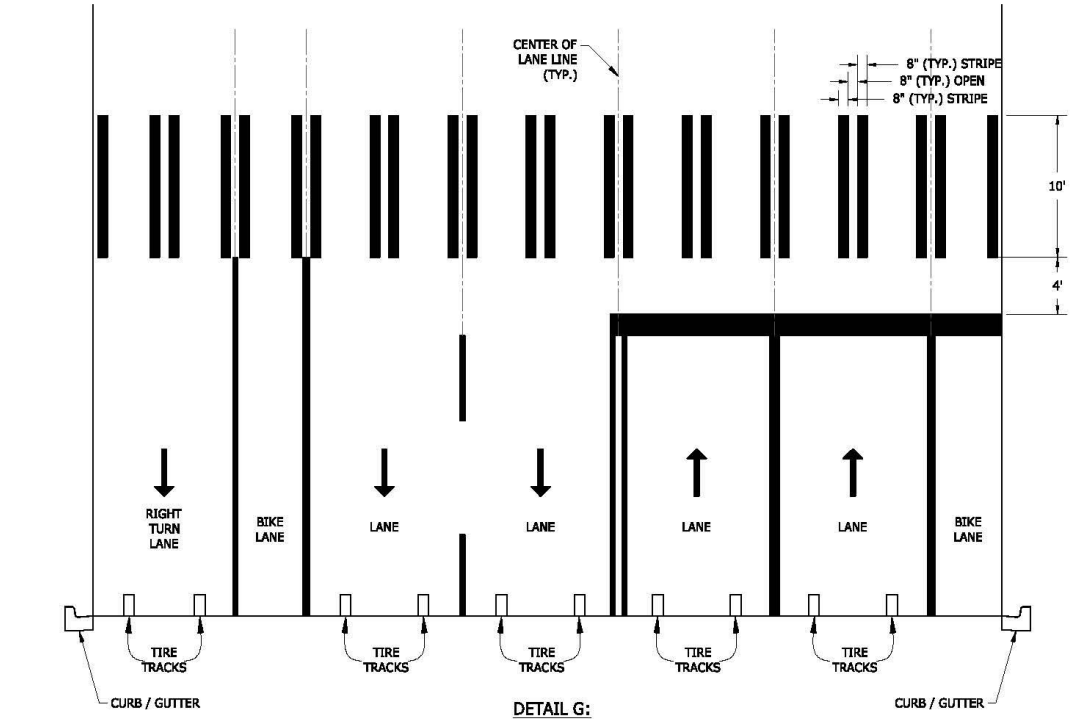


NOTES:

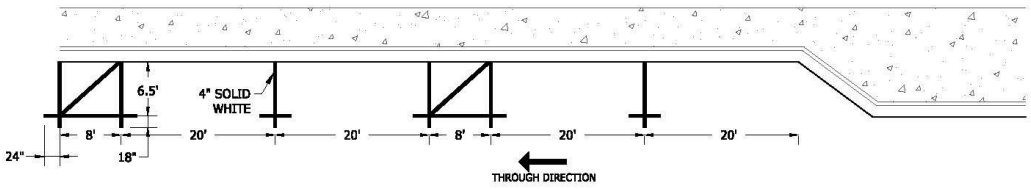
1. USED WHEN A BIKE LANE APPROACHES AN INTERSECTION, STRIPE A SKIP SECTION OF 50 FEET ENDING AT CURB RETURN.
2. SOLID BIKE STRIPING SHALL CONTINUE ACROSS DRIVEWAYS.
3. WHEN PARKING APPROACHES AN INTERSECTION, STRIPE A SKIP SECTION OF 50 FEET ON THE TRAVEL LANE SIDE OF THE BIKE LANE AND A 25 FOOT SECTION 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



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

Justification:

Page 1/4:

- Added an intersection configuration that includes a T-intersection and shows that the bike lane goes between the left and right turn lanes.
- Added a note that states, “For bicycle lanes, stripe a skip section of 50 feet approaching the intersection.”

Page 2/4:

- Added leader specifying the type of striping (4” white solid), Detail C.

Page 3/4:

- Added Note 4 which states, “For crosswalks, if a gap is larger than 6 feet to the center of the marking, add more stripes as appropriate.”

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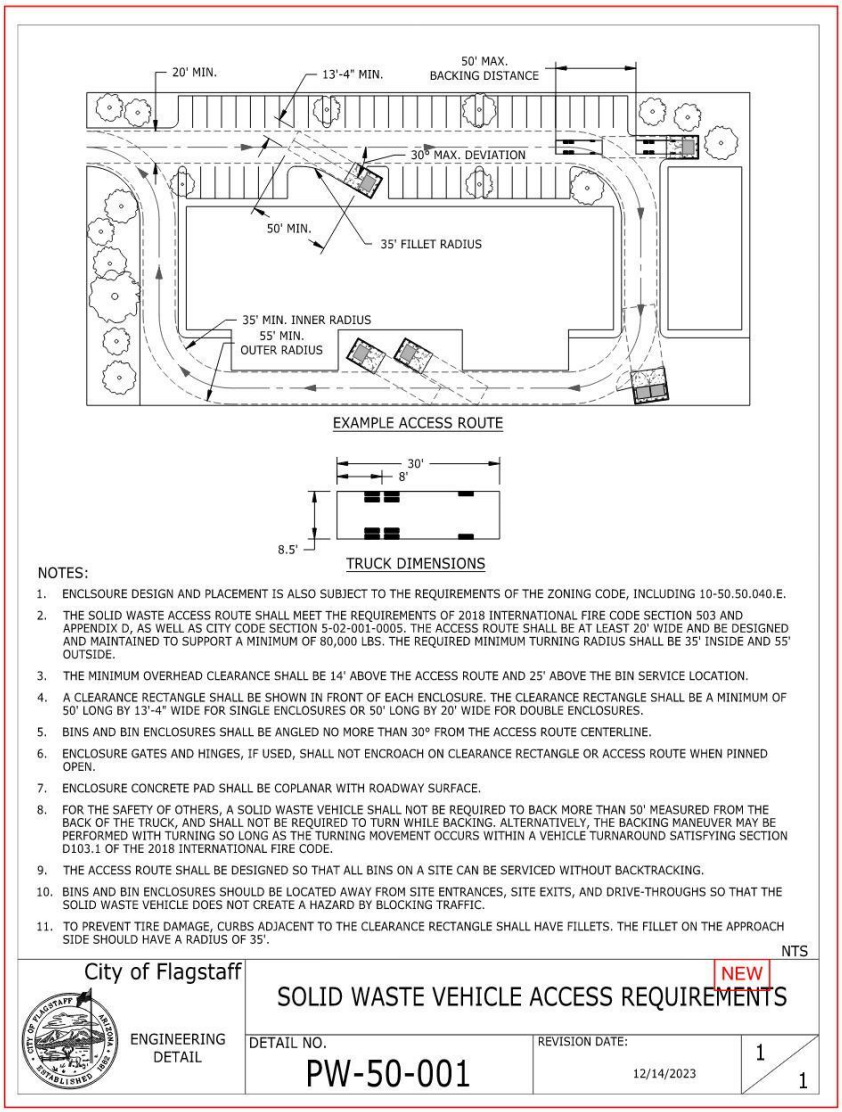
PW-50-001: Solid Waste Vehicle Access Requirements

Section 75. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section PW-50-001: Solid Waste Vehicle Access Requirements, to read as follows:



Justification:

Enclosures have been built that meet our code requirements but cannot be used because their location makes it physically impossible for solid waste vehicles to access them. Enclosures are also sometimes designed in areas with tight maneuvering around obstacles, leading to property and vehicle damage.

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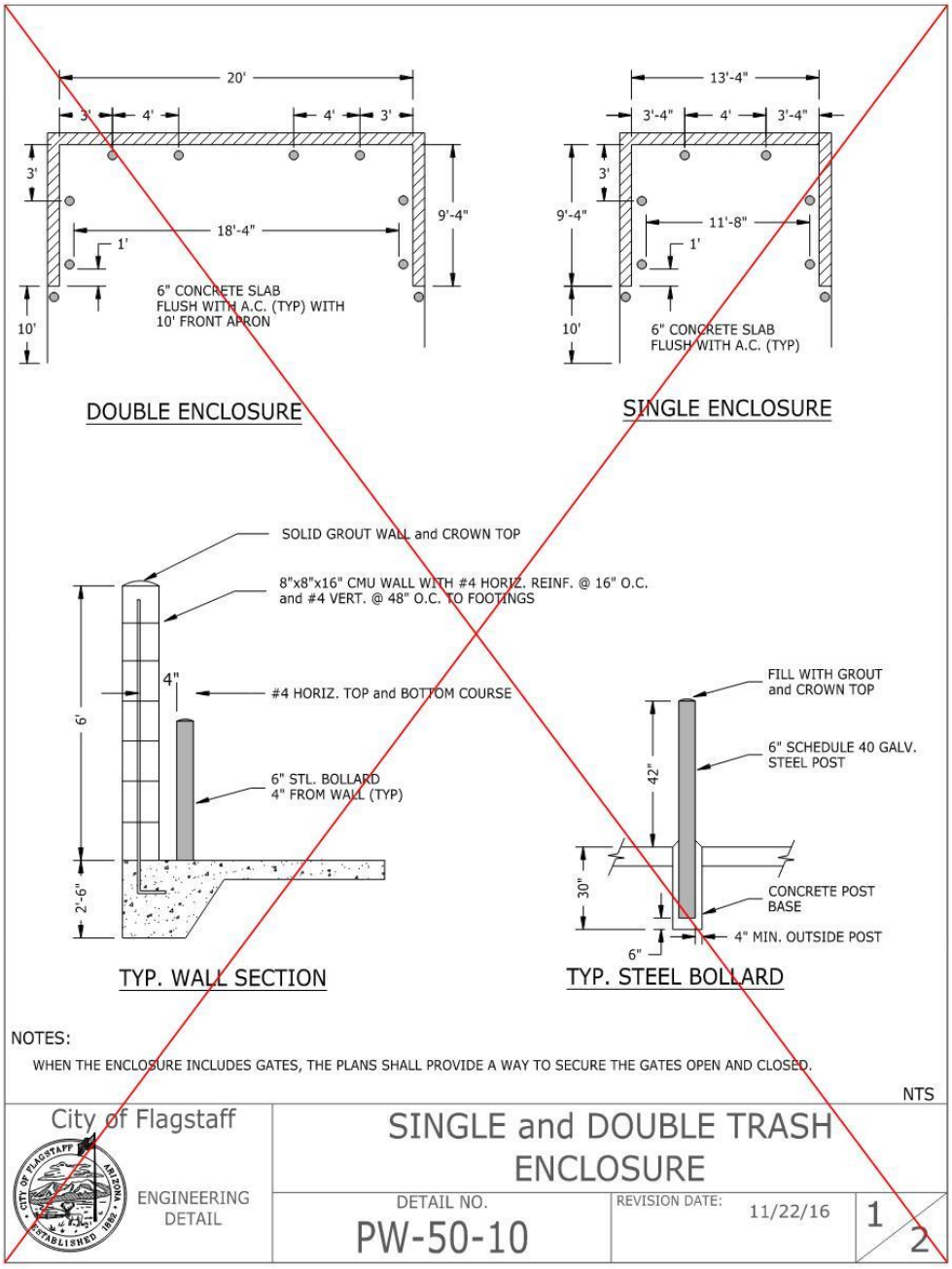
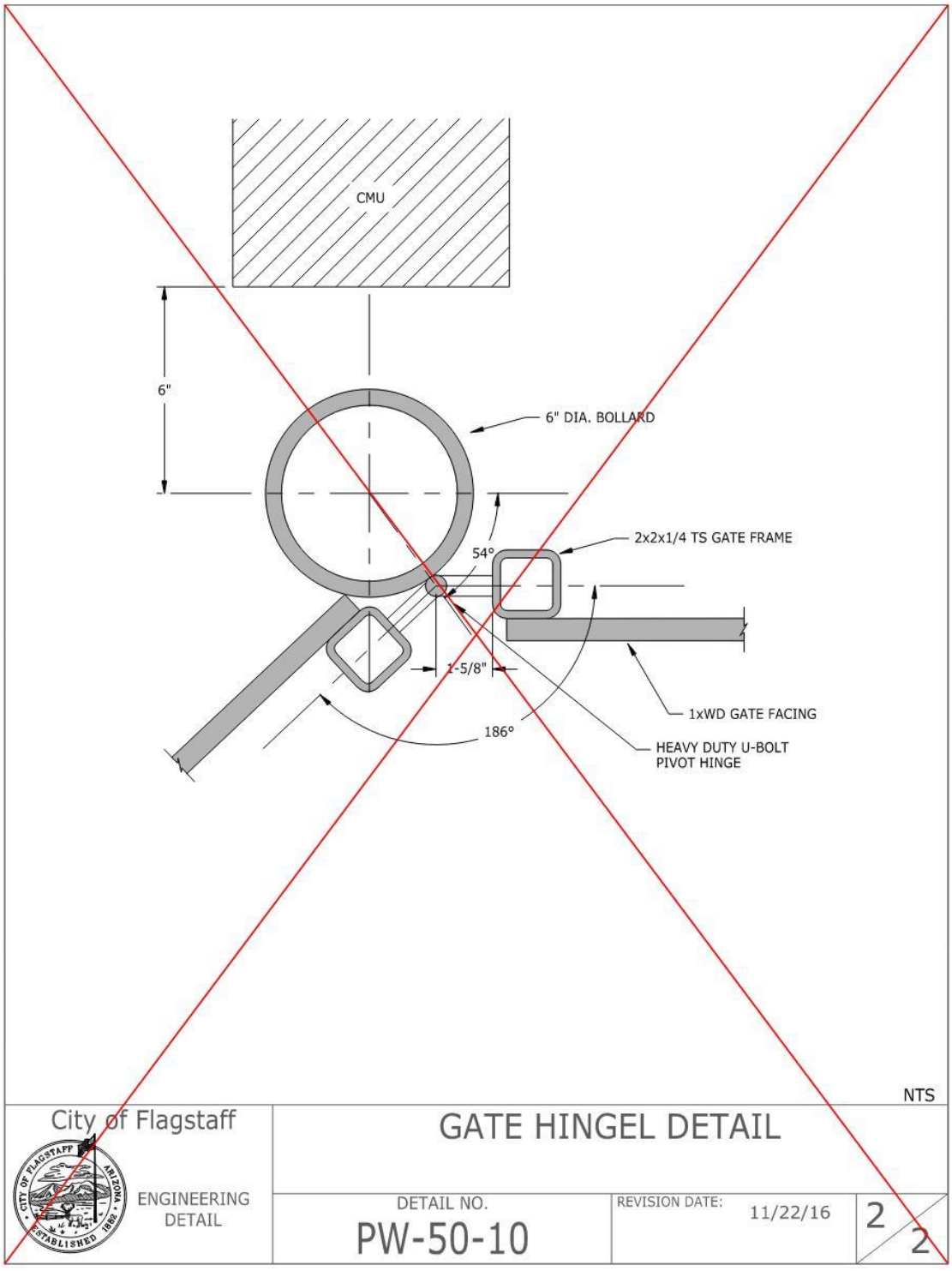
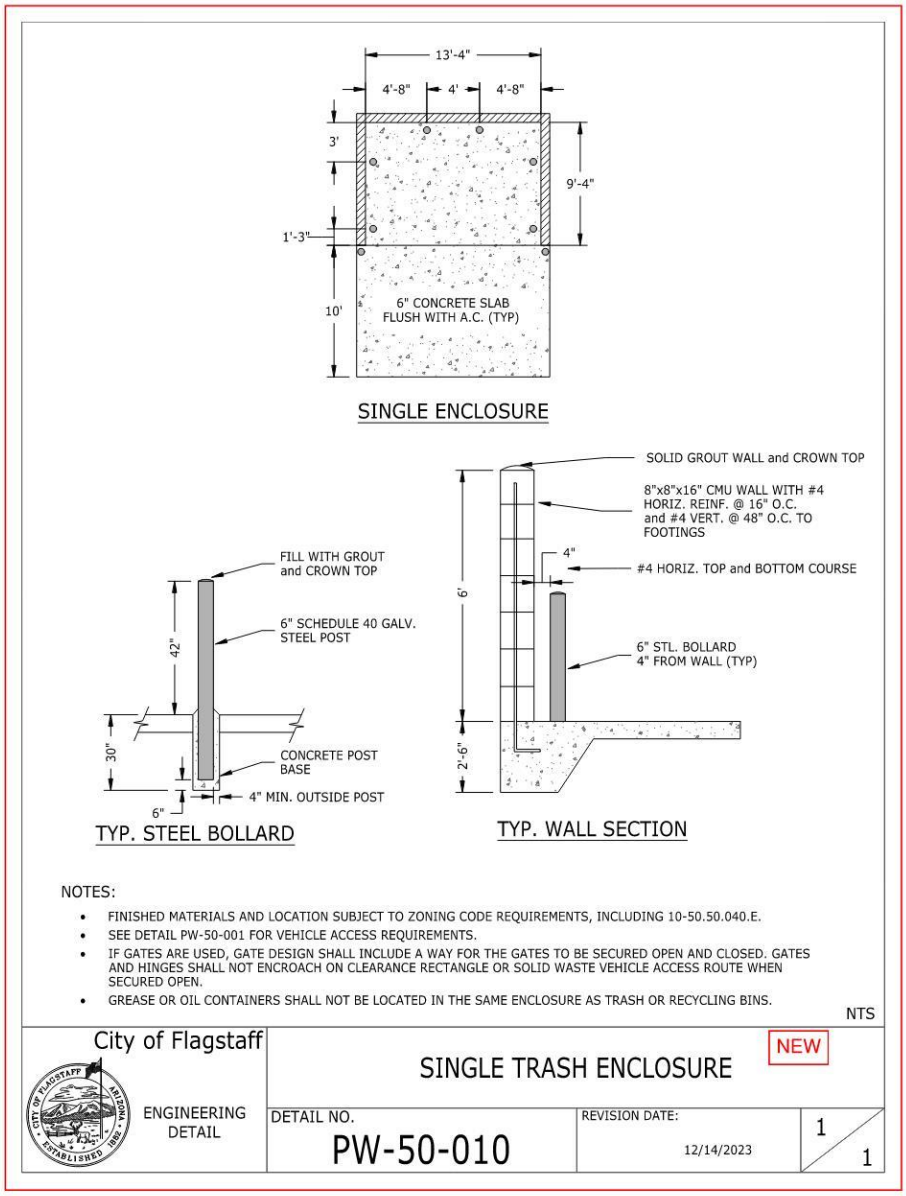
PW-50-010: Single and Double Trash Enclosure

Section 76. 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"
1xWD GATE FACING
186°
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



Justification:

There are mathematical errors in the version of the detail currently in code. These have been corrected. Developers will typically use either the single enclosure or the double enclosure, but not both. Separating them eliminates the need to delete extraneous information from the detail drawing before adding it to a plan set. Grease and oil containers kept in the same enclosure as a trash or recycle bin can be spilled when the bin is serviced. The gate hinge detail doesn't work geometrically and is not used in practice.

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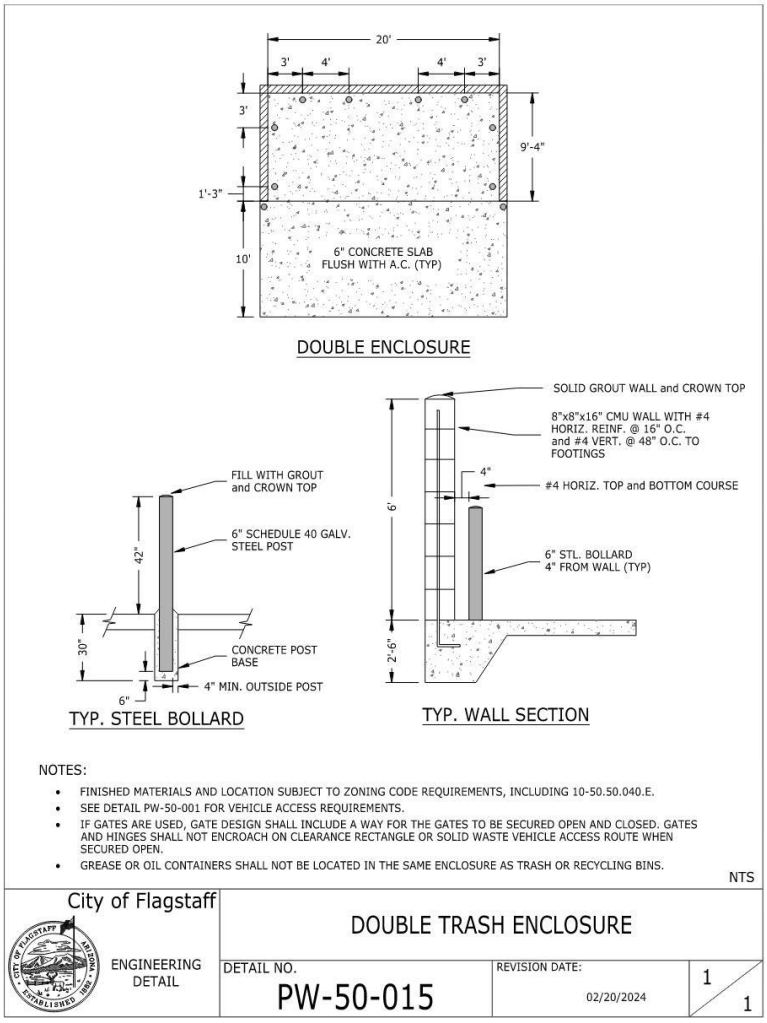
PW-50-015: Solid Waste Double Enclosure

Section 77. Add Title 13 Engineering Design Standards, Chapter 13-23: Standard Drawings, Section PW-50-015: Solid Waste Double Enclosure, to read as follows:



Justification:

There are mathematical errors in the version of the detail currently in code. These have been corrected. Developers will typically use either the single enclosure or the double enclosure, but not both. Separating them eliminates the need to delete extraneous information from the detail drawing before adding it to a plan set. Grease and oil containers kept in the same enclosure as a trash or recycle bin can be spilled when the bin is serviced. The gate hinge detail doesn't work geometrically and is not used in practice.

(Back to top)

Summary of 2024 Amendments to Flagstaff City Code, Title 13, Engineering Design Standards and Specifications

13-04-001: Easements

- Restructured 13-04-001-0003 to make the intent clearer.
- Revised and added language to define more clearly what can and can't be placed in easements.
- Changed the definition of "access" to allow driving ordinary construction equipment in an easement.

13-06-002: Plans Required

- Revised paragraph 13-06-002-0001.1.A.3 to allow for cost to be part of a justification for engineering standards modification requests.
- Removed incorrect and unnecessary scale conversions from 13-06-002-0003.A.
- Changed plan submission requirement from mylar to electronic format in 13-06-002-0004.
- Added a requirement in 13-06-002-0004 for design engineers to provide summaries of changes between submittals during the civil plan review process.
- Added requirement for space on cover sheets for a City approval stamp.
- Changed plan submission requirement from mylar to electronic format in 13-06-002-0008.
- Changed plan submission requirement from mylar to electronic format in 13-06-002-0009.

13-06-003: Grading Plans

- Changed plan submission requirement from mylar to electronic format in 13-06-003-0002.

13-06-007: General Notes

- Added requirements for the general notes to specify the protection of survey monuments and the prohibition of road plates from November to April.
- Added a requirement for the water and sewer notes to specify the abandonment of unused service or stubs.
- Added a requirement for the water and sewer notes to instruct the contractor to verify the size of water service and water meter.
- Added a requirement for fire hydrant testing procedures to be stated on the water and sewer notes.

13-06-008: Construction Traffic Control Plans

- Added statement defining when a construction traffic control plan is required.

- Clarified that Traffic Control Plans are to be approved by the City of Flagstaff Traffic Engineering Section under the supervision of the Traffic Engineer to clean up job title and chain of responsibility.
- Removed the requirements for a specific engineering drawing scale.
- Removed the requirement to include a City permit number on the traffic control plan.
- Added that bicycle and pedestrian accommodations need to be made during temporary realignment or rerouting of existing facilities.
- Added note that accessible routes need to be included per ADA requirements.
- Updated a note to include that the permittee needs to reach out to the transit agency a minimum of 3-days in advance if a transit stop will need to be relocated.
- Updated a note to include that a new plan needs to be submitted and approved if work extends past the original dates.
- Added a note regarding advanced VMB, when they are required to be posted and which roadways and types of closures it applies to.
- Added a requirement for TCPs to have a note that they are only valid for the dates specified and when stamped.

13-09-001: Underground Utilities

- Removed most easement requirements in 13-09-001-0008.G to instead refer back to the easement requirements of 13-04-001.

13-09-002: Sewer System Design

- Removed the column allowing an “n” value of 0.010 for minimum slope.
- Removed requirement for a manhole at changes in pipe material.
- Added prohibition against connecting to an existing manhole by coring.
- Added guidance to locate manholes outside of sidewalks etc. when feasible.
- Changed language of 13-09-002-0010.A to prevent installation of sewer service across multiple parcels without an easement.

13-09-003: Water System Design

- Added guidance for manholes to be located outside of sidewalks, bikeways, bike lanes, and FUTS trails, when feasible.
- Changed language of 13-09-003-0007.F to prevent installation of water service across multiple parcels without an easement.
- Added a statement specifying that water meters shall be located at the frontage of the lot being served.

13-09-006: Sewer and Water Line Materials

- Broadened fire hydrant flange height requirements.
- Added language allowing some flexibility for hydrant installation positioning when necessary.

13-10-002: Street Design

- Moved Tables 13-10-011-01 and 02 to this section.
- Changed language in Table 13-10-011-01 regarding installation of roll curb.

13-10-006: Intersection Design

- Added requirements for lane alignment through intersections.
- Changed the approach intersection grade for signalized, or likely to become signalized, intersections from 2% to 3%.
- Added the approach intersection grade for a roundabout to be 4% for 200-ft.
- Added that an intersection shall maintain a maximum 2% cross slope.
- Added a table for minimum spacing of driveways to a roundabout controlled intersection.

13-10-007: Horizontal Alignment

- Updated reference to Table 13-10-011-01.

13-10-010: Driveways

- Added reference to NCHRP Report 659.
- Added requirement to pave driveways and parking areas.
- Added reference to new solid waste access requirements.

13-10-011: Resource and Slop Design Criteria

- Removed Tables 13-10-011-01 and 02 from this section to be added to Section 13-10-002-0001.

13-12-003: Lighting Layout Requirements

- In Table 13-12-003-01, changed the IESNA Distribution number for the Local (All) from 1 to 2.

13-12-005: Street Light Equipment

- In Table 13-12-005-01 changed the Maximum EPA to 1.5 square feet to match the design of our new Signal Pole design standards.
- Updated the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals to the newer edition (6th edition, with 2015 Interim Revisions).

13-14-001: Pedestrian and Bicycle Facilities

- Updated the name of the division to include pedestrian facilities.
- Updated the reference to the AASHTO “Guide for the Development of Bicycle Facilities.”

13-14-002: Flagstaff Urban Trails System (FUTS)

- Added this whole new division.

- Added detail for design guidelines, dimensions, structural requirements, expansion and control joints, shoulders, street/sidewalk transitions, fencing, and tunnels and underpasses for Flagstaff Urban Trail Systems.

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

- Combined this chapter with Chapter 13-04, which is also related to rights-of-way and easements.
- Separated permit application requirements from permit requirements.
- Changed from paper plan submission to electronic plan submission.
- Added reference to Division 13-06-008 for traffic control plan requirements.
- Added reference to prohibition of road plates from November to April.
- Updated contact and notification requirements.

13-16-002: Signal Design Elements

- Added statement that signal cabinets, poles, push buttons, and streetlight poles shall be outside of pedestrian/bicycle ways, and that full width shall be maintained. Referenced the newly added Pedestrian Push Button Locations standard drawing.
- Added statement that push buttons shall be located to meet ADA requirements.
- Changed multiple references to ADOT Type G signal heads to instead be a 12" – 4 section heads.
- Added statement that all signal heads shall include a 1" retroreflective border around the perimeter of the backplate.
- Added new section titled 13-16-002-0003 Traffic Signal Pole Design Requirements. This specification describes the general requirements for traffic signal equipment to be installed within, or supplied to, the City of Flagstaff.

13-16-004: Signal Construction

- Added specification for bagging new traffic signal and pedestrian heads.
- Changed plan submission requirements from paper submissions to electronic submissions.

13-16-005: Traffic Signs

- Added statement that traffic signs shall be outside of pedestrian/bicycle ways.

13-16-006: Pavement Markings

- Added statement that pavement markings shall comply the MUTCD, the Arizona Supplement to the MUTCD, the ADOT Traffic Safety for Schools, Guidelines, and these standards.

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

- Updated the line of site at intersections and driveways section to follow AASHTO standards.
- Created new figure to illustrate the new dimensions.

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

- Added a statement to disallow plating during winter months (Nov. – April) for snowplow operations to the MAG Detail 211 – Standard Trench Plating Detail.
- Added reference to NCHRP Report 659 in MAG Detail 250 and 251.
- Updated reference to MAG Detail 420 and removed requirement for steps in manholes.
- Updated reference to MAG Detail 421.
- Updated reference to MAG Detail 422 and removed requirement for steps in manholes.

Standard Drawing 8-06-010: Standard Valley Gutter

- Increased concrete apron thickness.

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

- Delete previous detail drawing and replace with a new one.

Standard Drawing 09-03-101: Air Release Valve 1”

- Delete previous detail drawing and replace with a new one.

Standard Drawing 09-03-102: ARV Location and Standpipe Positioning

- New detail drawing specifying position of ARV and standpipe.

Standard Drawing 09-06-071: Double Check Valve Assembly Installation

- Removed drainage and updated notes.

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

- Added GFI outlet.
- Changed “dump outlet” to “relief valve”.
- Updated notes.

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

- Resized and centered drawing.
- Removed reference to U.S.C.
- Updated notes.

Standard Drawing 10-06-011: Standard Delineator

- Changed the delineator sign to MUTCD OM2-1V, as the previous sign was out of date.

Standard Drawing 10-06-015: Median Nose Signs

- Added a new standard that provides clarity and consistency for median nose signage utilizing MUTCD signs R4-7 and OM-3R.

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

- Separated into two drawings, one for streets and one for off-street driveways and parking areas.

- Rephrased note to require design by a registered engineer.

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

- New detail for off-street driveways and parking areas with information taken from Standard Drawing 10-09-010.

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

- Updated ADA reference.
- Added note referencing new solid waste access requirements.

Standard Drawing 10-10-019: Bus Pullout

- Added a note stating that when a shelter/bus stop is adjacent to a FUTS, the FUTS shall be aligned behind the shelter/bus stop.

Standard Drawing 10-10-035: Bicycle Exit / Entrance Ramp

- Added a new standard that provides clarity and consistency for bicycle exit and entrance ramps. The City has designed these ramps many different ways and this is the one we have decided to standardize.

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

- Delete this standard drawing.

Standard Drawing 13-03-011: Fire Hydrant Assembly

- Update flange height range to match 13-09-006-0006.R

Standard Drawing 13-03-015: Collapsible Bollard

- New detail for a collapsible bollard for use on FUTS trails in place of removable bollards.

Standard Drawing 14-01-010: Flagstaff Urban Trails System Details

- Delete this standard drawing and replace with Drawings 14-02-001, 002, and 010.

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

- Delete this standard drawing and move the information to the new Division 13-14-002

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

- New drawing to replace 14-01-010 with updated information related to the new Division 13-14-002

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

- New drawing to replace 14-01-010 with updated information related to the new Division 13-14-002

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

- New drawing to provide more detail on expansion and contraction joint construction on paved FUTS trails.

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

- New drawing to replace 14-01-010 with updated information related to the new Division 13-14-002

Standard Drawing 16-02-010: Traffic Signal Pole Design

- Added a new standard that provides clarity and consistency for design of traffic signal poles.

Standard Drawing 16-04-010: Pedestrian Rapid Flashing Beacon

- Changed the title of this standard.
- Page 1/5:
    - Added the location of the electric service and signal cabinet/BBS.
    - Added notes on the specific cabinet, battery backup system, and electric service required for this set up.
- Page 2/5:
    - Added MUTCD R1-5L signs and a note that includes the location of the signs.
    - Added MUTCD W11-2 sign to each mast arm.
    - Added references to other standard pages.
- Page 3/5:
    - Added a new custom sign which states “Cross Traffic May Not Stop Use Caution When Crossing.”
    - Updated the pedestrian push button and size of the MUTCD R10-25 sign that is mounted to it.
    - Changed the dimension of the fluorescent yellow prismatic retroreflective border from 2” to 3”.
    - Added notes to align with ADA requirements.
    - Updated the signal heads to not include louvers.
    - Added height dimensions to signs.
    - Updated the height to the pedestrian push button from 38” to 42”.
    - Added references to other standard pages.
- Page 4/5:
    - Updated the signal heads to not include louvers.
    - Added MUTCD W11-2 sign to the mast arm.
    - Changed the dimension of the fluorescent yellow prismatic retroreflective border from 2” to 3”.
    - Added note to specify mounting bracket for the overhead MUTCD W11-2 sign.
    - Added references to other standard pages.
    - Updated the height to the pedestrian push button from 38” to 42”.
- Page 5/5:
    - Added new page with detailed information on the mechanics and material list for the signal heads.

Standard Drawing 16-05-010: Street Name Signs

- Updated an error with dimensioning of the height of the letters on Detail A.

Standard Drawing 16-05-020: Traffic Signal Street Name Signs

- Added a note to specify the mounting brackets.

Standard Drawing 16-05-030: Sign Post Detail

- Added a separate detail for the specific breakaway base.

Standard Drawing 16-06-010: Intersection Striping

- Page 1/4:
    - Added an intersection configuration that includes a T-intersection and shows that the bike lane goes between the left and right turn lanes.
    - Added a note that states, "For bicycle lanes, stripe a skip section of 50 feet approaching the intersection."
- Page 2/4:
    - Added leader specifying the type of striping (4" white solid), Detail C.
- Page 3/4:
    - Added Note 4 which states, "For crosswalks, if a gap is larger than 6 feet to the center of the marking, add more stripes as appropriate."

Standard Drawing PW-50-001: Solid Waste Vehicle Access Requirements

- New detail to describe how to position solid waste enclosures for safe access by trucks.

Standard Drawing PW-50-010: Single and Double Trash Enclosure

- Separated this detail into one for a single enclosure and one for a double enclosure.
- Corrected some dimensioning errors.
- Deleted the gate hinge detail.
- Added a note requiring that gates and gate hinges not encroach on clearance rectangle.
- Added a note requiring that grease and oil containers be kept separate from trash or recycle bins.

Standard Drawing PW-50-015: Solid Waste Double Enclosure

- New detail for solid waste double enclosure taken from PW-50-010.

Engineering Standards Revisions

Summary of Commissions/Committees and Public Comments

Contents

12/06/2023 Transportation Commission

Commissioner Questions/Comments:

- Councilmember McCarthy – Sometimes when driving down Butler it is difficult to see the stop lights because the sun is right in the view. What can we do about this? Maybe another signal lower down, but maybe peds would block it. Has staff every thought about a solution to this? Santana – Retroreflective backplates on the signal heads. ADOT just recently did this all along Milton. Bauman – We have updated the ped rapid flashing beacon signal heads to include these. Do show up in Highway Safety Manual as being effective. We haven't called them out on our traffic signals at this point, but we can. One potential issue is we are very windy here and our signal heads require louvers, we cannot do the backplates and the louvers. Maybe more research on our part to see which one we can do, or if there is an option for both. There are a couple signal heads mounted at 8' high.
- Commissioner Kuhn – How often are the crosswalk marking redone? Bauman – Not sure PW schedule, but they are struggling to fill positions and that is why signing and markings are behind. The arterials twice a year for longitudinal lines, then crosswalks and stop bars half the City one year and the other half the next year. PW just cannot hire people, open positions for years. Exploring possible contractor options to catch up. Limited to shorter season. Kuhn – maybe prioritize certain locations? Bauman – Good idea, we can discuss this with them.
- Commissioner Koenig – Martin, assume went through the ATMP for bike & ped stuff? Martin – Yes, went through it and divided into three categories, easier, medium, more difficult.
- Commissioner Koenig – Can we add queuing space at intersections for bikes? If ped pushes button, where do they put themselves in the pathway, maybe increase pathway size? Martin – Can take a look at that when reviewing for curb ramps at intersections. PROWAG becoming official guideline and how it will affect curb ramps and include where to stage ped/bikes that are waiting. ADOT Milton CMP says benefit for ped/bike staging areas. PROWAG also may require this.
- Commissioner Koenig – Bike signals? Martin – Some upcoming projects may include bike specific signals and leading pedestrian time. Maybe this can be in future code updates, can investigate this.
- Commissioner Cruickshank – Bike exit and entrance ramps, is there a specific sign for this ramp? Santana – Do not believe there is a sign. Bauman – there is not a specific sign, but the pavement markings are the signal for this, the skip striping. Cruickshank – Is this enough? Bauman – There is no merging or conflict, because the line is just an extension of the curb.
- Commissioner Cruickshank – Ped Rapid Flashing Beacon and the crosswalk is offset. Santana – Safer for the peds, because makes them stop to think. Bauman – This is just a schematic, this depicts a narrow median, the normal is like 15ft, the wider will make it easier to stay on bike.
- Commissioner Cruickshank – Is there a standard for the push button location in a median? Butler & Humphreys, button is way too close to the roadway, it needs to be set back from the roadway. Bauman – This was the first one we ever installed and used flashers installed in the medians. It is also bad because they get hit often. The new typical layout requires mast arms, the median mount is just a button and can be places not so close. This crossing will get upgraded soon-ish.
- Commissioner Stone – For these types of crossings, is it standard for each side to be independent buttons? Pressing the button twice, maybe time it. Santana – Have designed these to be pushed twice, do not want to zoom across, want the peds to pause and check traffic and push button. Also, added a little LED button so peds know it is on. Bauman – False calls for

infrared detected crossing. When have offset and Z crossing, tend to run as two crossings, if narrow median, just single crossing. Responsiveness is key.

- Councilmember McCarthy – Maybe put a sign out for peds saying you must push two buttons, peds do not know to push it twice.
- Commissioner Koenig – Impact analysis and modeling. Bauman – Will be a different round.

Public Comment:

- Dapper Dre – Not sure if this is all crossings, but a heavy ped area is out in front of Crystal Magic, not good for people that are not able bodied. If in a wheelchair and go off the ramp, it aims you straight to the middle of the intersection. Maybe this can be a standard that can be added. Maybe get community/citizens to help with striping around town since PW is so short staffed. Prefer people to refer to crashes as 'crashes', not 'accidents'.

12/07/2024 Bicycle Advisory Committee

Ince gave a presentation to summarize the revisions to the engineering standards that are related to the ATMP.

- Committee Member – Tunnels discussed, being able to see the end, and feeling safter? Martin – can consider this in the next round. Committee Member – Lighting requirements in tunnels? Martin – not in this round but will add to the next round.
- Committee Member – Question regarding rapid flashing beacon, the z-crossings are not great for bikes, but they are good for peds. Martin – the changes are minor structural details and adding more signage. Committee Member – Get on bike, start peddling, slam on breaks, do not love as crossing method, experiences on Butler having to push both buttons, do not like. Would prefer to go on the rdwy than use this signal. Committee Member – would imagine people in a wheelchair would struggle with the z-crossing also.
- Committee Member – making that sharp turn is difficult and do not like having to push the buttons, maybe have the drivers get out of vehicles to push the button.
- Committee Member – leading pedestrian intervals, would something like that be included in these standards? Martin – Yes, this is a spot for something like that. Committee Member – push buttons for cyclists? Martin – yes, this is the spot for something like that. We have discussed things like this, but a next round of the updates.
- Committee Member – difficult to tell if the light is flashing. Martin – Jeff point is PROWAG has detailed guidelines for audible pedestrian signals.
- Committee Member – Does not like the yield (RFB's), likes the PHB's better because feel safer. Martin – these are in MUTCD, they do human factor studies before they are installed. Putting anything new out needs to be learned. PHB used a lot in Tucson. If not intuitive, how long does it take to learn? Martin – follow up question is if we do not use these, what would we use? Committee Member – a regular signalized intersection. Martin – there is a half-signalized intersection on University. Estella – this is more normal and people know how to use it.
- Committee Member – Trail surfaces on FUTS, anything that has commuter traffic should be paved, so can be plowed and swept.

12/27/2024 Commission on Inclusion & Adaptive Living

Ince gave a presentation to summarize the revisions to the engineering standards that are related to the ATMP.

- Commissioner Rachael - encouraging people to put tires up on sidewalks. If abut sidewalk to street, encourage people to block sidewalk. Martin - require parkway for our cross section, maybe moving froward, if roll curb, will require parkway. Cul-de-sacs, little on street parking because driveways are so frequent.
- Commissioner Rachael - ADA requirements ramp 8.33%, 8% is perfect.
- Commissioner Russel – FUTS trail and railings? Any discussion on railings? Martin – Will look into this and see if other documents provide guidance, this may fall into the next round of revisions, because more discussion.
- Commissioner Rachael – Any recommendations/requirements for hearing disabled people? Martin - PROWAG has much info on Accessible Pedestrian Signals (APS). There hasn't been guidance on how they work before.

01/18/2024 Business Advocacy Division Meeting

David Millis gave a presentation which included a summary of the proposed Engineering Standards revisions -

- Joe - supportive of admin code changes, want to be more engaged on political sensitive items. Heads up on when that may start. Sustainability would come before the public, what to be ahead of the game on those changes.
- Chair - will go through this and get back with any questions. Echo what first guys said, interested in the next round changes. Millis - sign up for emails and we will keep updated to all rounds.
- Guillermo - appreciate looking and cleaning. Is there any chance we would add other things to this? Millis - if there are other things interested in adding to this round, give us the comments now. Depending on the extents of the change, may be able to get it this round. Guillermo - cross sections - looking at JWP & Butler things are changing. Millis - not in this round. Jeff - Butler, following council priority. Started to dive into cross sections and it got complicating fast. One of the biggest priorities was schedule. We will continue the collaboration now, but not in code now.

01/31/2024 Public Open House

City Staff: David Millis, Robert Thompson, Paul Mood, Martin Ince, Reid Miller, Steph Santana, Jeremy DeGeyter
Public: Caleb Landing (Peak Engineering), Carlton Johnson (Norris Design), Anne Dunno (Mtn Line), Tyler Denham, Dapper Dre (citizen), Adam Shimoni (FBO), Zach Markewicz (Daily Sun/Lumberjack), Mandia Gonzales (MetroPlan), Rick Schuller (Ardurra-Woodson Engineering), John Carr (Coconino County), Julie Leid (Peak Engineering), Tom Smith (Peak Engineering)

- Tyler - Safety of vertical curbs versus roll curbs for bicycles.
- Julie - Addition of professionally prepared in TCP, are they sealed. Millis - does not need to be sealed, but Trafficade, try to clarify what is on application.
- Julie - roll curbs, driveways #7 understands it now, but struggled when read it. Got hung up on access point, is it a concrete apron, Millis - maybe 'vehicular access'. Julie - work on the wording, it is a concrete dwy or apron.
- Julie - Paving all access per City - fire lanes compacted AB, not much room. Millis - language was intended to be crafted, access to code required parking/drives/etc. So if other portions of a lot,

ex pulling trailer over to other side of the lot. Julie - the fire code piece was hung up. Idea do not want tracking of material in to the rdwy. Secondary access in that case. Millis - maybe exclusion for emergency type use is not intended to have that requirement. Detail references does include option for alternative sections. Stick with typical standard for anything that is secondary access and not routinely used except for

- Julie - thank you for FUTS fencing stuff, it is helpful.
- 13-10-011 - Typo 'Slop'
- Anne Dunno - 10-10-019 - transit guidelines document, how to incorporate transit in environment. Does it just make sense to include guidelines in here. Maybe good location to discuss Mtn Line guidelines. IDS - meetings intended for that.
- Anne - Process comment, unclear how permitting process for traffic memo, Traffic Statement, TIA. Timing on when it occurs, has own separate scoping and review process. Whole separate scoping. Millis - would like to see it as requirement? Anne - Make comment in code to refer to the TIA guidelines. Steph - we will tackle that next round.
- Julie - pg. 137 - access routes for trash, saying that any route that a trash truck may have to follow has to be 20' paved clear the whole way. Ex - have angled one way stalls, that one way drive needs to be 20', so could not have a splitter island in a dwy opening within that 20'. Millis - coming from PW & Development Engineering. Ex - saw example at a school. What we did was this is a prescriptive, you meet it you meet it. If constraints, can provide additional turning movements, and show that it can fit. Do not want to burden with more asphalt. Julie - maybe a note 12 - turning movement or engineering analysis, demonstrate it works. Millis - open to looking that and make that change.
- Tyler - LOS, design speed, bike/ped. Martin & Paul - water valves, manholes, push buttons (minor stuff). Next round will be more Council discussions. Mentioned the different boards and commissions. Millis - TCP need to include more for ped & bike closures, include accessible routes along arterials & collectors.
- Caleb - 13-06-008 - TCP's - TCPs need to accommodate peds/bikes/ADA access.
- Caleb - Temp ped routes following ADA, maybe consider PROWAG. Martin - formally adopted, but not adopted as law, went from being a best practice to what need to do to meet ADA criteria. Enforceable law, not yet. Caleb - will PROWAG be the new ADA requirement. Martin - yes, XX.
- Shimoni - when will phase 2 start? Millis - what policy goals will come down from Council. Steph - cross-sections coming next, bike lanes off the rdwy, get started right away. Adam - more curious when LOS conversations come. Steph - that one is more complicating and may even come later than the next round? Need to discuss with Jeff & Paul Mood.

02/01/2024 Virtual Public Open House

City Staff: David Millis, Robert Thompson, Martin Ince, Reid Miller, Steph Santana, Dee Williams
Public: Anthony Quintile (Flagstaff Biking Organization), Carl Ramsey (Architectural & Environmental Associates), Jason Carlaftes (WSP Engineering), Payton Cooke (WSP Engineering), Taylor Davis (WSP Engineering), Guillermo Cortes (Ardurra-SWI), John Sutherland (Capstone Homes), Kayla Fleishman (Ardurra-SWI), Michelle Medina (WSP Engineering), Stephen Irwin (Ardurra-SWI), Steve Orosz (Paradigm Engineering)

- Anthony - FBO - when is timeframe for seeing bike changes in code. Martin - short answer is TBD, have identified number of places where code will require further discussion with community & to implement ATMP. Planning & Engineering & Sustainability & Transportation

going through more comprehensive analysis of code. Do not have definitive timeframe, but we have been talking about the changes and the process to get it done. Anthony - okay, always harder than it needs to be, ATMP went through lots of public input so the challenge is putting it into legal language. Millis - ??

- Guillermo - Ask to dive into more about intersections and grades, maybe look at longitudinal grades, besides intersections, along a. Millis - GC - would like us to look into changing the grades on longitudinal arterials & collectors.
- Steve Orosz - when do get up to 4% at roundabouts, 4% difficult with ice at roundabouts. Steph - Jeff did the research on this and quoted AASHTO, but would need to refer to him on what he found. Steve - just concerned with going up to 4%.
- Millis - roll curb item, trying to respond to developer concerns and City struggle to get dwy entrances in in these tighter developments.
- Kayla - saw in the markup road plates during winter, was intention plows? Millis - correct, plows hitting the plates and causing damage to the plows, do have stipulation to allow if approved, intention is to improve safety for the plows in public ROW, that is open to traffic.
- John Sutherland - Thank you for changes, removal of the ramp/driveway pertains more to where have more vertical curb, have some subdivisions that have 45' lots and others to have different price point homes, wondering it combo ramp/dwy detail been removed, narrower lot subdivisions. Millis - Maybe combo dwy entrance w/ tactile dome, will not get into this round for sure, in the meantime (getting standards updated) and if came in with something that needs this we can discuss. Do not see immediate concern as long as dwy approach is single family with no commercial. Martin - XX
- Stephen Irwin - "Are the cross section updates you mentioned the same cross sections we have been applying to recent projects where we remove the bike lanes and pour wider 11' sidewalks?" Martin - talking future updates to cross sections? Yes, then yes, that would be part of it. Guillermo - any areas where there would be both, where there is a bike route & 11' path? Martin - 2 questions, first, have identified existing rds that need to be widened in future and need this treatment, have not looked to see if benefit of both bike lanes & path. Second, limited number of streets, either improved or new in Regional Plan, retrofit Butler Ave 9.6M grant, that is not all over town. Where we can, we will provide buffer, cannot do it but in a few select corridors. Can share the map of the bike network across town.
- Kayla - min slope n value removed. Millis - ADEQ - Concern from citizen brought to our attention. ADEQ allows 0.01, but requires a separate plan? An ongoing maintenance program by water services to accomplish that. So by just having table in our Standard that conflicts w/ ADEQ, was our reason for that. Kayla - are there areas where we have those flatter runs and will have to go into maintenance agreement w/ ADEQ? Millis - did not want to be in business of adding more in there, but would have to check w/ water services to check how they are currently doing that.
- Millis - aggregate trail - maybe should not be referring to that standard. Robert - did not look at that. Millis - may need to continue that on…
- John - Bigger questions on FUTS, but also some minor ones. Plan to put on the website. Streetlights, fixtures and what to purchase. Plans say install whatever watts, but the light color, place where we can be more specific. Steph - get a list of brands & the exact model. We can work on creating something like that. Millis - conversation w/ Jeff on this. Wouldn't even need to update standards, the section talks about this. When we see luminaires that do meet standards, we will create a list, at that time w/ conversation, have not had enough submittals to create that. That is only item in standards, where City can do a review of submittal, we can still assist and that is still in code. May not need code update. Steph brain - APPROVED PRODUCT

LIST? Millis - Cannot have a list of pre-approved becuase so many different rdwy types and luminaires.

- John - local streets not required
- John - Mast arms centered over middle of lane. Would like some clarification on this. Steph - will talk with streetlight expert.
- John - Rural local street w/ no curb & gutter. Reid/Martin/Steph - We have not heard of them being removed. Do want this to remain in code.

02/01/2024 Bicycle Advisory Committee & Pedestrian Advisory Committee

Ince gave a presentation on the proposed revision to roll curbs and made a recommendation to remove this from this round of revisions. This will give more time to build in more safety measures or guardrails.

- Committee Member Questions/Comments:
    - Chair - Redid her street and vertical curb hold more water, then flooding happened. Flooding more common because of burning forest. Vertical curbs keep more water in the streets, glad for vertical curbs keeping her house safe.
    - Committee Member Sam - Accessibility concerns group, taken photos of sidewalks around town, people parking in parkway and on sidewalks, that happens frequently, implantation or more rolled curbs decrease access to sidewalks. Martin - Commission on Inclusion & Adaptive Living - heard this presentation and concerned for accessibility. More difficult going over rolled curb, if the pathway is blocked by a parked car.
    - Committee Member Estella - When is the second round being considered? Martin - TBD. Estella - the code analysis update is happening now, is this being considered? Martin - not sure.
    - Councilmember McCarthy - Understands more difficult to go over rolled curbs. On the other hand, looking for developers to build more affordable housing. Would save a significant amount of money to go with roll curbs. Martin – Issue with cutting driveways is more applicable to single family housing. Even for townhouses, goes from vertical to dwy to vertical to dwy, it constantly transitions because lots are so narrow.
    - Committee Member - anything that possibly takes up bicycle/ped space should not be in engineering standards, another committee member agrees.
    - Committee Member – To other point, park further apart, one safety measure have as a bicyclist, people can readily see you, people routinely try to pass bikes, if there was a broader space. Most bikeways are two-way small residential streets.
    - Committee Member Kim - in favor of looking at this more, seems there are more cons than pros, but want to consider to be equitable for everyone. But want to consider more vulnerable users.
    - Chair - FUTS shoulders question, what is a 2-ft shoulder on FUTS. Martin – 2-ft is a recovery space, not concrete, but a recovery zone, we have 2-ft shoulders as out standards now.
    - Committee Member Valerie - Vertical curbs at intersections, this should be absolutely nonnegotiable. Staff - This is already included in our standards.

02/09/2024 OpenGov Online Survey

Summary Of Annotations

As of February 13, 2024, 12:12 PM, this forum had:		Topic Start	Topic End
Attendees:	43	January 9, 2024, 9:19 PM	February 10, 2024, 9:00 PM
Annotations:	10		
Minutes of Public Comment:	30		

Individual Annotations

13-04-001: Easements

Name not available
January 24, 2024, 9:10 AM

I want no changes at all. Flagstaff is anti business and has too many restrictions as is.

13-06-007: General Notes

Name not available
February 1, 2024, 1:08 PM

General comments:

Specify the median bullnose construction.

Add language about timing of subdivision sidewalk construction with home construction.

Can an automated light system be added to crosswalks, that require lights, to save the pedestrians that don't push the button from being run over?

13-06-008: Construction Traffic Control Plans

Stephanie Santana
inside City Limits
January 12, 2024, 1:28 PM

Mtn Line - Updated a note to include that the permittee needs to reach out to the transit agency a minimum of 3-days in advance if a transit stop will need to be relocated. It would be helpful if the permittee reached out to Mountain Line if one of our routes traverses on the roads impacted by the construction. We often do not hear about a road or lane closure till it is happening and we have to change our routing on the fly.

13-09-002: Sewer System Design

Name not available
February 1, 2024, 12:40 PM

Would like to see the .010 pvc slope remain. A quarterly maintenance plan can be simple, like starting with an occasional observation of the sewer line for issues.

13-14: Bicycle Facilities

Name not available
February 1, 2024, 12:50 PM

FUTS trails are unnecessarily expensive. The expansion joint details, dowles, and saw cutting are not necessary. Aggregate surface course material should be readily available in Flagstaff like abc or cinders. Landscaping, etc. needs to be within the shoulders of the FUTS where the shoulders are in the parkway of a street. The 20' concrete section adjacent to a sidewalk is unnecessary. And a slope 5' from the edge of the FUTS should not necessitate a railing, it should be at the edge of the shoulder.

13-16-002: Signal Design Elements

Name not available
February 1, 2024, 12:53 PM

Clarify "mast arms centered over each lane" in a multi lane road.

13-21-002: Addendum to MAG

Name not available
February 1, 2024, 12:57 PM

Clarify the manhole orientation to traffic since the steps are being removed. And are the aluminum MH lids not longer required?

10-10-019: Bus Pullout

Stephanie Santana

inside City Limits
January 12, 2024, 1:30 PM

Mtn Line -
Added a note stating that when a shelter is adjacent to a FUTS, the FUTS shall be aligned behind the shelter. I'd change language from shelter to "bus stop" to be more general since we don't always have a shelter along a FUTS.
On the drawing of the FUTS with the bus pull out, it could be useful to have the dimensions of our bus pad on the drawing. Can be found in the Transit Guidelines, page 74.

10-10-035: Bicycle Exit / Entrance Ramp

Name not available
February 1, 2024, 1:00 PM

The FUTS ramp opening should match the FUTS width; 10'. Text in 13-14 also states 10' ramp.

10-10-039: Dwy-Ped Ramp Combo (T-Intersections)

Name not available
February 1, 2024, 1:02 PM

Would like to keep the combination ramp/driveway at least in a modified form.

Comment Cards

City of Flagstaff Engineering Standards Revisions

Name: Anne Dunno, Cap Dev. Manager

Company/Organization: Mountain Line

Standard Division Number	Comments
	Consider adding reference to Mountain Line Transit Guidelines in the EGR Standards.
	modify notice of traffic impacts to 7 days.

CITY OF FLAGSTAFF

STAFF SUMMARY REPORT

To:	The Honorable Mayor and Council
From:	Stephanie Santana, Transportation Engineer Sr. Lead
Co-Submitter:	David Lemcke
Date:	01/04/2024
Meeting Date:	02/27/2024

TITLE:

Butler Avenue Corridor and Pilot Bicycle Lanes Update

DESIRED OUTCOME:

Staff recommends transitioning the separated bicycle lanes to painted double stripes on Butler Avenue and Beaver Street to lessen the financial impacts and staffing requirements on City snow operations, and in anticipation of the future projects including the Safe Streets for All grant project and the Lone Tree Overpass project. Staff also recommends keeping the speed limit on Butler Avenue the same to promote voluntary compliance, encourage uniform flow, clearly communicate reasonable and prudent speeds, and ensure an effective enforcement environment for the Police Department.

EXECUTIVE SUMMARY:

During the May 23, 2023 Special Meeting/Work Session, Council tasked Transportation Engineering Staff with conducting a speed limit study along Butler Avenue between Milton Road and Sawmill Road to determine the appropriate speed limit. Council also tasked staff with collaborating with Public Works and the Bicycle Advisory Committee to determine which separated bicycle lane curbs could be removed to improve snow operations. During the same meeting, staff informed Council they had submitted for the Safe Streets and Roads for All (SS4A) grant to redesign the Butler Avenue Corridor pedestrian and bicycle infrastructure (Butler Avenue Complete Streets Conversion).

Staff is prepared to update Council on the Butler Avenue Speed Zone Evaluation, the Pilot Bicycle Lanes, and the awarded grants. The speed limit study along Butler Avenue has been completed and a report and presentation have been created. The results of the study show the existing posted speed limits are the most appropriate because the posted speed limit matches the design speed, which also matches the operating speeds. A reduced speed limit would result in larger speed differentials which have been found to increase the potential for vehicle crashes. The Police Department has also indicated their concerns with enforcement of a lowered speed limit on this particular section of roadway.

Staff transitioned separated bicycle lane curbs to double stripes this summer in collaboration with Public Works, City Council, and the Bicycle Advisory Committee. Staff met with Public Works and have determined the pilot bicycle lanes should be transitioned to double stripes in anticipation of future grant projects and to lessen the financial impacts and staffing requirements on City snow operations.

The City was awarded the SS4A grant for $9.6M (total project cost of $12M) and the Transportation

Alternatives grant for $417k. The SS4A grant funds will be used to redesign Butler Avenue to include a multi-use path with a parkway from Milton Road to Sawmill Road, construct a new rapid flashing beacon crossing at O'Leary Street, and upgrade the crossing at Humphreys Street. The Transportation Alternatives grant funds the design of protected intersections at Beaver Street and Butler Avenue and San Francisco Street and Butler Avenue. An additional protected intersection is also being planned at Lone Tree Road and Butler Avenue as part of the Lone Tree Overpass project.

INFORMATION:

Please see the attached Butler Avenue Speed Zone Evaluation study and presentation for more information.

Attachments: Butler Ave Speed Zone Evaluation
Butler Ave Corridor Update Presentation

Speed Zone Evaluation

Butler Avenue

Milton Road to Sawmill Road

CITY OF FLAGSTAFF

TRANSPORTATION ENGINEERING SECTION

FEBRUARY 2024

Contents

Executive Summary

This engineering study was conducted in response to Council's request during the May 23, 2023 special meeting/work session to investigate if the speed limits on Butler Avenue between Milton Road and Sawmill Road could be lowered. This study will outline the laws and guidelines in Arizona for speed zoning and will determine the appropriate speed limits for this section of roadway with consideration for road characteristics, 85th percentile speed, free flow speed, roadside conditions, and crash history. Based on the results it is apparent the current posted speed limits should remain unchanged because they match the operating speed and the design speed of the roadway. The current speed limits promote voluntary compliance and uniform flow.

Speed Zoning Concepts

An engineering study is required for setting speed limits in Arizona, as defined by Arizona Revised Statute (ARS) 28-703:

> *"A local authority shall determine by an engineering and traffic investigation the proper maximum speed for all arterial streets in its jurisdiction…"*

Speed zoning concepts are defined in the ADOT Traffic Guidelines and Processes. Please see the excerpt below from ADOT TGP 221 Speed Zoning Concepts for more information:

> *"The majority of operators of motor vehicles drive at a speed that they consider reasonable and prudent for existing conditions and or environment that they are driving in. Posted limits that are set higher or lower than those dictated by roadway and traffic conditions are ignored by the majority of motorists. A speed limit should be set so that the majority of motorists comply with it voluntarily and enforcement can be directed to the minorities that do not adhere to.*
>
> *Speed zoning in Arizona is defined as the process of determining the numerical maximum speed, for a defined roadway segment, on the basis of a traffic engineering investigation or study. Speed zoning is based on the principle of setting the limit as near as practicable to the speed that 85 percent of the drivers consider to be reasonable and prudent, i.e., the 85th percentile speed. The 85th percentile correlates to the first standard deviation above the mean; statistically the first standard deviation is the average speed of motorists above the mean speed."*

An excerpt from ADOT TGP 222 Speed Studies:

> *"To improve safety and efficiency it is desirable for traffic to be going close to a uniform speed as differential in speeds leads to higher crash potential. Once the roadway is constructed, drivers operate at a speed they determine to be reasonable and prudent, based on their perspective of the roadway conditions usually represented by the 85th percentile speed of free flow traffic. To encourage uniformity in traffic speeds the 85th percentile speed of free flowing traffic is the standard starting point for determining the appropriate speed limit. Several factors may also affect the appropriate speed limit. Analysis of these factors (listed below) in conjunction with the 85th percentile speed provides an accurate representation of traffic*

operating conditions along any given section of highway and provides a scientific basis for the selection of speed limits:

A. Pace Speed
B. Length of section
C. Alignment
D. Roadway width and shoulders
E. Surface condition
F. Sight distance
G. Traffic volume
H. Crash experience/history
I. Maximum comfortable speed on curves
J. Side friction (roadside development, parking, bicycle use, and pedestrian activity)
K. Signal progression
L. Other factors"

Roadway and Traffic Characteristics

Butler Avenue between Milton Road and Sawmill Road is a 0.9-mile-long Minor Arterial roadway. The cross section of Butler Avenue is a 5-lane roadway, with two through lanes in each direction, a center median/left turn lane, and bicycle lanes for each direction of travel (curb separated bike lanes from Milton Road to Lone Tree Road and double striped bike lanes between Lone Tree Road and Sawmill Road). Sidewalks, which range between 5' and 6' wide, are present on both the north and south sides of the roadway. The width of the travel lanes range from 10'-6" to 12', while the width of the bicycle lanes range from 5' to 5'-6". The average daily traffic (ADT) is approximately 21,300 vehicles per day (vpd).

The corridor consists of signalized intersections at Milton Road, Beaver Street, San Francisco Street, Lone Tree Road, and Sawmill Road. A pedestrian rapid flashing beacon is located at Humphreys Street. The posted speed limit varies throughout this area, with an existing posted speed limit of 35 mph between Milton Road and Lone Tree Road, and an existing posted speed limit of 40 mph between Lone Tree Road and Sawmill Road. The alignment consists of moderate horizontal curves near the Murdoch Community Center, with very minimal to no vertical curves. All intersections have adequate sight distance.

The geographic context includes both urban and suburban due to the Southside neighborhood on the western half of the corridor and the Sawmill shopping center on the eastern half. Most of the parcels between Milton Road and San Francisco Street are zoned Community Commercial, while between San Francisco Street and Elden Street is zoned High Density Residential. All parcels east of Elden Street and north of Butler Avenue are zoned Light Industrial, while the parcels south of Butler Avenue are zoned Highway Commercial. A zoning map is included in Appendix A: City of Flagstaff Zoning Map.

There are nine blocks between Milton Road and Lone Tree Road and four blocks between Lone Tree Road and Sawmill Road. Table 1: Driveway and Alley Count below shows the number of driveways and alleys in each block along the corridor. All driveways and alleys along the corridor between Milton Road and Sawmill Road are access controlled with either a median or striping, which makes them function as right in/right out only driveways.

Table 1: Driveway and Alley Count

Speed	Roadway	to	Roadway	EB Driveways / Alleys	WB Driveways / Alleys
35 mph	Milton	to	Kendrick	1	0
	Kendrick	to	Humphreys	0	3
	Humphreys	to	Beaver	3	1
	Beaver	to	Leroux	1	1
	Leroux	to	San Francisco	1	2
	San Francisco	to	WC Riles	3	4
	WC Riles	to	O'Leary	0	0
	O'Leary	to	Elden	1	0
	Elden	to	Lone Tree	1	2
Total Number of Driveways				**11**	**13**
Average Number of Driveways / Block				**2.20**	**1.44**
40 mph	Lone Tree	to	Windsor/Gabel	0	4
	Windsor/Gabel	to	Regent/Lumber	0	2
	Regent/Lumber	to	Cambridge	0	0
	Cambridge	to	Sawmill	0	0
Total Number of Driveways				**0**	**6**
Average Number of Driveways / Block				**0**	**1.5**

The Butler Avenue corridor is one block north of Northern Arizona University and about four blocks south of Downtown Flagstaff. There is moderate pedestrian and bicycle activity through the corridor. Bicycle counts were collected from approximately 12-hours' worth of video footage in April of 2023 and there were 12 bicycles in the peak hour. All signalized intersections have striped crosswalks and are programed with a pedestrian phase. At each signalized intersection there are green striped two-stage bicycle turn boxes.

There are six bus stops along the 0.9-mile-long stretch of Butler Avenue. Three in the westbound direction and three in the eastbound direction. There are two stops adjacent to one another just west of the Butler Avenue and San Francisco Street signalized intersection which has a stop frequency of 8 stops per hour in the westbound direction and 7 stops per hour in the eastbound direction. There are two stops adjacent to one another just west of the Butler Avenue and Elden Street stop-controlled intersection which also has a stop frequency of 8 stops per hour in the westbound direction and 7 stops per hour in the eastbound direction. Lasty, there are two stops adjacent to one another west of the Butler Avenue and Sawmill Street signalized intersection which each have a stop frequency of 5 stops per hour.

The posted speed limits of 35 mph/40 mph are appropriate for the context of Butler Avenue based on the urban/suburban land use type and the minor arterial roadway classification from the City of Flagstaff Engineering Design Standards which were used to create the curves and operating conditions that exist today. It has no on-street parking nor store front access. There are a moderate number of driveways and alleyways, but they are access controlled and do not have high volumes of traffic utilizing them.

Crash Experience

Crashes are considered in speed zone studies to determine if the study area has a higher than average crash rate, or if the portion of speed related crashes is higher than average. Three other arterial roadway segments were analyzed in this study for comparison: West Route 66 between Woodlands Village Boulevard and Milton Road, Fourth Street between Route 66 and Lockett Road, and Milton Road between Plaza Way and Phoenix Avenue. The crashes along these segments were analyzed to determine total crash incidents and speeding related crashes. The results of this analysis can be seen below. It should be noted that Butler Avenue has a high percentage of intersection related crashes due to high cross street volumes and signalized intersection density. Staff have successfully pursued a Safe Streets and Roads for All grant to improve safety at all signalized intersections along the corridor.

Table 2: Crash Data Analysis

Road Section	Speed Limit (mph)	Length (miles)	Signals	ADT (vpd)	Time Range	Speed Related Crashes (%)	Intersection Related Crashes (%)	Crash Rate Per Million Vehicle Trips
W Butler Avenue	35-40	0.9	5	21,300	2018-22	32%	70%	7.3
N Fourth Street	30	0.8	3	17,000	2018-22	25%	58%	4.8
W Route 66	30-40	0.7	3	20,200	2018-22	33%	66%	3.3
S Milton Road	30	0.7	4	34,000	2018-22	44%	53%	7.9
Citywide Data	NA	NA	NA	NA	2018-22	32%	49%	NA

Operating Speeds

Several pneumatic tube studies have been conducted on Butler Avenue to gather vehicle speed and volume data. Pneumatic tube counters were placed on Butler Avenue at three different locations during October 2023 for a continuous 9-day period in order to gather existing condition data for this study. Tube counters were also placed in April 2022 and October 2021 as part of evaluating how the pilot bike lanes were affecting driving conditions. Tube data is also provided from 2009 before the medians were installed on Buter Avenue. Please see the table below for the results of the studies. These results are also included on a map in Appendix B: Butler Speed Study Existing Conditions.

The results include the 85th percentile speed, the 50th percentile speed and the pace speed. The ADOT Traffic Guidelines and Processes defines how the 85th percentile speed is used to set speed limits:

> *"Speed zoning is based on the principle of setting the limit as near as practicable to the speed that 85 percent of the drivers consider to be reasonable and prudent, i.e., the 85th percentile speed. The 85th percentile correlates to the first standard deviation above the mean; statistically the first standard deviation is the average speed of motorists above the mean speed."*

The 50th percentile speed represents the median, or the speed at which 50% of drivers are traveling at or below. The pace speed represents the 10 mph speed range in which the highest percentage of drivers were traveling.

Table 3: Traffic Study Results

Date	Location	Posted Speed (mph)	85th (mph)	50th (mph)	Pace (mph)
10/2023	Drury Inn	35	34	29	25-34
10/2023	Murdoch Community Center	35	37	32	28-37
9/2009*	East of O'Leary	35	39	35	30-39
10/2021**	Speedway Gas Station	35	35	30	25-34
4/2022***	Speedway Gas Station	35	34	28	26-35
10/2023	Dutch Bros Coffee	40	39	35	31-40

**Before medians*
***Before the separated bicycle lane curbs were installed*
****After the separated bicycle lane curbs were installed*

It should be noted that all 85th percentile speeds have a minimum gap time of 5-seconds applied, and the 85th percentile speeds at each location were determined by taking the average of the 85th percentile speeds of each direction of travel (eastbound and westbound). Gap time is the time difference between the rear of a vehicle and the front of its follower, and applying a minimum gap time of 5 seconds helps identify the free flow speed when vehicles are unincumbered by signal queues or pedestrians crossing.

Federal Highway Administration USLIMITS2

The Federal Highway Administration (FHWA) USLIMITS2 is an Expert System Approach which utilizes a web-based program designed to help practitioners set reasonable, safe, and consistent speed limits for specific segments of roads. The details of Butler Avenue were inputted into the website to generate a recommended speed limit based on several factors including 85th percentile speed and 50th percentile speed based on road context, crash history, roadway geometry, and pedestrian and bicyclist activity. Butler Avenue was analyzed in three segments: Milton Road to San Francisco Street, San Francisco Street to Lone Tree Road, and Lone Tree Road to Sawmill Road. The results of the USLIMITS2 analysis are illustrated below. Detailed output sheets are included in Appendix C: FHWA USLIMITS2 Results.

Table 4: USLIMITS2 Results

Road Segment	Posted Speed Limit (mph)	USLIMITS2 Recommendation (mph)
Milton Road to San Francisco Street	35	30
San Francisco Street to Lone Tree Road	35	30
Lone Tree Road to Sawmill Road	40	35

Discussion and Conclusions

The 85th percentile speeds are within 2 mph of the existing posted speed limit at each study location. This demonstrates an accurate relationship between the posted speed limit and the natural free-flow speed of traffic on the roadway. Under current speed limit signage, between 7% and 17% of vehicles violate the speed limit. If the speed limit were reduced by 5 mph on each section of roadway, between

35% and 63% of vehicles would violate the speed limit. It should be noted that changing only the number on the speed limit sign has little to no effect on how people actually drive, so it is safe to assume the percentage of vehicles traveling above the speed limit will remain constant. Artificially lowering the speed limit sign increases the number of vehicles violating the speed limit, and it also leads to more differentials in speeds between vehicles, for a proportion will try to adhere to the new limit, and the majority will travel at the natural speed of the road. Large differentials in speed between traveling vehicles has been found to increase the likelihood of a crash and should be avoided.

Table 5: Vehicles Traveling Over the Speed Limit

Segment of Butler	Current Speed Limit (mph)	Existing Vehicles Violating the Speed Limit (%)	Speed limit reduced by 5 mph (mph)	Potential Vehicles Violating the Speed Limit (%)
Milton to San Francisco	35	7%	30	35%
San Francisco to Lone Tree	35	17%	30	63%
Lone Tree to Sawmill	40	8%	35	41%

The crash analysis shows that the portion of speed related crashes reported on Butler Avenue in the last five years of data matches the portion of speed related crashes City wide in that same time frame at 32%. When compared to Fourth Street and Route 66, 33% of crashes were speeding related on Route 66, which matches City wide data and Butler Avenue data. Fourth street reported less speed related crashes at 25% of all crashes. Milton Road experienced 44% of all crashes being speed related. This suggests that there are not an excessive number of speed-related crashes on Butler Avenue when compared to City wide data and other similar arterial road segments. Butler Avenue did have the highest crash rate per million vehicle trips of the minor arterials, but this is attributed to the additional signals present on that section of roadway, which is reflected in the higher proportion of intersection related crashes seen on Butler Avenue when compared to the other sites and the Citywide. Protected intersections will be included in future grant projects to improve intersection safety.

USLIMITS2 recommended lowering the speed limit by 5 mph along all of Butler Avenue, but staff does not see this as a viable solution because the 85th percentile speeds found in the study already align with the existing speed limits. It is desirable to set speed limits as close as possible to the 85th percentile speed to encourage voluntary compliance and avoid enforcement issues, as is outlined in ADOT Traffic Guidelines and Principles. When literature was reviewed to understand the effect of lowering speed limits on vehicle speeds, it was determined that, overall, lowering only the posted speed limit did not meaningfully impact the driving speed of vehicles. It should also be noted that USLIMITS2 states:

> *"A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out."*

Recommendation

The results of the speed study show that the existing posted speed limits closely align with the 85th percentile speeds of drivers. The current posted speed limits promote voluntary compliance and do not create an enforcement issue. ADOT Traffic Guidelines and Processes recommends setting the speed limit

as near as practical to the 85th percentile speed, which is reflected in the current posted speed limits. The crashes analyzed in the last 5 years of available data do not indicate that there has been an excessive amount of speed related crashes along Butler Avenue. Due to these results and the guidance from ADOT regulations, staff recommend no changes to the existing posted speed limits. A visual representation of this recommendation is included in Appendix D: Butler Speed Study Recommendation.

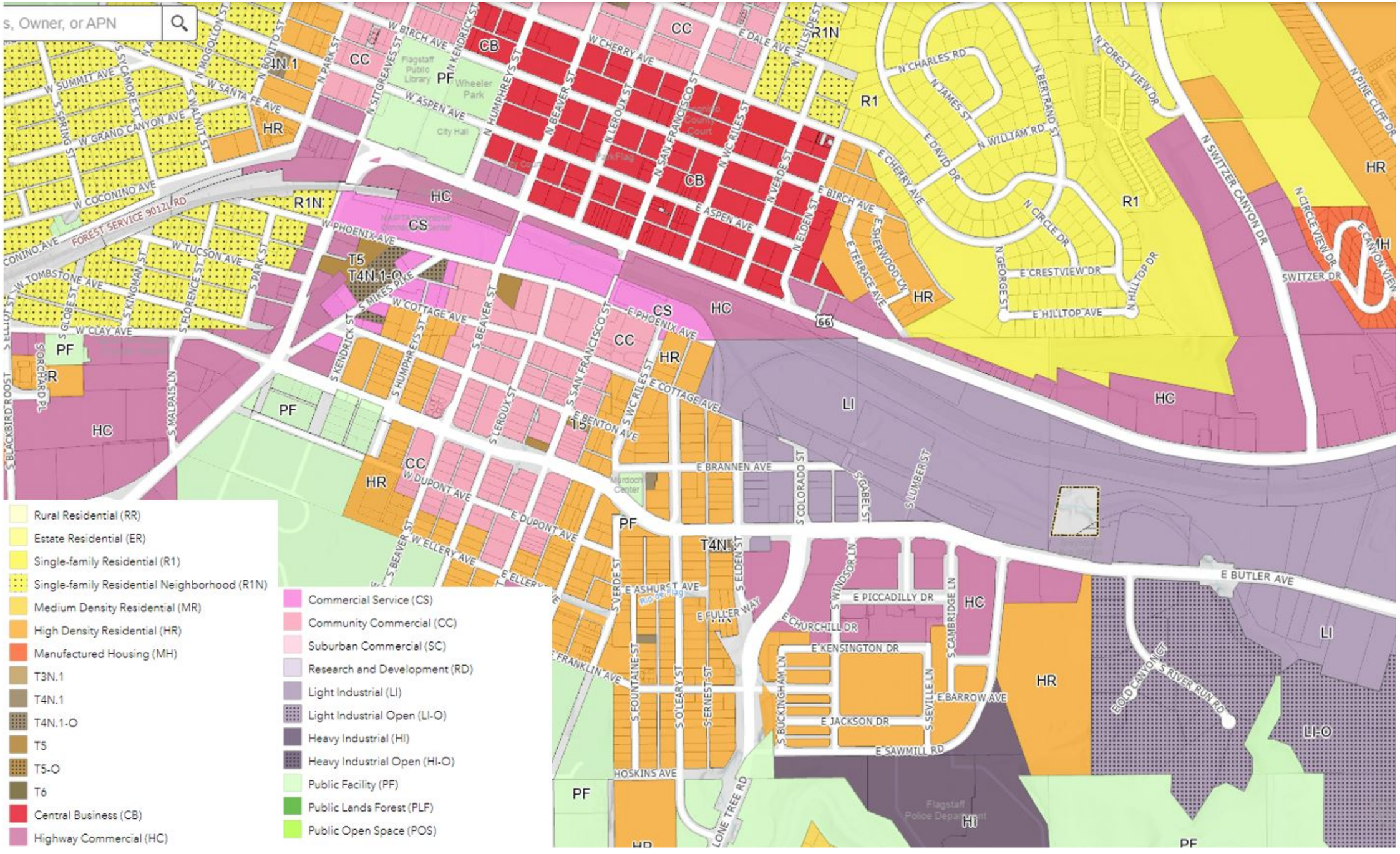
Lowering the speed limit alone has a negligible effect on driver's speeds, drivers continue to drive at the speed they deem to be reasonable and prudent for the conditions present on the segment of roadway. This leads to an enforcement issue because people will continue to travel at the natural speed of the road, and a larger portion will be violating the now lowered speed limit. This also results in safety concerns for there will be a larger differential in speed among drivers between the small proportion that adhere to the lowered speed limit and the majority who travel at the natural speed of the road. Differentials in speed have been found to increase the potential for vehicle crashes and should be avoided. For all these reasons, it is recommended that the speed limits along Butler Avenue between Milton Road and Sawmill Road remain the same.

Butler Avenue from Milton Road to Sawmill Road has recently been studied and is now funded for pedestrian and bicycle upgrades at all of its major intersections – Beaver Street, San Francisco Street, Lone Tree Road and Sawmill Road. These projects are all at different stages of development and also include raised and separated bikeways on both sides of Butler Avenue. These projects will move from concepts to physical construction and eventually opening for public use. Staff will continue to monitor prevailing speeds along with crash records along Butler Avenue to determine if adjustments to existing posted speed limits should be implemented as roadway conditions and the resulting operating speeds adjust to the new roadway design.

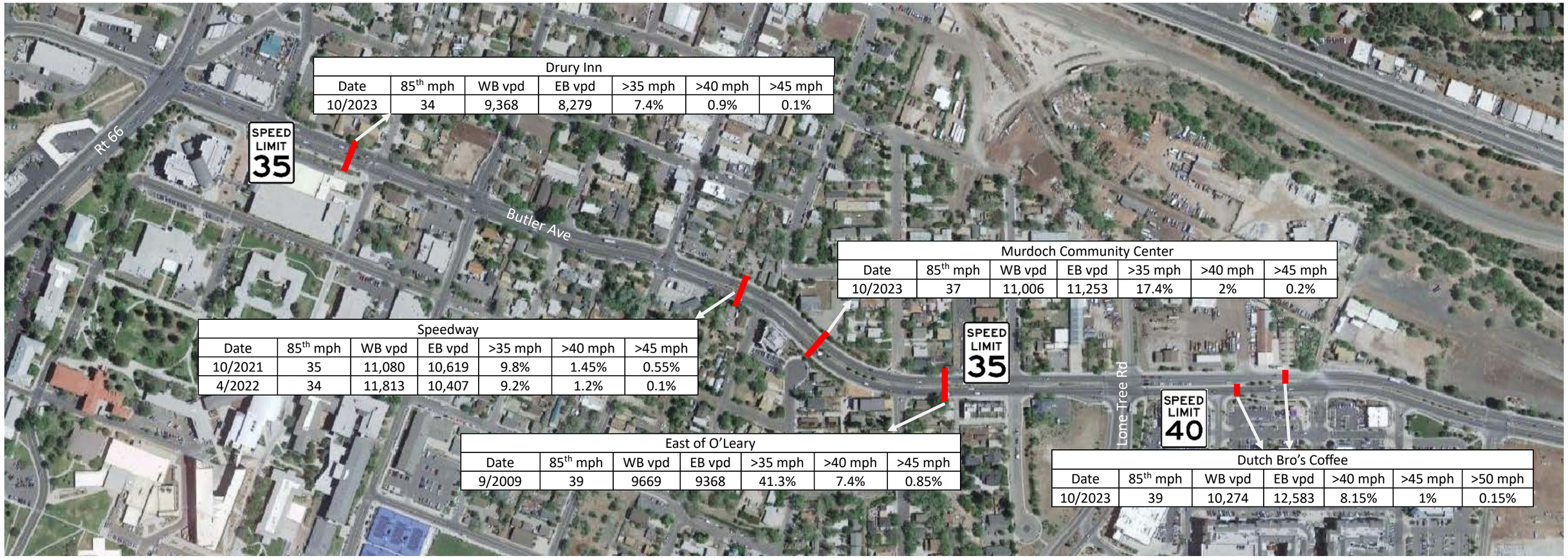
References

1) ADOT Traffic Guidelines and Processes, Subsection 220, *Speed Zoning.* Website. Issued March 2021. TGP0220 2021-03 TSMO Speed Zoning (azdot.gov)
2) ADOT Traffic and Guidelines and Processes, Subsection 221, *Speed Zoning Concepts*. Website. Issued March 2021. TGP0221: 2021-03 TSMO Speed Zoning Concepts (azdot.gov)
3) ADOT Traffic Guidelines and Processes, Subsection 222, *Speed Studies.* Website. Issued March 2021. TGP0222-2021-03 TSMO Speed Studies (azdot.gov)
4) Arizona Revised Statute 28-703. *Alteration of speed limits by local authority.* 28-703 - Alteration of speed limits by local authority (azleg.gov)
5) FHWA *Manual on Uniform Traffic Control Devices*. 2009. https://mutcd.fhwa.dot.gov/
6) Insurance Institute for Highway Safety (IIHS). *Lowering the speed limit from 30 to 25 mph in Boston: effects on vehicle speeds*. Website. Issued August 2018. iihs-dropspeed.pdf (thenewspaper.com)

Appendix A: City of Flagstaff Zoning Map



Appendix B: Butler Speed Study Existing Conditions



Drury Inn						
Date	85th mph	WB vpd	EB vpd	>35 mph	>40 mph	>45 mph
10/2023	34	9,368	8,279	7.4%	0.9%	0.1%

Speedway						
Date	85th mph	WB vpd	EB vpd	>35 mph	>40 mph	>45 mph
10/2021	35	11,080	10,619	9.8%	1.45%	0.55%
4/2022	34	11,813	10,407	9.2%	1.2%	0.1%

Murdoch Community Center						
Date	85th mph	WB vpd	EB vpd	>35 mph	>40 mph	>45 mph
10/2023	37	11,006	11,253	17.4%	2%	0.2%

East of O'Leary						
Date	85th mph	WB vpd	EB vpd	>35 mph	>40 mph	>45 mph
9/2009	39	9669	9368	41.3%	7.4%	0.85%

Dutch Bro's Coffee						
Date	85th mph	WB vpd	EB vpd	>40 mph	>45 mph	>50 mph
10/2023	39	10,274	12,583	8.15%	1%	0.15%

NOTES:

1) All 85th percentile speeds have a minimum gap time of 5 seconds applied.
2) The 85th percentile speeds were determined by taking the average of the 85th percentile speeds of each direction of travel.
3) Volumes are the average of available Tuesday, Wednesday, and Thursday counts.

USLIMITS2 Speed Zoning Report

Project Overview

Project Name: Butler – Southside West

Analyst: Martin Ince

Date: 2023-10-30

Basic Project Information
Project Number: B001
Route Name: Butler Ave
From: Milton
To: San Francisco
State: Arizona
County: Coconino County
City: Flagstaff city
Route Type: Road Section in Developed Area
Route Status: Existing

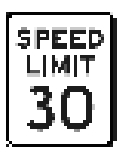
Roadway Information
Section Length: 0.34 mile(s)
Statutory Speed Limit: 35 mph
Existing Speed Limit: 35 mph
Adverse Alignment: No
One-Way Street: No
Divided/Undivided: Divided
Number of Through Lanes: 4
Area Type: Residential-Collector/Arterial
Number of Driveways: 18
Number of Signals: 3

Crash Data Information
Crash Data Years: 5.00
Crash AADT: 22000 veh/day
Total Number of Crashes: 124
Total Number of Injury Crashes: 3
Section Crash Rate: 908 per 100 MVM
Section Injury Crash Rate: 22 per 100 MVM
Crash Rate Average for Similar Roads: 231
Injury Rate Average for Similar Roads: 77

Traffic Information
85th Percentile Speed: 34 mph
50th Percentile Speed: 29 mph
AADT: 22000 veh/day
On Street Parking and Usage: Not High
Pedestrian / Bicyclist Activity: High

Project Description: Speed limit study for Butler Ave from Milton to San Francisco through Southside

Recommended Speed Limit:



Note: The section crash rate of 908 per 100 MVM is above the critical rate (303). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Disclaimer: The U.S. Government assumes no liability for the use of the information contained in this report. This report does not constitute a standard, specification, or regulation.

Equations Used in the Crash Data Calculations

Exposure (M)
M = (Section AADT * 365 * Section Length * Duration of Crash Data) / (100000000)
M = (22000 * 365 * 0.34 * 5.00) / (100000000)
M = 0.1365

Crash Rate (Rc)
Rc = (Section Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Rc = (24.80 * 100000000) / (22000 * 365 * 0.34)
Rc = 908.36 crashes per 100 MVM

Injury Rate (Ri)
Ri = (Section Injury Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Ri = (0.60 * 100000000) / (22000 * 365 * 0.34)
Ri = 21.98 injuries per 100 MVM

USLIMITS2 Speed Zoning Report

Project Overview

Project Name: Butler - Southside East

Analyst: Martin Ince

Date: 2023-10-30

Basic Project Information
Project Number: B002
Route Name: Butler Ave
From: San Francisco
To: Lone Tree
State: Arizona
County: Coconino County
City: Flagstaff city
Route Type: Road Section in Developed Area
Route Status: Existing

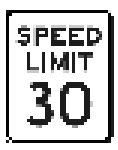
Roadway Information
Section Length: 0.38 mile(s)
Statutory Speed Limit: 35 mph
Existing Speed Limit: 35 mph
Adverse Alignment: No
One-Way Street: No
Divided/Undivided: Divided
Number of Through Lanes: 4
Area Type: Residential-Collector/Arterial
Number of Driveways: 15
Number of Signals: 2

Crash Data Information
Crash Data Years: 5.00
Crash AADT: 22000 veh/day
Total Number of Crashes: 75
Total Number of Injury Crashes: 4
Section Crash Rate: 492 per 100 MVM
Section Injury Crash Rate: 26 per 100 MVM
Crash Rate Average for Similar Roads: 231
Injury Rate Average for Similar Roads: 77

Traffic Information
85th Percentile Speed: 37 mph
50th Percentile Speed: 32 mph
AADT: 22000 veh/day
On Street Parking and Usage: Not High
Pedestrian / Bicyclist Activity: High

Project Description: Speed limit study for Butler Ave from San Francisco to Lone Tree through the Southside

Recommended Speed Limit:



Note: The section crash rate of 492 per 100 MVM is above the critical rate (299). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Disclaimer: The U.S. Government assumes no liability for the use of the information contained in this report. This report does not constitute a standard, specification, or regulation.

Equations Used in the Crash Data Calculations

Exposure (M)
M = (Section AADT * 365 * Section Length * Duration of Crash Data) / (100000000)
M = (22000 * 365 * 0.38 * 5.00) / (100000000)
M = 0.1526

Crash Rate (Rc)
Rc = (Section Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Rc = (15.00 * 100000000) / (22000 * 365 * 0.38)
Rc = 491.58 crashes per 100 MVM

Injury Rate (Ri)
Ri = (Section Injury Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Ri = (0.80 * 100000000) / (22000 * 365 * 0.38)
Ri = 26.22 injuries per 100 MVM

USLIMITS2 Speed Zoning Report

Project Overview

Project Name: Butler - Sawmill

Analyst: Martin Ince

Date: 2023-10-30

Basic Project Information
Project Number: B003
Route Name: Butler Ave
From: Lone Tree
To: Sawmill
State: Arizona
County: Coconino County
City: Flagstaff city
Route Type: Road Section in Developed Area
Route Status: Existing

Roadway Information
Section Length: 0.23 mile(s)
Statutory Speed Limit: 40 mph
Existing Speed Limit: 40 mph
Adverse Alignment: No
One-Way Street: No
Divided/Undivided: Divided
Number of Through Lanes: 4
Area Type: Commercial
Number of Driveways: 11
Number of Signals: 2

Crash Data Information
Crash Data Years: 5.00
Crash AADT: 23000 veh/day
Total Number of Crashes: 42
Total Number of Injury Crashes: 3
Section Crash Rate: 435 per 100 MVM
Section Injury Crash Rate: 31 per 100 MVM
Crash Rate Average for Similar Roads: 231
Injury Rate Average for Similar Roads: 77

Traffic Information
85th Percentile Speed: 39 mph
50th Percentile Speed: 35 mph
AADT: 23000 veh/day
On Street Parking and Usage: Not High
Pedestrian / Bicyclist Activity: High

Project Description: Speed limit study for Butler Ave from Lone Tree to Sawmill through Sawmill district

Recommended Speed Limit:

Note: The section crash rate of 435 per 100 MVM is above the critical rate (317). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Note: A speed zone of 0.23 miles is generally too short for the recommended speed limit. Consider lengthening the speed zone (if that is possible) or using the speed limits from adjacent sections (if they are appropriate for this section). If the speed and other data you provided are representative of conditions for this short section, then the speed limit noted above may be considered.

Note: The road section is in an area with high pedestrian or bicycle activity. Consider implementing engineering measures to reduce speeds before lowering the recommended speed limit. See Engineering Countermeasures for Speed Management and PedSafe for more guidance.

Equations Used in the Crash Data Calculations

Exposure (M)
M = (Section AADT * 365 * Section Length * Duration of Crash Data) / (100000000)
M = (23000 * 365 * 0.23 * 5.00) / (100000000)
M = 0.0965

Crash Rate (Rc)

Appendix D: Butler Speed Study Recommendation

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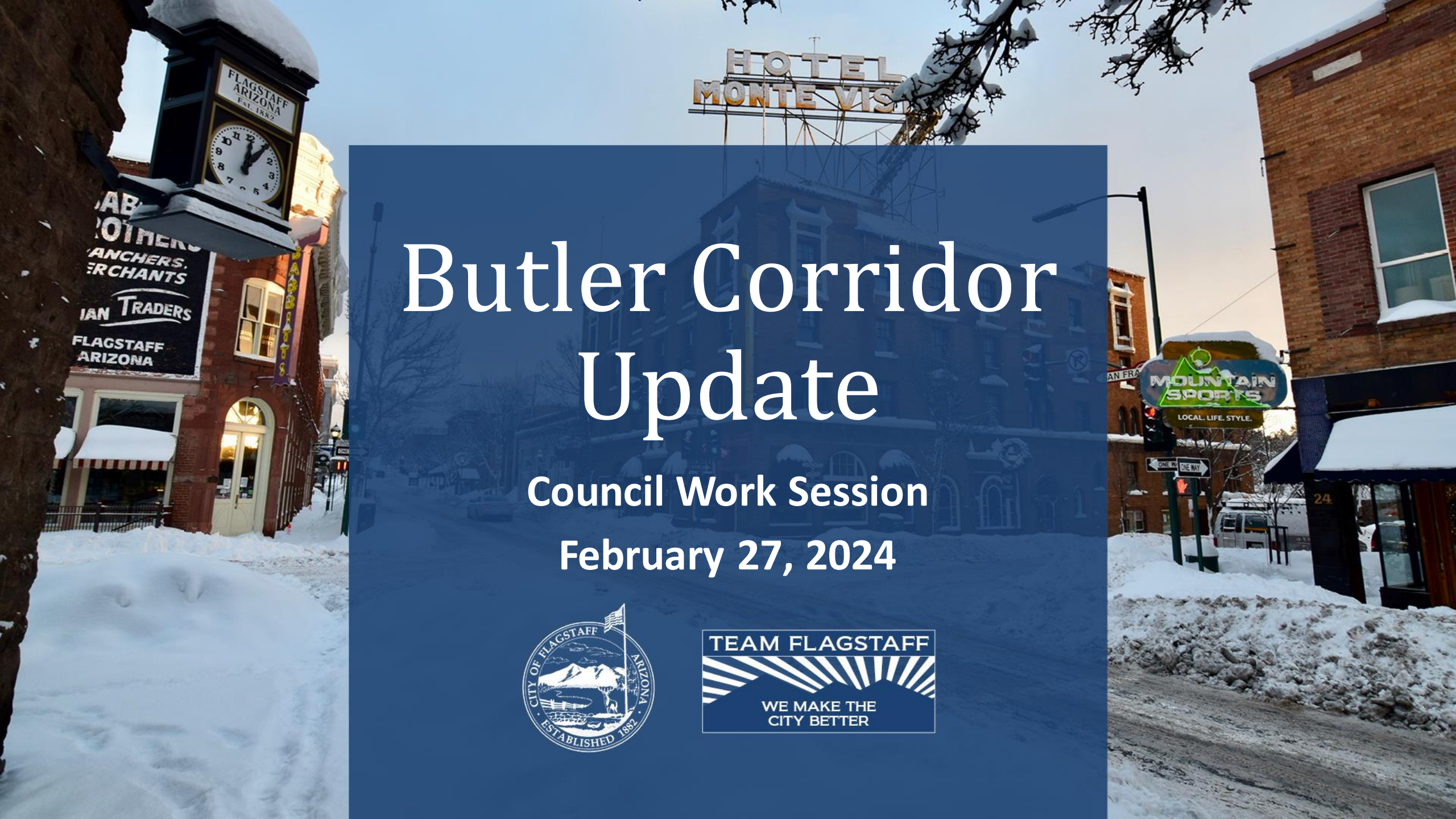


Butler Corridor Update

Council Work Session

February 27, 2024

CITY OF FLAGSTAFF · ARIZONA · ESTABLISHED 1882

TEAM FLAGSTAFF

WE MAKE THE CITY BETTER

Topics

- Pilot Bike Lanes
- Speed Study
- Future Projects

Pilot Bike Lane Update

- Buffered Bike lane update
- Community feedback
- Winter Service levels
- Cleaner and more maintainable infrastructure

Winter Service Reductions City-wide

General Service to Infrastructure

Sharrows

Speed Study

- Purpose of the Study
- Road Hierarchy
- Speed Zoning Concepts
- Study Results
- Discussion/Conclusions
- Staff Recommendation

TEAM FLAGSTAFF
WE MAKE THE CITY BETTER

Overview of Speed Study

What is a Speed Study?

- Speed studies take the temperature of the road. They evaluate the existing conditions of a roadway to determine if the established speed limits promote voluntary compliance and reflect the 85th percentile free flow speed
- Context (urban, rural, downtown)
- Geometry
- Pedestrian and bicycle use
- Crash experience

Context Example

30 MPH Speed Limit

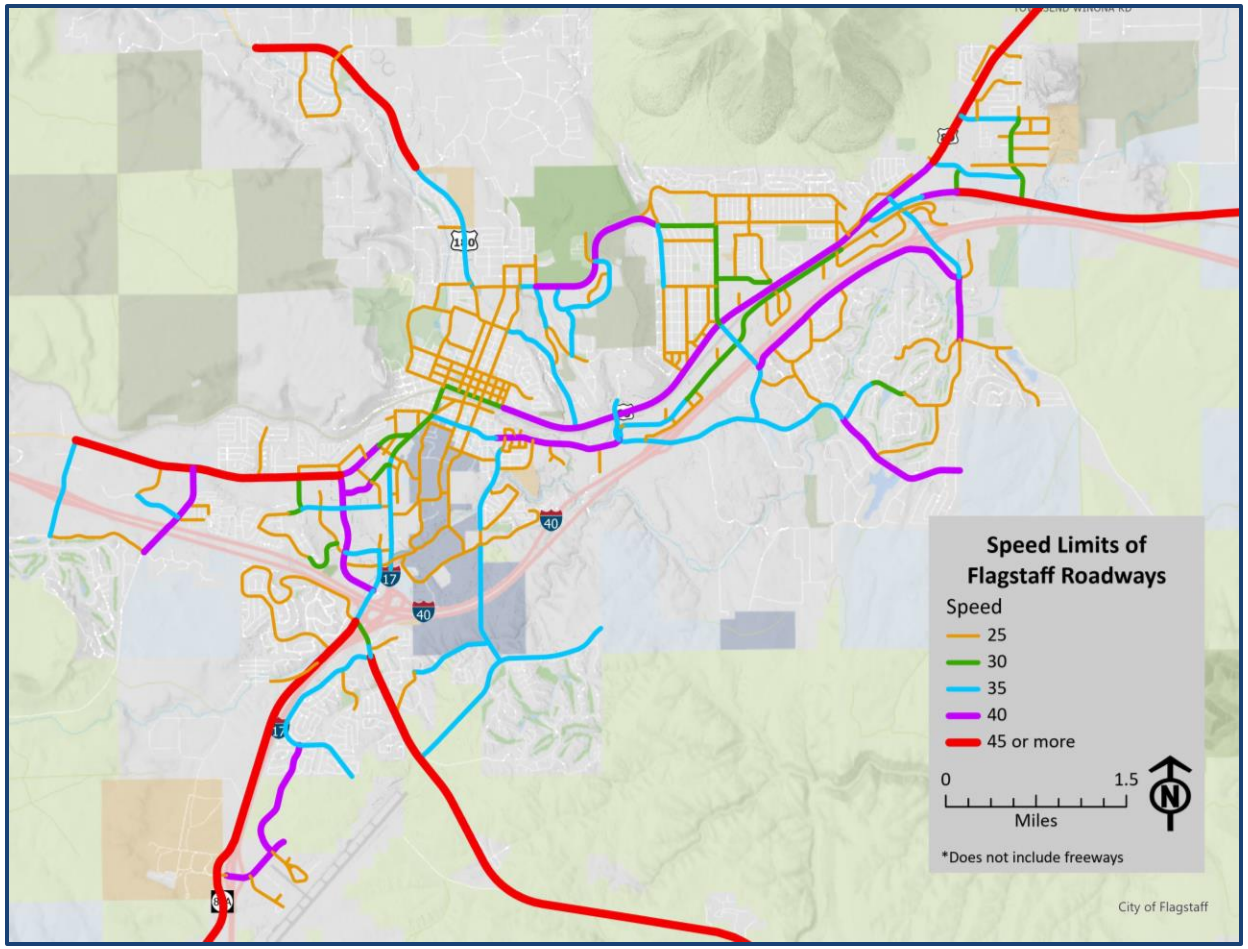
Route 66 Near Downtown

35 MPH Speed Limit

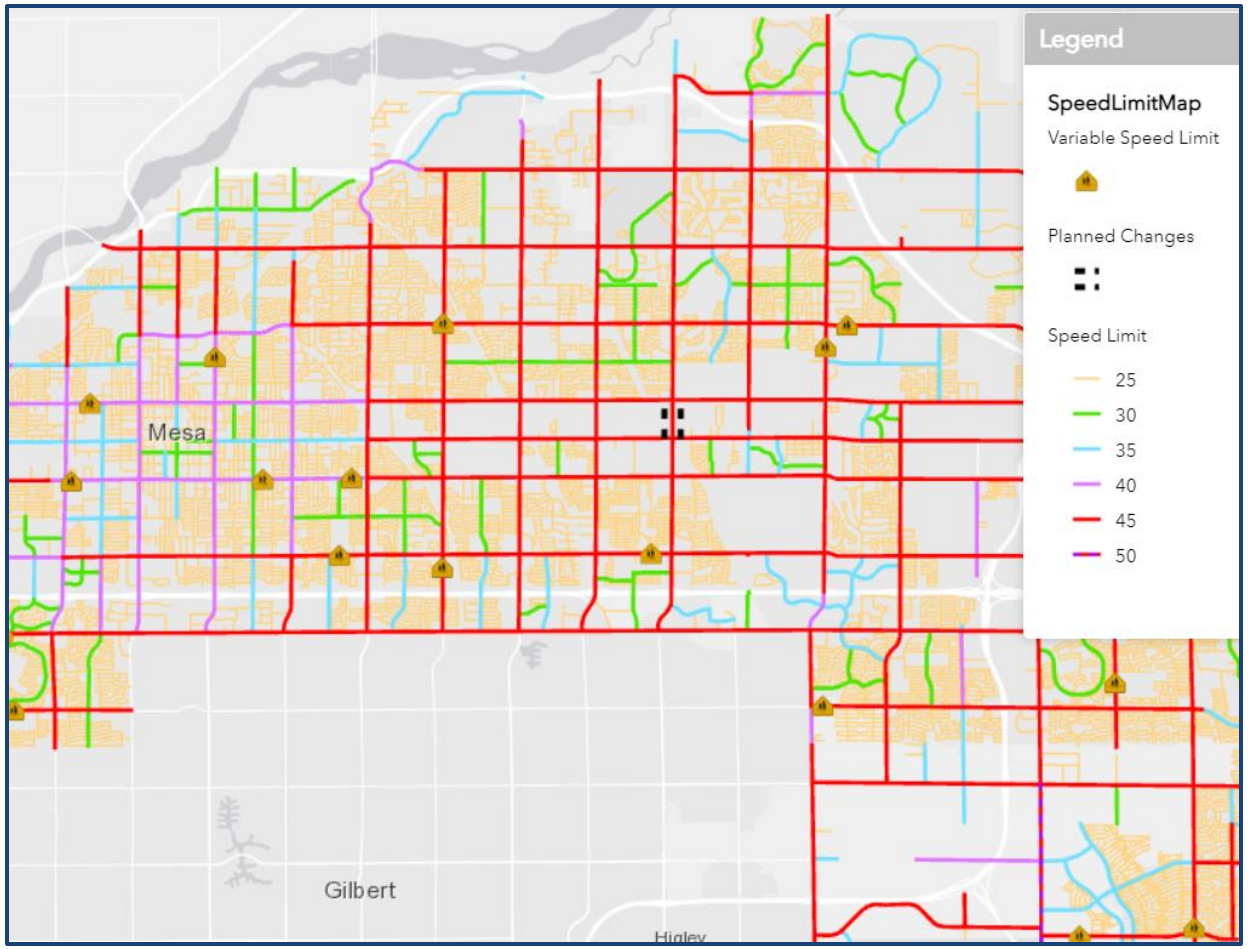
Butler Avenue

Speed Limit Maps

City of Flagstaff



City of Mesa



Vehicle Speeds and Safety

- Slower vehicle speeds is an important component of Vision Zero, Safe Systems approach, National Safety Strategy
- Lower vehicle speeds make the roadway safer for all users
- Setting appropriate posted speed limits is part of an overall approach to speed management, but may require additional changes (geometry, education, enforcement)
- Unreasonable posted speed limits will not be followed, may introduce other safety concerns (speed differential), and may increase police enforcement efforts

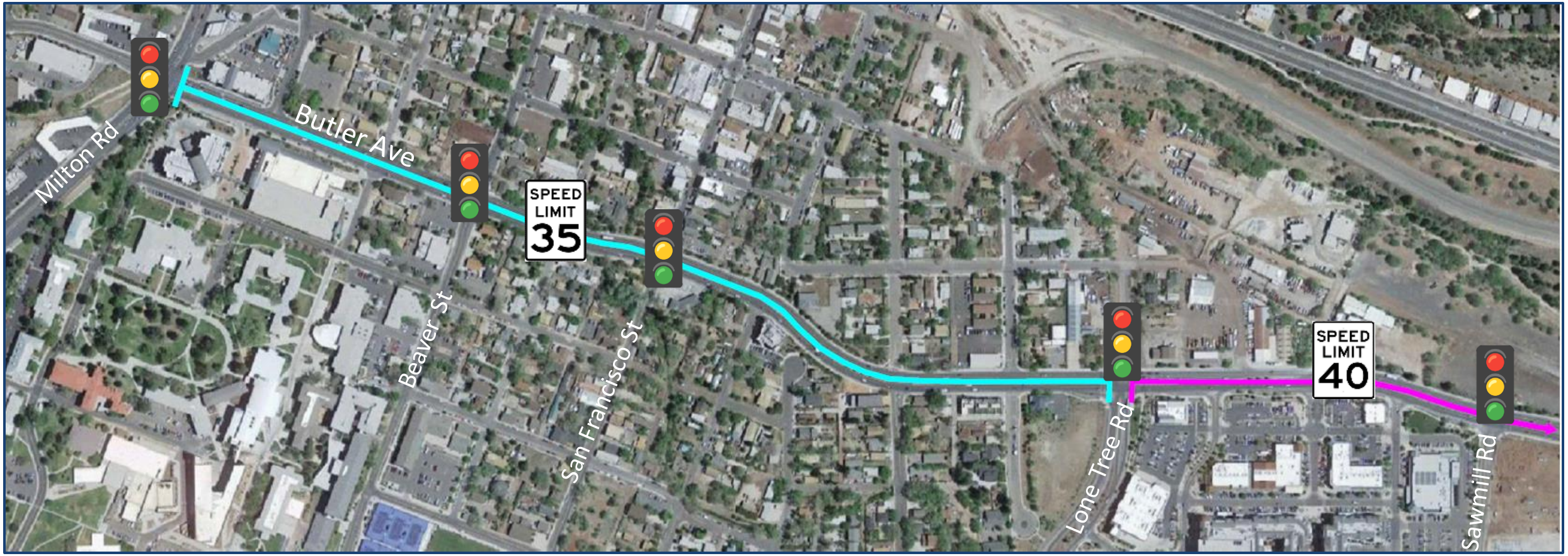
Arizona Revised Statutes

Title 28: Transportation

- Article 6: Speed Restrictions
  - 28-703 Alteration of speed limits by local authority

"A local authority shall determine by an engineering and traffic investigation the proper maximum speed for all arterial streets in its jurisdiction…"

Current Posted Speed Limits

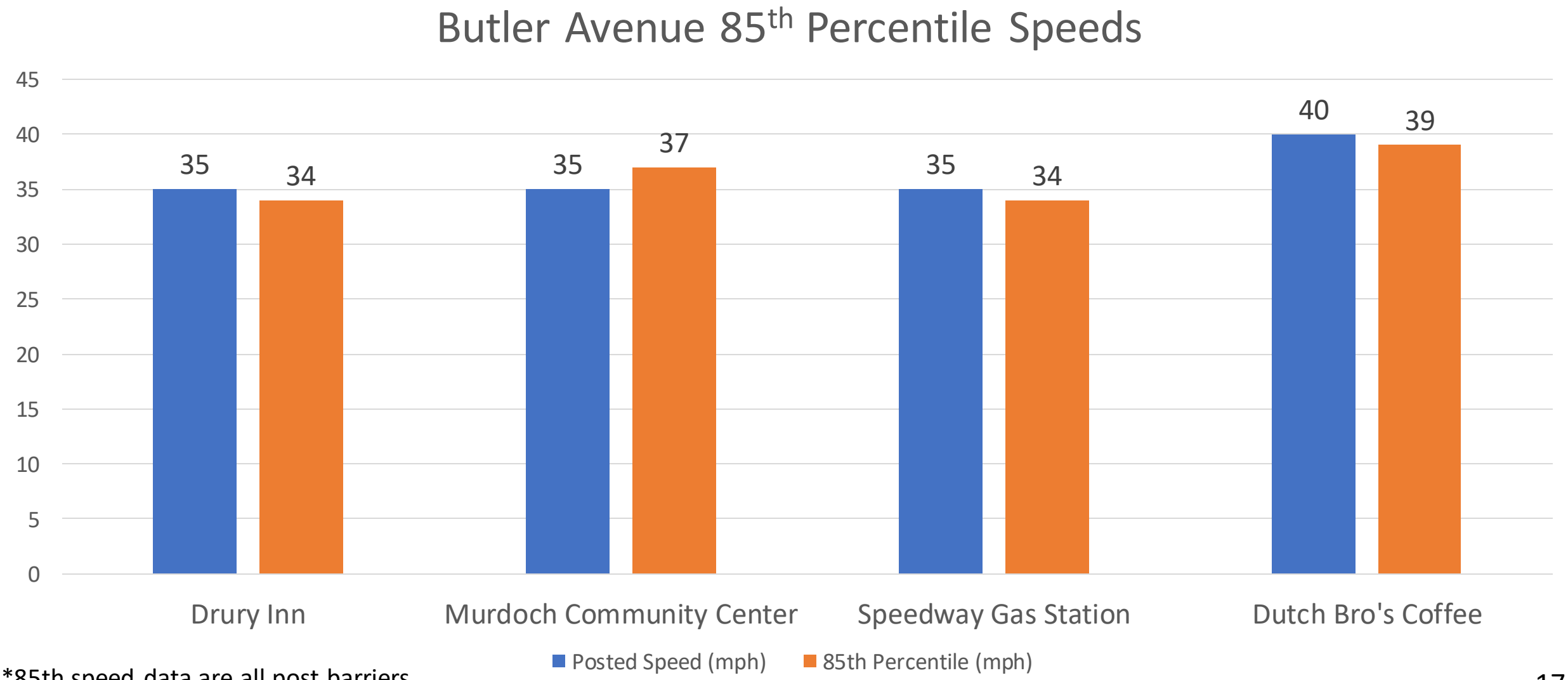


Speed Zoning Concepts

ADOT Traffic Guidelines and Processes

- 85th Percentile
- Encourage voluntary compliance
- Encourage uniform speed
- Unreasonable speed limits are ignored

Butler Ave Study Results



*85th speed data are all post barriers

Discussion

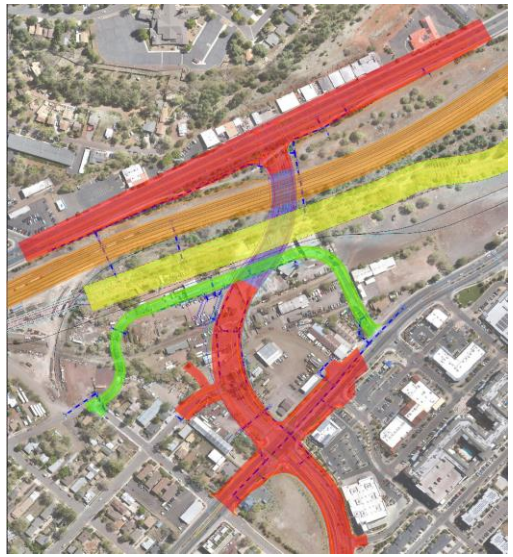
- The results show the vast majority of drivers are driving at or below the speed limit
- The posted speed aligns with the design speed which aligns with the operating speed
- When compared to other arterials in Flagstaff, Butler Avenue had average crash rates and average speed related crash proportions

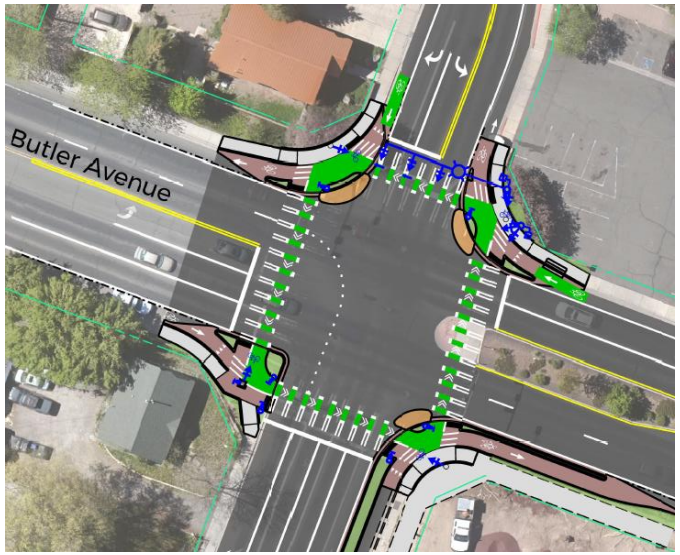
Recommendation

- The Engineering Speed Study concludes that the speed limits on Butler Avenue remain the same to continue promoting voluntary compliance, encouraging uniform flow, clearly communicating reasonable and prudent speeds, and ensuring an effective enforcement environment for the police
- Staff is committed to reevaluating the speed limits on Butler Ave after the completion of the Safe Streets for All (Complete Streets) grant project

Future Projects

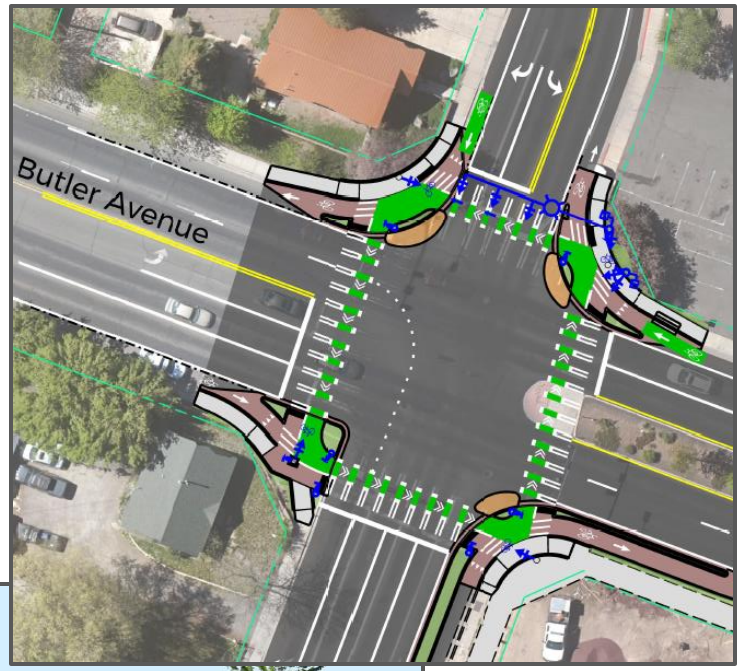
- Safe Streets For All
- Lone Tree Overpass

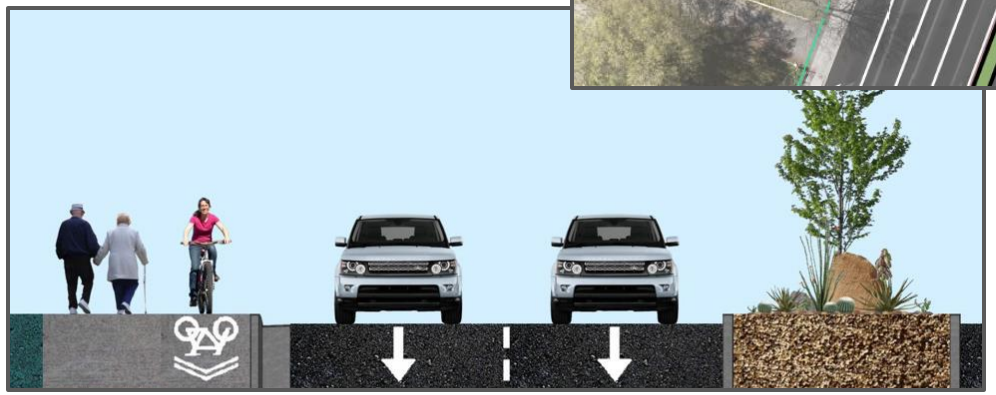


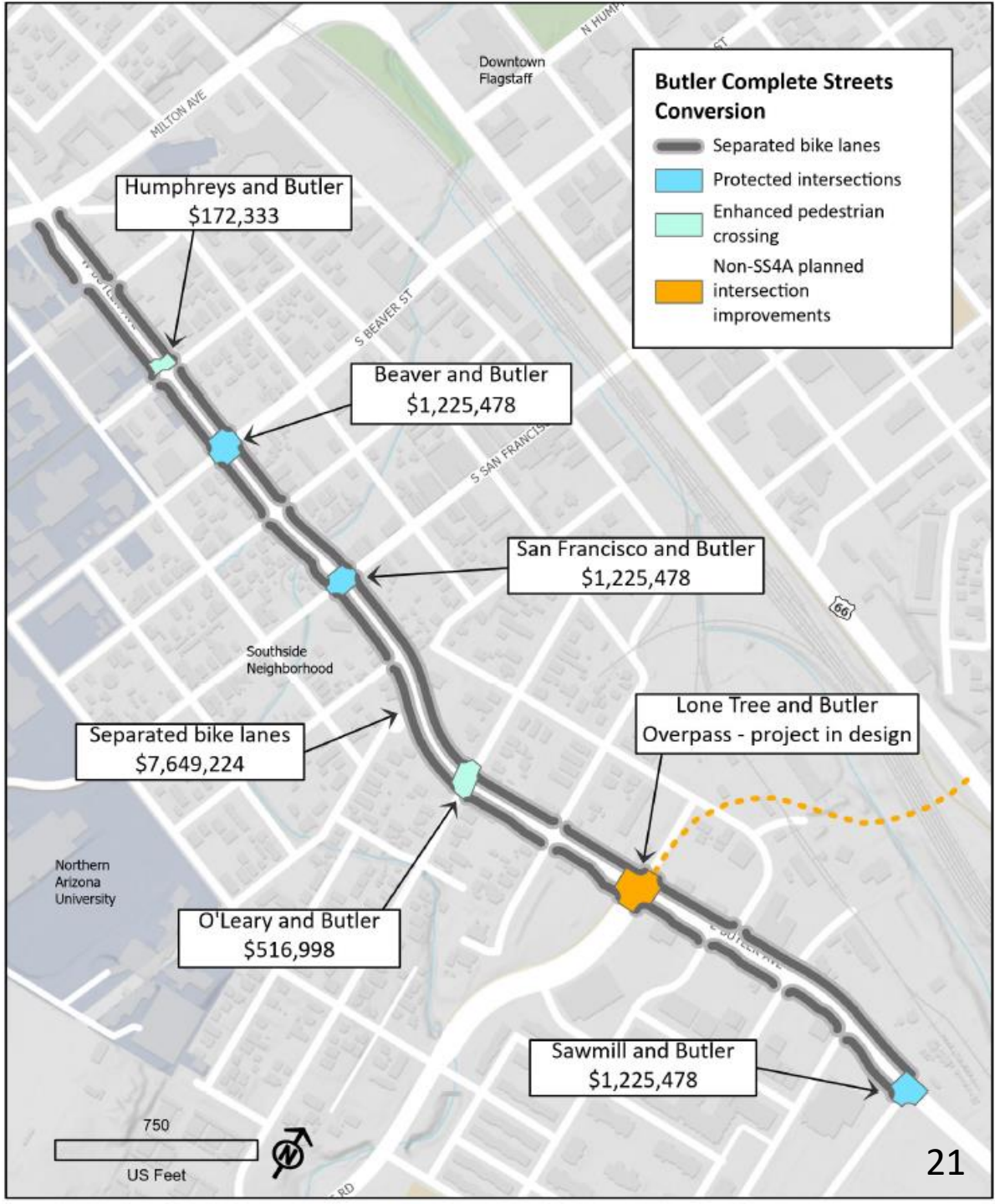


Safe Streets for All Grant

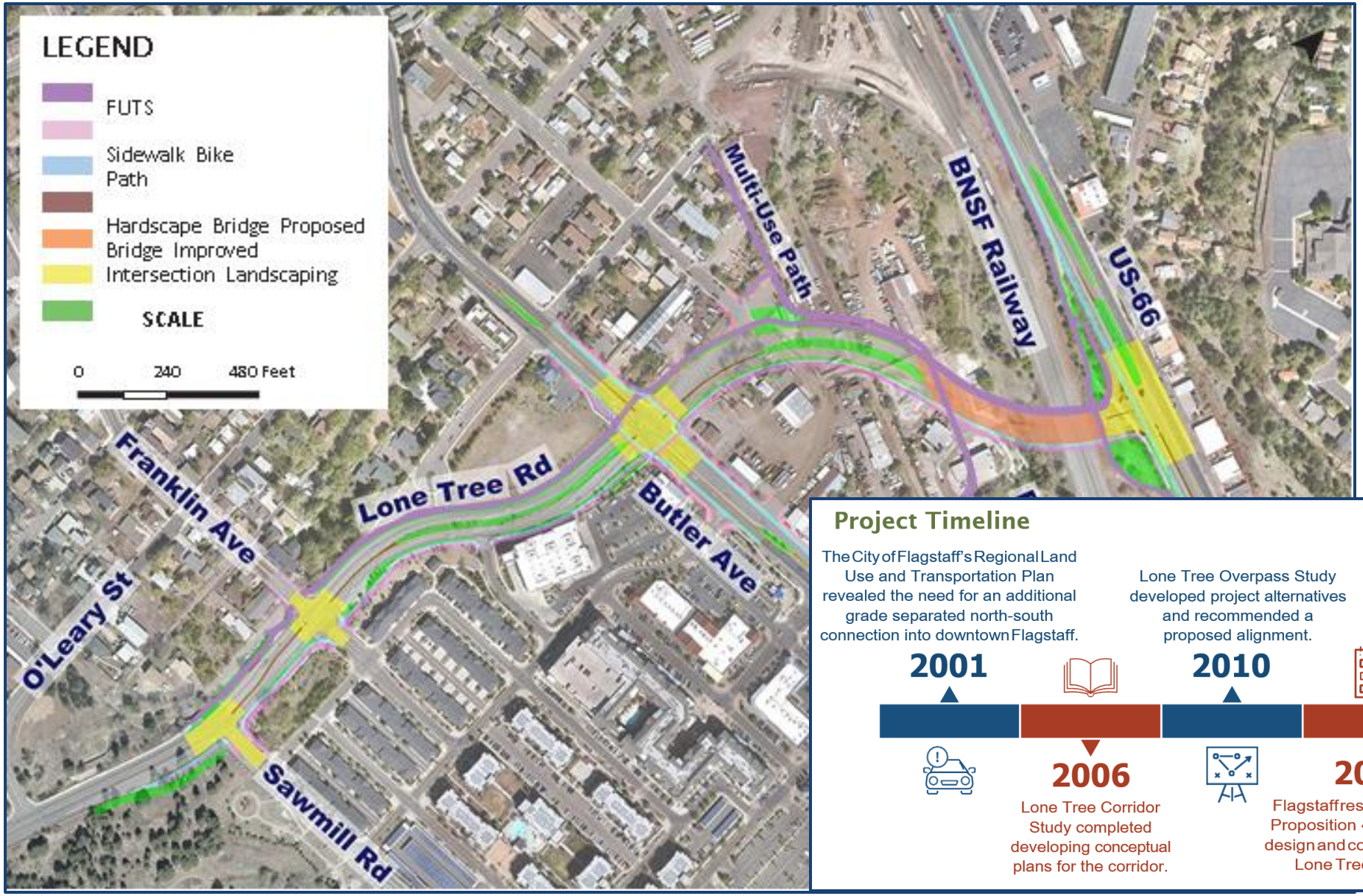
- 3 Protected Intersections
- 2 Enhanced Pedestrian Crossings
- Multi-use path with parkway
- Awarded $9.6 million







Lone Tree Overpass



Project Timeline

2001 — The City of Flagstaff's Regional Land Use and Transportation Plan revealed the need for an additional grade separated north-south connection into downtown Flagstaff.

2006 — Lone Tree Corridor Study completed developing conceptual plans for the corridor.

2010 — Lone Tree Overpass Study developed project alternatives and recommended a proposed alignment.

2018 — Flagstaff residents approve Proposition 420 to fund the design and construction of the Lone Tree Overpass.

2020 — Lone Tree Overpass Study Final Report Update updated recommendations and cost from the 2010 Lone Tree Overpass Study.

2021-2023 — *We are Here — Design

2024-2026 — Construction

Committee and Commission Feedback

BAC/PAC

- Speed limits should be lowered
  - Due to proximity to NAU and the number of pedestrians and bicyclists
  - For the comfort of pedestrians and bicyclists because we want to encourage more ped/bike use
- Prefer to keep curbs until closer to the Butler Ave reconstruction

Transportation Commission

- Speed limits should be lowered
  - Before or with the construction of SS4A project
- Prefer to keep curbs until Fall 2024 to see if public works can maintain during winter. If maintenance is not feasible, the curbs should be transitioned to double stripes

Conclusions/ Staff Recommendations

Pilot Bike Lanes

Speed Study

Future Projects

- The speed limit on Butler Avenue should remain the same to promote voluntary compliance, encourage uniform flow, and provide a clear reminder of reasonable and prudent speeds
- Staff is committed to reevaluating Butler Avenue speed limits after the completion of future projects

Thank You

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TEAM FLAGSTAFF

WE MAKE THE CITY BETTER

Potential Council Options

Butler Speed Limit

1. Follow Staff recommendation to keep existing posted speed limits
2. Wait for grant project completion and study again
3. Come back with Ordinance to adjust speed limits by Council authority