



Mountain Line

Transit Guidelines

September 2019



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Adoption

The creation of the Mountain Line Transit Guidelines has been on Mountain Line's Board approved Strategic Work Plan since January 2018 in order to better integrate transit in the development process. These Transit Guidelines serve as Mountain Line's guiding principles to enhance service delivery and strive for continuous improvement in all we do.

This document may be amended with the approval from Mountain Line's Board of Directors. Requests for such amendments may be brought forth by staff or others seeking a specific change through a request to the Mountain Line CEO.

The document has been adopted by Mountain Line's Board of Directions on September 18, 2019.

Acknowledgements

Flagstaff Metropolitan Planning Organization

City of Flagstaff

Coconino County



Mountain Line is open to new partnerships and is happy to meet with developers to discuss how developments can incorporate features that are conducive to transit. Please consult with Mountain Line early in the process.

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CONTENTS

1.	Introduction.....	1
1.1	Introduction.....	1
1.2	Roles and Responsibilities.....	1
1.3	How Should These Guidelines Be Used?	2
2.	Planning.....	5
2.1	Creating Transit Oriented Communities	5
2.1.1	How can transit benefit developers?.....	5
2.1.2	How can developers support transit?.....	7
2.1.3	Development, Ridership, Demand	9
2.2	Transportation Demand Management.....	10
2.2.1	How can TDM benefit you?	10
2.2.2	What can developers do?.....	11
2.3	Integrating Transit into the Transportation Ecosystem.....	14
2.3.1	Bus Stop Placement	14
2.3.2	Bus Pullouts.....	16
2.3.3	Enhancing Transit Corridors.....	18
3.	Facilities: Design, Construction and Maintenance.....	21
3.1	Bus Stop Types	21
3.2	Bus Stop Implementation.....	21
3.3	Bus Stop Amenities	23
3.4	Bus Stop Customization.....	25
3.5	ADA Compliance	26
3.6	Advertising at Transit Facilities	26
3.7	Bus Stop Maintenance	27
3.8	Temporary Construction Impacts to Transit.....	27
4.	Fleet Characteristics.....	29
4.1	Mountain Line Vehicles.....	29

Appendices

- Appendix A: Bus Stop Layout
- Appendix B: Amenities
- Appendix C: Curb and Signage
- Appendix D: Fleet Specification
- Appendix E: References

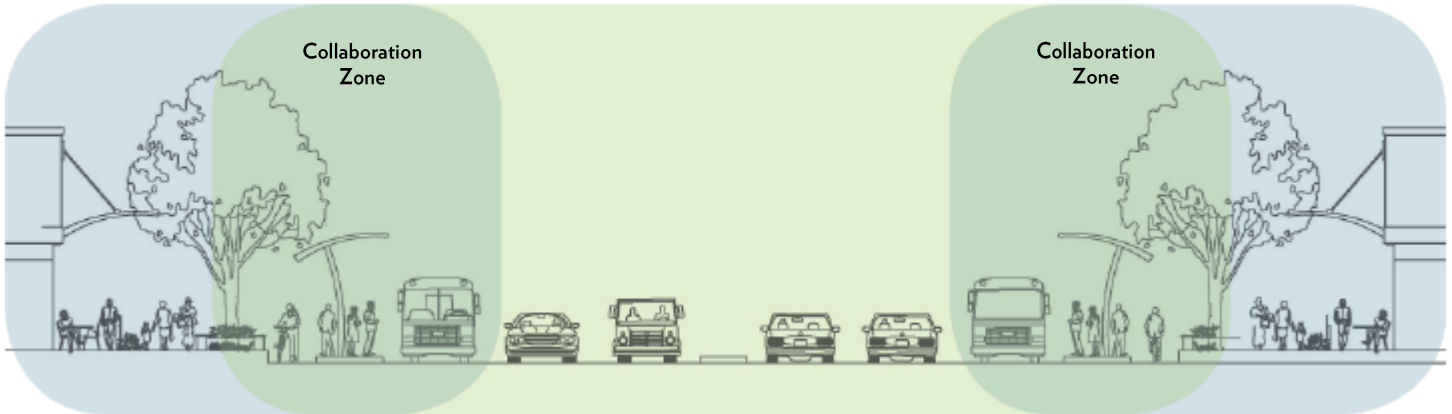
Introduction

1.1 Introduction

The purpose of the Mountain Line Transit Guidelines is to ensure the benefits of transit-oriented design is thought about early in site planning and concept design in all areas Mountain Line serves by creating an easy to use manual of key considerations in project development. These guidelines provide an objective and consistent criterion for Mountain Line staff and its partners to evaluate transit service and related transit facilities for new developments and roadway projects. They also support Mountain Line staff's decision making and are useful to partners in improving consistency on transit-related projects and private developers in learning how transit can best be integrated into a project.

1.2 Roles and Responsibilities

Creating an environment that supports high-quality transit is a collaborative effort between several stakeholders. As shown in the graphic below, adjacent developments and streetscape play important roles in integrating transit infrastructure and service. The overlapping areas, or “Collaboration Zones”, demonstrate the highest level of partnership between developers, city staff (or other jurisdictional right-of-way owners) and other stakeholders. For these zones, stakeholders should coordinate with Mountain Line to ensure developments and other projects enhance transit operations and/or infrastructure.



Developers and Planners

- Create convenient infrastructure within the development and surrounding streets for people to connect to transit
- Create land uses that can generate ridership
- Implement and support land use policies that are conducive to transit

For more information, see Section 2.1.

Jurisdictional Right-of-Way Owners

- Design, operate and maintain the roadways where transit operates
- Assist Mountain Line with ensuring transit is integrated into the greater transportation ecosystem

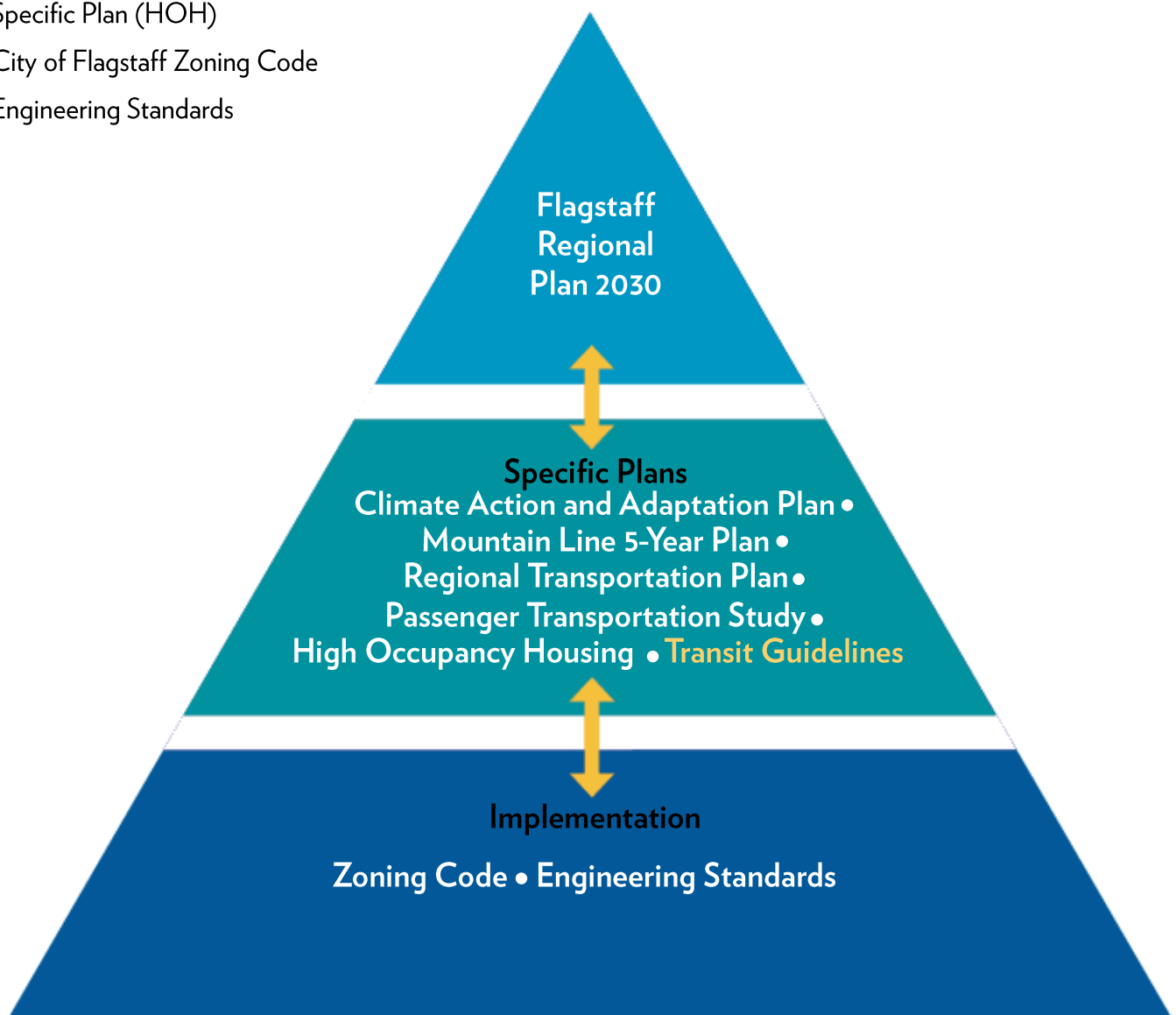
For more information, see Section 2.3.

1.3 How should these Guidelines be used ?

These Guidelines are meant to supplement, not replace, existing policies, regulations and plans. The Guidelines should be used with:

- Flagstaff Regional Plan 2030: Place Matters
- City of Flagstaff Climate Action and Adaptation Plan (CAAP)
- Mountain Line's 5-Year Plan
- Regional Transportation Plan (RTP)
- Northern Arizona Council of Governments (NACOG) Passenger Transportation Study
- City of Flagstaff High Occupancy Housing Specific Plan (HOH)
- City of Flagstaff Zoning Code
- Engineering Standards

The Guidelines are based on both existing Flagstaff policies and research on best practices from transit agencies around the world. Throughout this document, preferences, best practices and examples are provided to serve as a starting point for conversations regarding transit infrastructure and service implementation. For more in-depth information about a context and/or scenario-specific inquiry, please contact Mountain Line staff at 928-779-6624 for further guidance. Staff will work towards setting up a meeting within two weeks of inquiry.



Hierarchy of planning documents.

As summarized in Table 1-1, adopted plans from the City of Flagstaff, FMPO and NACOG promote further integration of transit in the community through land use and transportation policies. The plans included in the table are just a few examples of the existing plans within the community and other agencies have adopted plans, regulations and policies that support transit within the community. These Guidelines outline the best practices for implementing the goals and policies set out by agencies within the community.

Table 1-1: Support for Transit

Plan	Goal/Policy #	Goal/Policy
Flagstaff Regional Plan 2030: Place Matters	Goal T.7	Provide high-quality, safe, convenient, accessible public transportation system, where feasible, to serve as an attractive alternative to single-occupant vehicles.
Flagstaff Regional Plan 2030: Place Matters	Goal T.1.6	Provide and promote strategies that increase alternate modes of travel and demand for vehicular travel to reduce peak period traffic.
Flagstaff Regional Plan 2030: Place Matters	Goal T.1.7	Coordinate transportation and other public infrastructure investments efficiently to achieve land use and economic goals.
Flagstaff Regional Plan 2030: Place Matters	Goal T.2.4	Consider dedicated transit ways where appropriate.
City of Flagstaff Climate Action & Adaptation Plan	N/A	Prioritize transportation modes and infrastructure such as walking, biking and public transit that promote health, maintain Flagstaff's clean air status and reduce emissions.
Flagstaff High Occupancy Housing Plan	Goal 3	Leverage high occupancy housing to create more efficient and equitable transportation.
Flagstaff Metropolitan Planning Organization Blueprint 2040: Regional Transportation Plan	N/A	People matter — health, safety and affordability benefits are gained from alternative modes. Place matters — human-scale environments for walking and biking make places welcoming.
NACOG Passenger Transportation Study — Phase 1	N/A	Passenger transportation in Northern Arizona is a network of services that are locally operated and regionally connected. It enhances and sustains the quality of life and economic vitality of the region, reduces isolation by being accessible to all and is efficient, reliable, affordable and safe.

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Planning

2.1 Creating Transit Oriented Communities

2.1.1 How can transit benefit development?

Transit increases property values and encourages economic development (Cortright, 2017). Residents and businesses are willing to pay a higher rent for a property that is located in a transit oriented neighborhood. As a result, locating developments near transit is a strategic way for developers to maximize their return on investment.

Access to transit is one of the factors employers consider when deciding where to locate their businesses because they want to be easily accessible to their

employees, consumers and clients. Similarly, people prefer to live in locations where they can easily access transit because transit connects people to employment opportunities, educational institutions, healthcare, shopping and recreational opportunities.

Proactive collaboration will allow Mountain Line staff to give input early in the process and plan for future service and/or infrastructure investments that may be needed to accommodate increased ridership demand the development may generate.

The **BENEFITS** of Transit Supportive Development



1 **Economic**

- The City of Flagstaff offers parking reductions of up to 10% for developments within one-quarter mile of a bus stop.
- For every \$1 a community invests in public transportation, approximately \$4 is generated in economic returns (Grisby, 2014).
- Investments in transit can yield 51 jobs per \$1 million invested (Grisby, 2014).



2 **Attractiveness**

- Property values increase by an average of \$2,000 for every additional transit score point. Transit score is a measurement for how well a location is served by transit (Cortright, 2017).
- During the last recession, residential property values performed 42 percent better if they were located near public transportation with high-frequency service (Mooney, 2013).
- Based on a recent study, the number one factor in businesses choosing to relocate their offices to a central business district was better access to public transportation (Goddin, 2015).



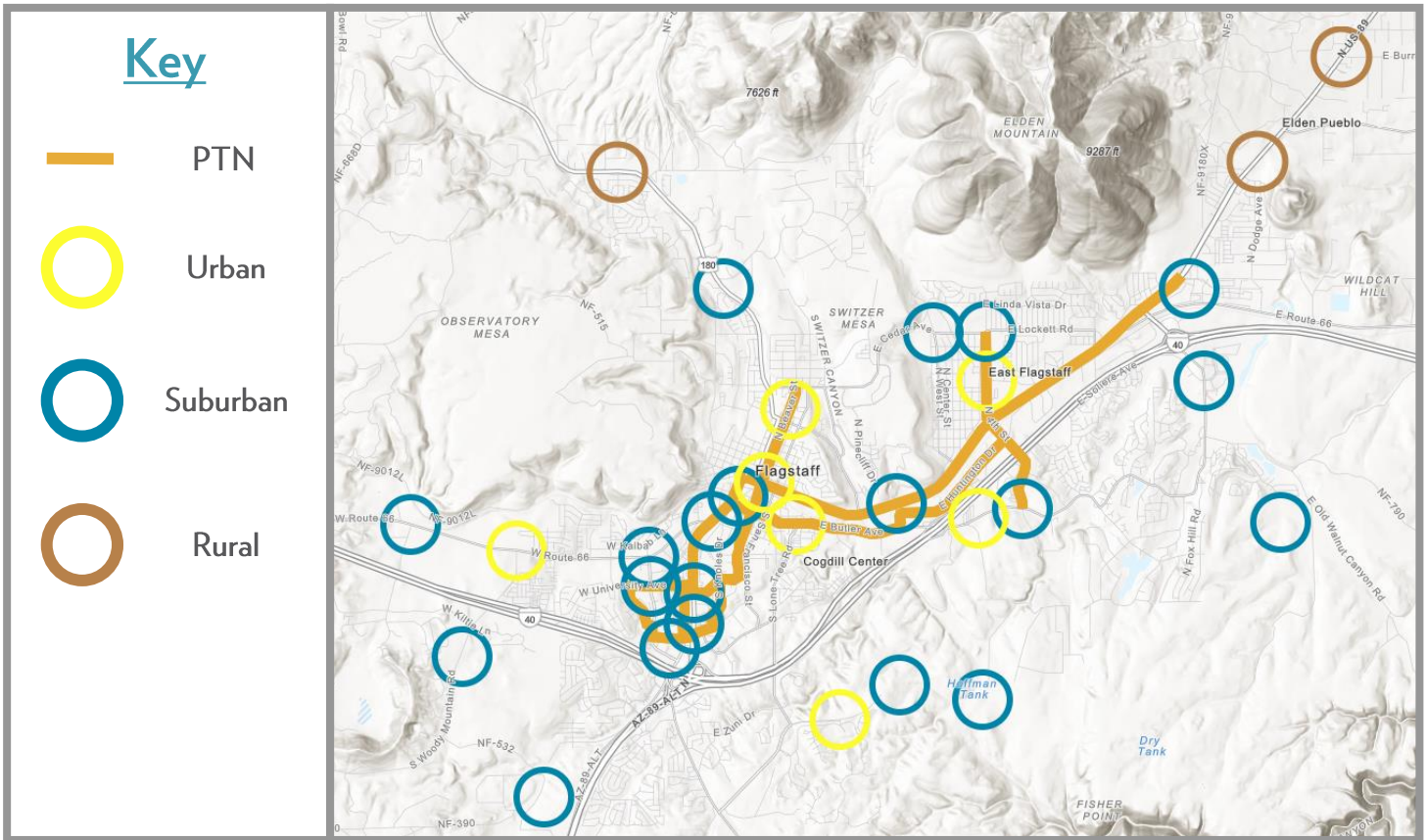
3 **Lifestyle**

- Transit + housing = affordability. Saves \$9,000 a year (McKone, 2010).
- A single percentage-point increase in transit ridership is associated with a 0.437 percentage-point lower obesity rate in counties across the United States (Science Daily, 2019).
- Good accessibility to public transportation contributes to a reduced risk of depression (Jaffe, 2015).



4 **Mobility**

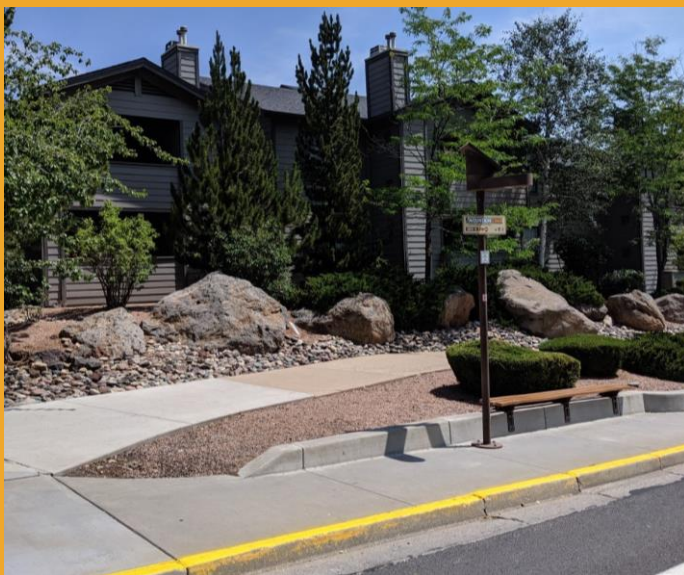
- Transit improves access to health services, fresh food, educational opportunities and economic opportunities, creating healthy communities and enhancing livability (Del Rio, 2017).
- Transit can be a powerful tool to advance equity and social justice in American cities (Transit Center, 2018).



Activity centers established by the Flagstaff Regional Plan overlaid on the PTN (AECOM, 2019).

As part of Mountain Line's Five-Year Plan, Mountain Line and its partners have identified corridors on which the agency will make the strongest commitment to service. In the map above, these corridors are highlighted in gold.

The Permanent Transit Network (PTN) identifies where the city should encourage Transit Oriented Development. Development, street improvements and transit priority projects on and around these corridors will help Mountain Line deliver efficient and high ridership service in the future.



Type II bus stop in Flagstaff with a direct pathway from development.

Maximizing the Benefits of Transit...

While locating a development near transit offers developers several benefits on its own, providing direct access to a transit stop from a development can further enhance these benefits from transit. A direct walkway or path from a development to a transit stop increases customer access and spending and lowers the cost of living for residents, making it a more attractive place to live and work. For more information on the best practices for connecting developments to transit, see Section 2.1.2.

2.1.2 How can developers support transit?

Transit Oriented Developments (TOD) locate housing and commercial developments within walking distance of and ideally adjacent to transit. TODs incorporate design features that enhance transit boost the desirability of developments. Accessibility to transit is one of the top factors people consider when deciding where to live, especially for people between the ages of 18-24 (Florida, 2015).



Articulated bus at a Type II bus stop.

TOD Best Practices



Connect people to transit to:

- Minimize residents' and employees' need for a car, increasing affordability.
- Improve access and transit utilization.

Effectively provide connections to transit by:

- Creating small block sizes within the development to reduce walking distances.
- Maintain a walkable quarter mile distance to transit stops by adding crossing opportunities when suitable.
- Providing direct and designated walkways to the transit stop.
- Limiting walking distances from the transit stop to the front door of the building.



Incorporate amenities to:

- Create a comfortable environment for transit riders.
- Enhance safety at transit stops.

Amenities may include:

- Seating areas
- Shade
- Wayfinding signage
- Dark sky compliant lighting

Planning Best Practices



Create dense, mixed-use developments to:

- Allow people to access multiple destinations from a single transit stop.
- Improve walkability.

Design mixed-use development by:

- Incorporating a mix of residential, retail, and office space.
- Create dense, walkable spaces which enhance sense of place and connect to surrounding land uses.



Encourage people to take transit to:

- Reduce vehicle trips to and from development.
- Reduce parking demand.
- Improve sense of community.
- Improve air quality.

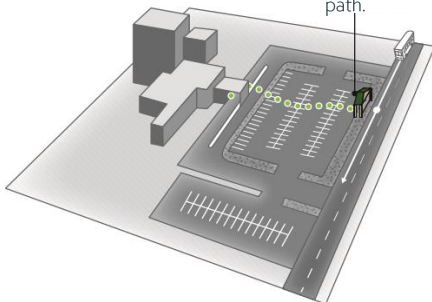
Promote transit ridership by:

- Providing discounted or free transit passes to residents and/or employees. See section 2.2 for more information on the ecoPASS program.

Site Planning Examples

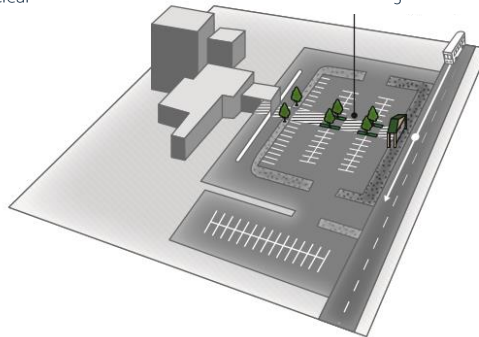
Poor

Bus stop is far from land use and riders must access the building through the parking lot with no clear path.



Improved

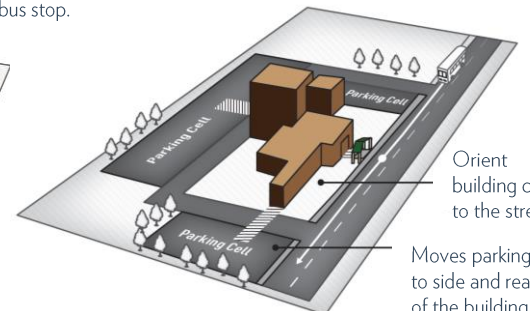
Landscape promenade with paint-striping on crosswalks connecting the building with the bus stop.



Good

Orient building closer to the street

Moves parking to side and rear of the building. Connectivity to building and parking lot.



BONUS: For excellent site planning, create connectivity within the site plan and to adjacent land uses to promote walkability and enhance access to transit.

2.1.3 Development, Ridership, Demand

New developments generate trips for all modes of transportation, including transit. The City of Flagstaff have a transportation impact analysis (TIA) process that can calculate the anticipated trip generation for a particular development. The FMPO is updating their regional transportation model which incorporates elements to assess transit mode share, such as access to transit. In the future, this will help reduce mitigation requirements for developers.

For developments that generate high amounts of transit trips, such as high-density housing, developers are

encouraged to collaborate with Mountain Line early in the design process. Early collaboration with Mountain Line staff during the development process will help Mountain Line plan for future service and/or infrastructure investments that may be needed to accommodate the increased ridership. Additionally, Transportation Demand Management (TDM) provides other tools to mitigate generated traffic. To learn more, please see Section 2.2.



New developments generate trips for all modes of transportation, including transit.

2.2 Transportation Demand Management

Similar to a water conservation program that regulates or incentivizes using less water, Transportation Demand Management (TDM) is a set of tools designed to help reduce congestion on the existing transportation network by encouraging transportation choices through regulations, policies, incentives and programs.



Examples of TDM strategies.

2.2.1 How can TDM benefit you?

TDM can benefit a development through a variety of measures, including:

- Reduce the number of vehicle trips to and from a development, which decreases traffic on the surrounding road network;
- Decrease the demand for parking, which reduces the need for additional parking and associated maintenance costs; and
- Add a competitive advantage over other developments through added amenities and benefits.
- Expand mobility options which increases access to businesses and transit via other modes.

If interested in discussing how your development can support transit by incorporating TDM tools, please contact Mountain Line at 928-779-6624

2.2.2 What can developers do?

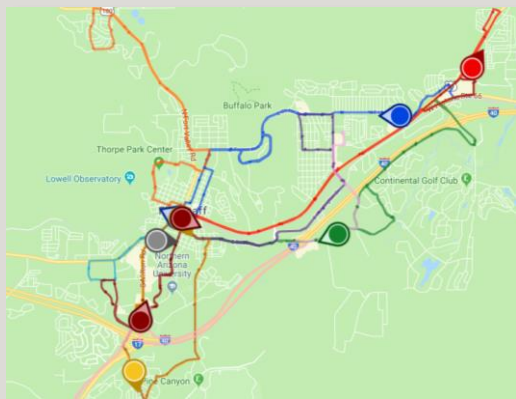


ecoPASS



Provide an ecoPASS

Mountain Line partners with businesses, neighborhood associations, and housing developers to provide discounted annual transit passes for every employee or resident. The goal of the ecoPASS program is to expand mobility options by getting free passes to as many people as possible, improving equity and lowering transportation costs for employees and residents. The ecoPASS program can be one of the many benefits you can provide to your residents or employees, which can help attract and retain residents or employees. The ecoPASS program is ideal for housing developments or employers within a quarter mile of a bus stop.



Install real-time arrival screens

Businesses or residential developments can add a real-time arrival screen in their lobby or front desk area. Real-time arrival screens are an effective way to keep passengers informed on accurate bus arrival times, improve passenger satisfaction, and increase ridership. This TDM measure is ideal for developments within a quarter mile of transit.



Provide funds for operations or capital

For developments that are high ridership generators, such as high occupancy housing or large employers, developers can increase transit ridership via capital improvements, such as bus purchases, or funding operations on adjacent routes to increase the frequency or provide a longer span of service. Investments in operations require ongoing funds with a commitment of five years with two automatic renewals of five years from the developer. Funds for capital are one-time investments. All requests will be approved by Mountain Line's CEO and General Manager.



Provide bike share memberships

Bike share programs make bikes available for short-term rental and locations throughout a city. They are ideal for connecting people to and from transit and allows short, one-way trips by bicycle possible. Bike share programs introduce people to the benefits of commuting via bicycle. Developers can pay for all or a portion of employees' or residents' bike share monthly



Source: Skabalund, 2019

Provide bicycle fleets

Residential developments and employers can also provide a fleet of bicycles which residents and employees can rent out or borrow. This decreases the barrier of bicycle ownership and maintenance, and can provide residents with the opportunity to use a bicycle for running errands, commuting, or for recreation. Developers can do one of three solutions: contract the service, purchase a maintenance contract with a local bike shop or a tun-key solution.



Source: Green NAU, 2018

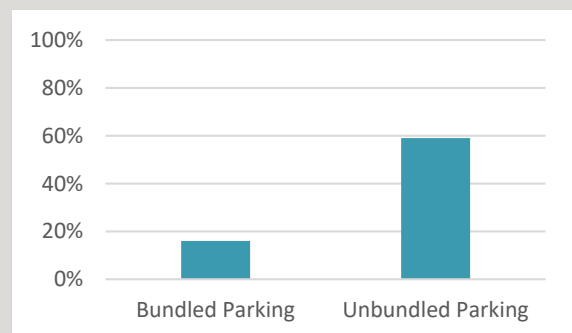
Create secured bicycle parking

Residential developments and employers can promote bicycling by providing safe, reliable, and easily accessible bicycle parking, above and beyond existing bicycle parking requirements. This can take the form of bicycle lockers or covered bicycle parking.



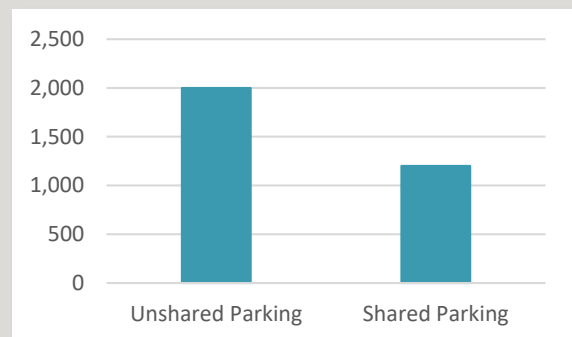


Percentage of residents who use transit with...



Source: Pinski, 2018

Number of parking spaces needed with...



Source: City of Santa Cruz, 2019

Manage Parking

Parking is expensive for developers to build and for property managers to maintain. Parking management affects the supply and price of parking.

Unbundled parking is separating the cost to rent a parking space from the cost of renting an apartment or condo. This has been cited as one of the most effective measures to support the use of other modes of transportation. Unbundled parking provides an opportunity to recoup some of the initial and ongoing maintenance costs. In addition, this can be a more equitable option for residents since they save money when they do not use a parking space, are not forced to pay for parking they do not need and can adjust their parking supply as their needs change.

Shared parking involves the use of a parking space to serve two or more of the same site or adjacent parcels without conflict, for example, a theater and a bank. The underlying basis of shared parking is to optimize the utility of parking resources and reduce the number of spaces needed, thus reducing initial and ongoing costs for parking.

The City of Flagstaff's zoning code lists additional **parking adjustments** for developments, please see the zoning code for additional parking reductions.



Discount car share memberships

Housing developments could consider providing discounted car share memberships that allow residents to forgo car ownership, thus reduce demand on parking and the number of cars per household. These programs can generally be used by anyone with a valid driver's license and a membership to the program. Northern Arizona University operates a car share program in Flagstaff.

2.3 Integrating Transit into the Transportation Ecosystem

2.3.1 Bus Stop Placement

2.3.1.1 Bus Stop Spacing

Mountain Line prefers to have stops every quarter mile. Too many stops slow the efficiency, while too few makes it challenging to walk to transit. Additional analysis by Mountain Line staff includes:

- Existing routes in the area
- Route timing
- Demographics
- Stop location specifics
- Land use
- Right-of-way limitations
- Walkshed
- Safety
- Accessibility

Exceptions to the recommended spacing requirements may be considered in certain circumstances, including if the location is close to a major ridership generator or have a high concentration of youth, seniors, disabled, and/or low-income populations.

Bus stops should be placed as close to intersections as possible. The proximity to intersections provides convenience and increased safety to transit patrons, minimizes mid-block pedestrian crossings, and reduces walking distances at transfer locations. All bus stop locations must comply with [Mountain Line's Title VI](#) outreach process, which can take up to 8-12 weeks. This process ensures non-discriminatory practices throughout the Mountain Line system. Other factors that may influence the placement of bus stops include:

- Access to the adjacent development
- Roadway and lane configuration
- Safety conditions
- Physical roadside constraints (trees, poles, driveways, etc.)
- Property and right-of-way concerns
- Convenience and comfort of transit riders
- Conflicts with traffic flow



Type III bus stop in Flagstaff.
















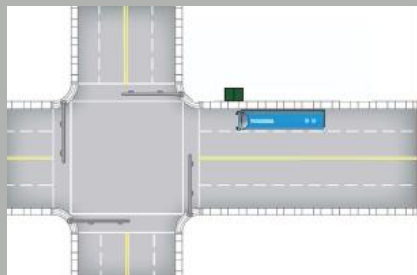







2.3.1.2 Types of Bus Stop Locations

There are three main types of bus stop locations: far-side stops, mid-block stops, and near-side stops. Far-side stops are located immediately after intersections, in the direction of bus travel. Near-side stops are located prior to intersections in the direction of bus travel, and mid-block stops are located at least 400 feet away from intersections. Mountain Line prefers far-side bus stop placement; however, bus stop placement can be influenced by a number of factors, including speed, street context, visibility impacts, driveways, jurisdictional requirements, turn lanes, and topography.



Type I bus stop in Flagstaff.

Table 2-1: Advantages and Disadvantages of Bus Stop Location Types

	Advantages	Disadvantages
Far-Side Stops 	 Minimizes conflicts between right-turning vehicles and buses.	 Intersections may be blocked.
	 By stopping after a light, it makes it easier to get into traffic if stopped in a bus pullout.	 Sight distance may be obscured for crossing vehicles.
	 Minimizes sight distance problems on approaches to intersections.	 Stopping far-side after stopping for a red light interferes with bus operations.
	 Encourages pedestrians to cross behind the bus.	
	Advantages	Disadvantages
Mid-Block Stops 	 Minimize sight distance problems for vehicles and pedestrians.	 Requires additional distance for no-parking restrictions.
	 Passenger waiting areas experience less pedestrian congestion.	 Encourages patrons to cross the street at mid-block.
		 Increases walking distance for patrons crossing at intersections.
		 Turn movement conflicts
	Advantages	Disadvantages
Near-Side Stops 	 Minimizes interferences with traffic by pulling into a right turn lane where such lanes exist.	 The right turn lane or through lane may be blocked by queuing buses.
	 Passengers access buses closest to crosswalk.	 Stopped buses may obscure curbside traffic control devices and crossing pedestrians.
	 Intersection available to assist in reentering normal traffic flow.	 Cannot use right turn lane when a bus pullout is required, creating additional costs to build the pullout infrastructure.
	 No double stopping with in-lane stops which allows transit vehicles to move faster.	

2.3.2 Bus Pullouts

A bus pullout is a designated spot where buses pull out of the flow of traffic to pick up and drop off passengers. In general, bus pullouts make transit operations less efficient because they require buses to wait for a break and re-enter traffic which can result in delays, making in-lane stops more desirable; however, there are circumstances that warrant the implementation of a bus pullout to create a safe environment for vehicles. To determine if a bus pullout is appropriate at a particular location, factors such as safe conditions for transit operations, right-of-way availability, roadway configuration, peak hour traffic volumes, speed limits, time point designations, vehicular line of site, peak hour transit activity and prevalence of mobility device usage should be considered.

The following considerations should be taken into account while evaluating whether a bus pullout is appropriate in a particular location:

- Ability to locate the pullout at the far-side of an intersection.
- Locations should have a sufficient space for buses to pull in and out of traffic with multiple routes and routing configuration considered.
- Since bus pullouts are long-term investments, the locations should be evaluated for long-term applicability and/or potential to be converted into other infrastructure as transportation needs change. As a result, bus pullouts may be more appropriate along the PTN or locations where the infrastructure could be converted into a queue jump or right-turn lane.



Articulated bus using in-lane stop in Flagstaff.



Bus pullout on Highway 180 in Flagstaff.

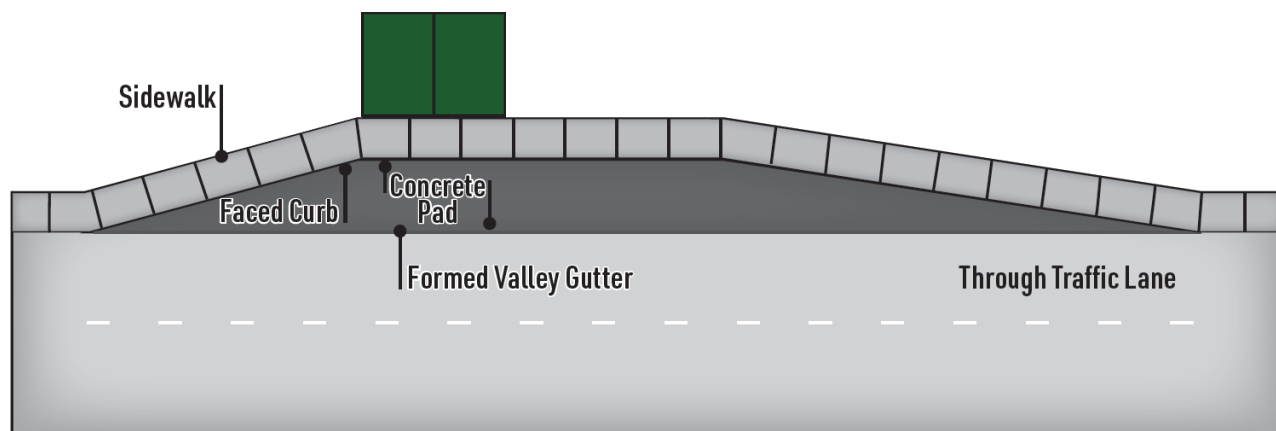
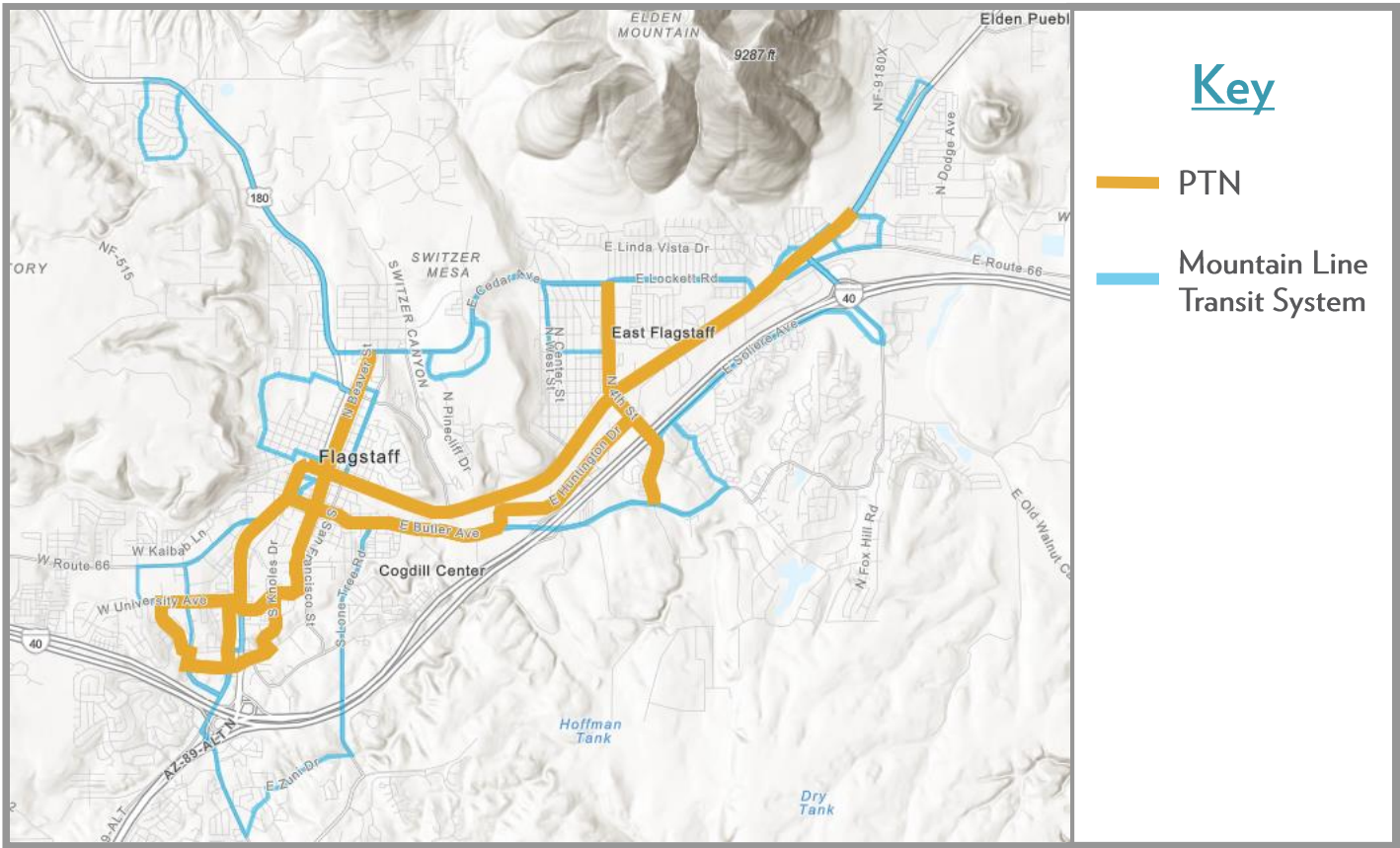


Diagram of bus pullout. See Appendix C for details.

2.3.3 Enhancing Transit Corridors

Street design plays an integral part in efficient and effective transit operations. Transit-friendly streets can employ several design elements to ensure transit can operate safely, efficiently, and comfortably within the right-of-way.

Mountain Line commits to providing the highest service level along their PTN. As a result, additional technology and infrastructure improvements may be implemented along the PTN to further enhance the reliability and attractiveness of transit service.



Mountain Line system map with Permanent Transit Network highlighted (AECOM , 2019).

On-Street Best Practices



When possible, roadways in commercial areas provide loading zones to prevent trucks from blocking buses.



On-street parking should not interfere with bus operations. The minimum lateral length is 50'; approach requires more room than departure.



Use roadway markers to differentiate between transit areas, parking or through traffic.



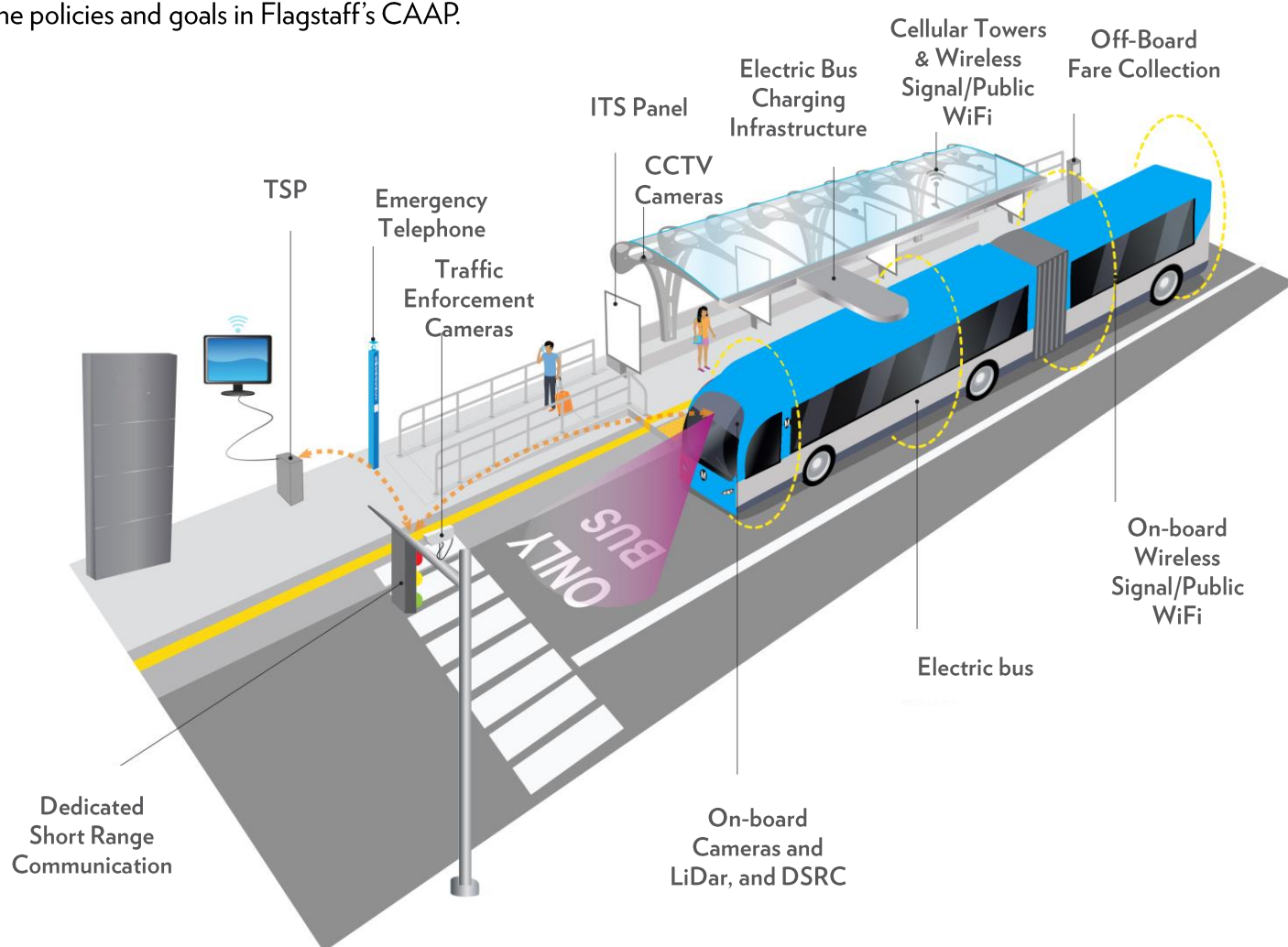
Flexible intersection design with smart technology allows a variety of bus movements.

2.3.3.1 Transit Priority Measures

Transit priority measures are infrastructure and technology improvements that allow buses to move faster, increasing frequency and reliability. Typically, transit priority measures are implemented along corridors that have transit service or along corridors with high traffic volumes that may cause delays. High traffic volumes are relative to the capacity of the roadway and need to be considered on a case-by-case basis.

Impacts to other modes from transit priority measures will vary on a case-by-case basis. Mountain Line acknowledges there may be trade offs for other modes. Mountain Line will coordinate with other agencies to identify the level of impact and determine if additional treatments are required to maintain the roadway's level of service; however, such trade offs are supported by the policies and goals in Flagstaff's CAAP.

The following section summarizes transit priority measures and implementation considerations for infrastructure and technology. This document outlines high-level guidelines for each priority measure; however, actual application and implementation will be determined during the design phase. Mountain Line will work cooperatively with jurisdictional agencies to determine the appropriate integration of transit priority measures.



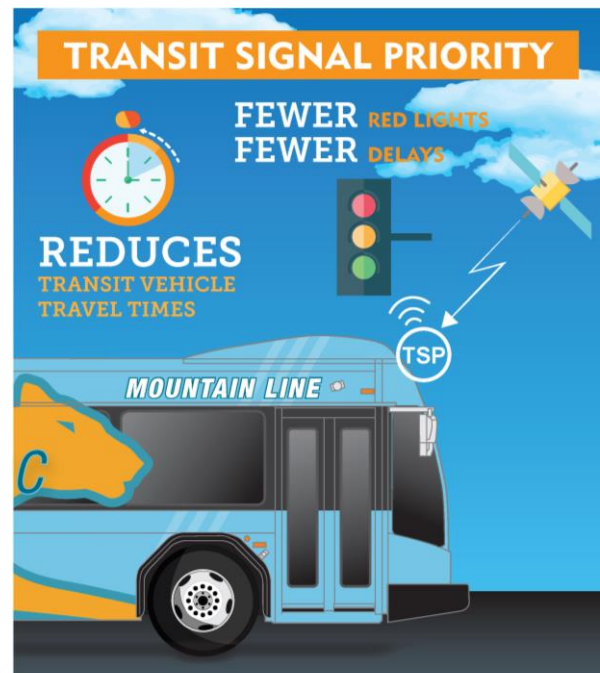
Toolbox of technology and infrastructure improvements that can enhance transit operations.

2.3.3.2 Transit Signal Priority

Transit Signal Priority (TSP) tools modify traffic signal timing or phasing when transit vehicles are present. TSP can enable Mountain Line to maintain run times and improve on-time performance. This allows Mountain Line to operate its current transit service without having to reduce service or significantly increase tax payer costs as traffic increases. To enable the implementation of transit signal priority, developers and other agencies can upgrade traffic signals and design street infrastructure. Updates should be consistent with the standards set in the Arizona Statewide ITS Architecture guidebook and jurisdictional agency requirements.

Key Features and Applications

- Consider applying TSP where signals are a major source of delay for transit, including:
 - Corridors with long signal cycles and long distances between signals.
 - Specific intersections with long signal cycles and/or signals that favor cross streets.
 - Areas with unique turning movements.
- TSP is most effective at signalized intersections operating at Level of Service D and E conditions, with a volume-to-capacity ratio between 0.8 and 1.00 (TCRP Report #118).
 - In heavy traffic flow, a combination of geometric and signal timing options should be implemented to improve transit operations, including queue jumps and Business Access and Transit Lanes.



2.3.3.3 Queue Jumps

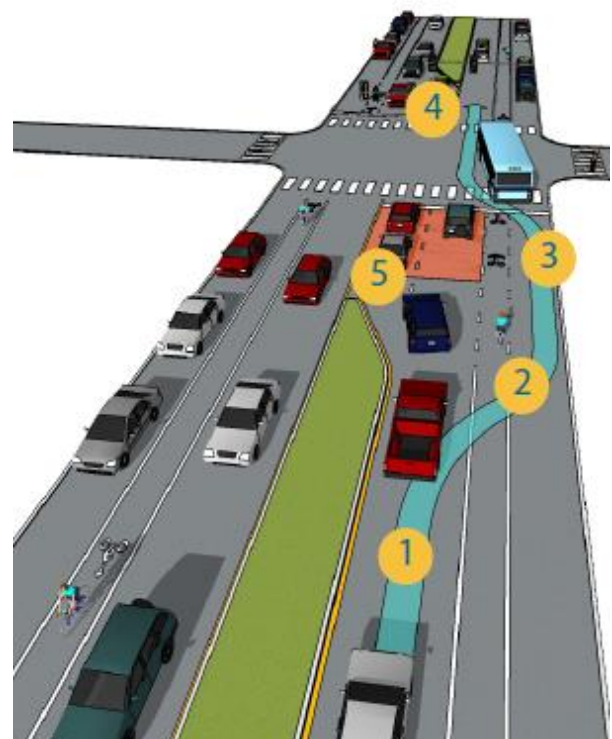
Queue jump lanes combine short dedicated transit facilities with either a leading bus interval or active signal priority to allow buses to enter traffic flow in a priority position, resulting in run-time savings and increased reliability.

Key Features and Applications

- Queue jumps are most appropriate on streets with moderately frequent transit service.
- Buses should operate in the right lane with high peak hour volumes.
- Queue jumps can be applied at near-side, far-side, or non-stop configurations.
- Separate signals should be used to indicate when transit proceeds and when general traffic proceeds.

Queue Jump Progression

- 1 Bus starts in mixed-traffic lane
- 2 Bus maneuvers out of traffic into designated queue jump area to trigger bus only signal
- 3 Bus receives bus only signal and moves in front of traffic
- 4 Bus re-enters mixed-traffic lane ahead of traffic
- 5 General traffic is stopped during the bus only signal phase



2.3.3.4 Bus Only Lanes

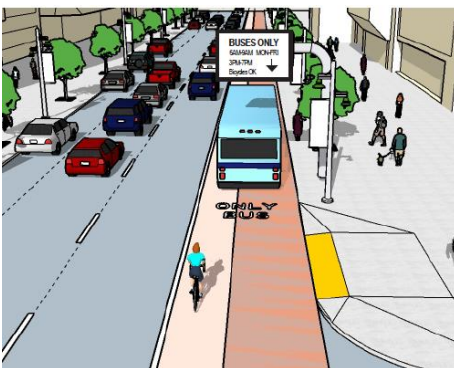
Bus only lanes are lanes that are exclusively for buses. Bus only lanes, including Bus/Bike lanes and Business Access and Transit lanes, reduce traffic-caused delays and improve travel time reliability by providing a dedicated operating environment for transit vehicles. The dedicated facility prevents transit vehicles from being delayed by traffic congestion. Typically, bus only lanes are implemented on high-capacity transit corridors to create efficient, attractive, and reliable transit service.

Key Features and Applications

- “Bus Only” markings should be applied to the dedicated bus lane.
- Apply solid white striping or colored paint to the bus only lanes to indicate to other vehicles that they cannot use the bus only lane.
- Curbside bus only lanes should be a minimum of 12 feet wide.
- Can be complimented by other transit priority measures, such as TSP, to further minimize delays on the corridor.
- Peak-Only Bus Lanes should be considered in scenarios where there are predictable patterns of bus delay due to peak-period motor vehicle traffic.
- Peak-Only Bus Only Lanes are most applicable on streets where there is high-frequency bus service plus high traffic volumes during peak-period traffic.
- Business Access and Transit lanes are primarily for transit use but also allow vehicles to turn into driveways and onto intersection streets. Business Access and Transit lanes are most effectively applied on:
 - High-volume, highly-congested segments;
 - Corridors where the bus operates in curbside lane; and
 - Corridors where it is important to maintain business access.
- Shared Bus/Bike lanes are an option on streets where dedicated bus and separate high-comfort bicycle facilities cannot be provided.

Types of Bus Only Lanes

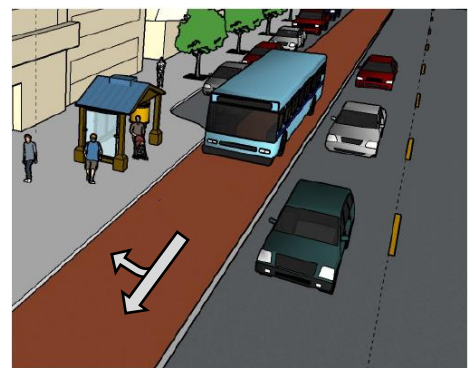
Peak-Only Bus Only



Shared Bus/Bike



Business Access and Transit



Facilities

Design, Construction and Maintenance

3.1 Bus Stop Types

Mountain Line implements four different types of bus stops to meet the needs of different contexts within the Flagstaff community. Depending on the bus stop type, Mountain Line will incorporate different types of amenities to best serve the community. Regardless of the bus stop type, all bus stops will include, at a minimum, a bus stop sign and a landing pad.

Table 3-1 summarizes the types of bus stop Mountain Line implements within its transit network. For further information about the specific criteria for determining which type of bus stop should be implemented at a particular location and what type of amenities should be included, please see Sections 3.2 and 3.3 respectively. See Appendix A for the layout and specifications for each bus stop type.

3.2 Bus Stop Implementation

Mountain Line uses a point system to determine which type of bus stop is appropriate at a particular location. See Table 3-2.

Mountain Line will consider exceptions to its bus stop type scoring criteria under certain circumstances. Scenarios where exceptions may occur include locations with limited right-of-way and/or property rights conflicts.

Based on jurisdictional right-of-way limits, new bus stop improvements may fall outside of the public right-of-way. In these circumstances, the developer shall grant an easement to Mountain Line for bus improvements located on private property. In addition, permits are required and issued by the jurisdictional agency.

Table 3-1: Description of Bus Stop Types

Type	Context	Level of Amenities
Type I	<ul style="list-style-type: none"> • Low ridership • Serves rural and suburban areas 	Low
Type II	<ul style="list-style-type: none"> • Medium ridership • Serves suburban areas 	Medium
Type III	<ul style="list-style-type: none"> • High ridership • Urban/suburban areas (especially locations with high density developments) • Near activity centers • Along PTN 	High
Type IV	<ul style="list-style-type: none"> • Very high ridership • Urban areas (especially locations with high density developments) • Near activity centers • Along PTN 	Very High

Mountain Line staff will perform a projected ridership analysis based on the proximity to the bus stop, route frequency, development density and stop performance at comparable developments. In addition, existing or proposed zoning of the development will be needed to complete the table.

Table 3-2: Bus Stop Type Scoring Criteria

Scoring Criteria	Score
Projected Ridership (Transit Activity) Low ridership (<10 boardings/alightings a day) – 0 points Moderate ridership (11-50 boardings/alightings a day) – 3 points High ridership (51-99 boardings/alightings a day) – 5 points Very high ridership (>100 boardings/alightings a day) – 8 points	
Land Use Density (Derived from jurisdiction's zoning code) Low density (T1, T2, RR, ER) – 0 points Moderate ridership (T3, T4, R1, R1N, SC, LI, RD, MH) – 3 points High ridership (T5, T6, MR, HR, CB, HC, CS, CC) – 5 points	
Youth, Senior, Disabled, or Low-Income Populations (includes schools, dedicated housing, and social service entities) Within a 1/4 mile (network distance, not radius) of population concentrations – 3 points Within a 1/8 mile (network distance, not radius) of population concentrations – 5 points	
Activity Center (Derived from Flagstaff's Regional Plan) Within Suburban Activity Center – 3 points Within Urban Activity Center – 5 points	
Community Spaces and Cultural Centers (includes museums, parks, community centers, and other spaces) Within network distance of 1/4 mile – 3 points Within network distance of 1/8 mile – 5 points	
Along Permanent Transit Network Located along Permanent Transit Network – 3 points	
High Exposure to Elements* In area with high exposure to wind, rain, traffic speeds greater than 40-mph, and areas with no parkway – 2 points	

**High exposure to elements such as wind and rain will be evaluated on a case-by-case basis and will be determined based off of the qualitative features of the area, such as whether or not the stop is located near a building that could provide some protection to passengers.*

Bus Stop Types	Outcomes
Type I	0-6
Type II	7-13
Type III	14-20
Type IV	21+

3.3 Bus Stop Amenities

Providing high-quality passenger amenities at bus stops can help Mountain Line attract new riders and increases the comfort of existing riders. Mountain Line incorporates a wide range of passenger amenities at their transit stops (See Appendix C for more details):

- **Landing Pads** are highly durable areas of roadway surface at transit stops that prevent asphalt distortion. FTA requires all new bus stops to have landing pads to be in compliance with ADA standards.
- **Connections to Adjacent Sidewalk** provide passengers with a clear and safe path to their destination.
- **Bus Stop Signs** clearly mark where the bus stop is located and provides the passenger with the stop number.
- **Logo Stops** include a bus stop beacon pole, an attached transit seat and either a concrete slab with a base mounting plate or a drilled pier foundation. Logo stops provide lighting and seating for passengers waiting at bus stops. Logo stops may be substituted for a bench if there are right-of way restrictions.
- **Route Map/Schedule(s)** allows for passengers to see where the route will take them and when the next bus is schedules to come.
- **Shelters** enhance passengers' comfort while they are waiting at the transit stop by providing protection from weather conditions. Every shelter includes a route map, seating and lighting
- **Custom Shelters** can enhance community character by serving as a public art piece and/or complementing the design and architecture of the development or the neighborhood near the transit stop location. See Section 3.4 for more information about the process of implementing a custom shelter.
- **Trash Receptacles** provide a convenient place for passengers to dispose of trash at bus stops. Trash receptacles are required to be placed on top of a concrete base.
- **Bike Racks** provide passengers with a secure place to lock their bike while they ride the bus. Bike racks are required to be placed on top of a concrete base.
- **Secure Bike Parking** provides passengers with a gated, covered and/or locked facilities to leave their bike while they ride the bus.
- **Scooter and Bikeshare Parking Zones** allow for safe places for passengers to park and retrieve scooter and bikeshare mobility devices that can facilitate first mile/last mile trips. The parking zones ensure mobility devices do not block pathways or interfere with transit operations.
- **Off-Board Fare Collection** allows passengers to purchase their fares before they board the bus. Examples include fare vending machines or mobile ticketing which can improve transit operations by allowing passengers to board transit vehicles faster.
- **Real-Time Arrival Signs** notify when the next bus will arrive at the transit stop.
- **Wayfinding Signage** guides passengers to their destinations. Wayfinding signage can be used to help passengers figure out which routes they need to take and/ or direct passengers towards their destinations.
- **Transportation Network Company (TNC) Pick Up/ Drop Off Zones** allow for on-demand car services, such as Uber and Lyft, to have a safe place to pick up and drop off passengers at the transit site. TNCs can facilitate first mile/last mile trips. The pick up/drop off zones ensure the TNCs do not interfere with transit operations, and passengers have a safe place to make their transition to and from TNCs.

Table 3-2: Amenities by Bus Stop Type

Amenity	Type I	Type II	Type III	Type IV
Landing Pad				
Connection to Adjacent Sidewalk				
Bus Stop Sign				
Logo Stop*				
Route Map/Schedule				
Shelter				
Custom Shelter				
Trash Receptacle				
Bike Racks				
Secured Bike Parking				
Scooter and Bikeshare Parking Zones				
Off-Board Fare Collection				
Real-Time Arrival Signs				
Wayfinding Signage				
TNC Pick Up/Drop Off Zones				

The information outlined in Tables 3-2 and 3-3 represent Mountain Line's preferences for implementing bus stop infrastructure; however, certain factors, such as right-of way limitations, partnerships and community interests, will also be taken into consideration when determining the type of bus stop that should be implemented and which types of amenities should be installed at the stop.

	Required: The bus stop must incorporate the amenity into the stop.
	Required if right-of-way is constrained: The bus stop must incorporate the amenity into the stop when right-of-way is constrained for a shelter.
	Recommended: The amenity is preferable at the bus stop but is not required.
	Optional: The amenity may be incorporated into the bus stop design on a case-by-case basis.
	Not Recommended: The amenity should not be placed at the bus stop.

3.4 Bus Stop Customization

Mountain Line is open to new partnerships and discussing the potential to create a customized bus stop that contributes to enhancing neighborhood identity, reflects a specific development's character, and/or creates a public art piece for the community. Mountain Line staff will evaluate bus stop customization requests on a case-by-case basis and actively coordinate with the development community to ensure the customized bus stop is functional and well-maintained.

If a developer is interested in a custom bus stop, the developer will need to follow the steps to the right.

Steps for Bus Stop Customization

- ① Schedule a meeting with Mountain Line staff.
- ② Submit a letter of intent to Mountain Line that identifies the scope, schedule and costs associated with the project.
- ③ Mountain Line and the jurisdictional right-of-way agency must provide the final approval of all customized elements
- ④ Mountain Line and the developer shall execute a long-term maintenance agreement.



Type III custom bus shelter in Flagstaff.

To be in compliance with Mountain Line's other policies, developers acknowledge:

- Mountain Line's advertising policy does not allow advertisements to be incorporated into bus stops. As such, customized bus stops cannot incorporate advertisements of any kind into the design.
- Customized stops need to incorporate some standard features: signage, route map, dark sky compliant lighting, seating, ADA requirements and Mountain Line branding.

To ensure the project's success, during the design process, the developer should take into consideration:

- Working with a structural engineer early in the process to ensure the bus stop can be effectively implemented.
- Maintaining the functionality of the bus stop with the design and choice of materials that enhances the comfort of passengers at the stop and does not inhibit the operational capacity of the stop.
- Considering the maintenance impacts of the design (i.e., using numerous colors in the design could make repainting the shelter challenging later on).



Type III bus stop in Flagstaff with bike rack, trash can, shelter, landing pad and signage.

3.5 ADA Compliance

Mountain Line complies with the Americans with Disabilities Act (ADA) standards. For specifications, reference the U.S. Department of Transportation's ADA Standards for Transportation Facilities. For typical bus stop layouts, please see Appendix A.

Key Considerations and Applications

- Boarding/Alighting Area: All bus stops must include a bus boarding and alighting area to provide a clear zone that allows passengers, including those with mobility devices, to board and alight safely.
 - Dimensions: Boarding and alighting area shall provide a clear length of 96" minimum, measured perpendicular to the curb or vehicle roadway edge, and a clear width of 60" minimum measured parallel to the vehicle roadway.
 - Surface: Bus stop boarding and alighting areas shall have a firm, stable surface. Typical surfaces are concrete but can be asphalt.
 - Slope: Parallel to the roadway, the slope of the bus stop boarding and alighting area shall be the same as roadway, to the maximum extent practical. Perpendicular to the roadway, the slope of the bus stop boarding and alighting area shall not be steeper than 1:48 (2%).
 - Bus stop boarding and alighting areas shall be connected to streets, sidewalks or pedestrian paths by an accessible route.
- Bus stops with shelters:
 - Due to site constraints, the bus stop boarding/alighting area can be located either within or outside of the shelter
 - Bus stops shall provide a minimum clear, level ground space of 30" minimum by 48" minimum to accommodate wheel chairs. Slopes steeper than 1:48 are not permitted
- Amenity Placement: Ensure other amenities (i.e., bike rack, trash receptacle) do not infringe on the boarding/alighting area and accessible route.



ADA compliant bus shelter in Flagstaff.

3.6 Advertising at Transit Facilities

Mountain line does not allow advertising at bus stops; however, Mountain Line does provide advertising opportunities on both the exterior and interior of transit vehicles. Please contact Mountain Line to learn more about our market coverage, ridership demographics, advertising rates and advertising policies.



Mountain Line bus with advertisement on the side of the vehicle.

3.7 Bus Stop Maintenance

Mountain Line strives to keep all of our transit stops in optimal condition to maximize passenger comfort. As such, Mountain Line performs corrective maintenance once a week and scheduled preventative maintenance at each bus stop. Mountain Line is responsible for trash removal, lighting, cleaning of amenities and graffiti removal.

During the winter, Mountain Line strives to keep bus stops clear by plowing snow at our bus stop locations. To help facilitate this process, shelters should not be placed near the edge of the street. When sufficient right-of-way exists, amenities should be placed behind the sidewalk and/or 7 feet (6 feet where possible) from the curb to allow space for snow removal. See the Appendix C for more information on bus stop configurations and amenity placement.

When a customized bus stop is going through the design process, Mountain Line will consider maintenance implications.

For repairs and replacements of customized elements, the developer/3rd party is responsible for replacing and updating customized elements and is required to enter a maintenance agreement with Mountain Line. For more information about designing a custom bus stop, please refer to Section 3.4.

3.8 Temporary Construction Impacts to Transit

Construction activities may impair Mountain Line's ability to deliver service. Developers, utility companies and/or jurisdictional agencies need to coordinate with Mountain Line to determine the impact roadway construction will have on existing transit service and stop(s). Mountain Line requests a minimum of ten days' notice of impact to service.

If the project's construction inhibits Mountain Line's ability to access a stop, Mountain Line will coordinate with the appropriate jurisdictional agency and developer to determine an appropriate location for a temporary bus stop. Mountain Line will communicate the placement of temporary bus stops and route detours with passengers. Mountain Line complies with [Title VI requirements](#) for implementing and communicating temporary service changes.



Mountain Line bus operating during the winter in Flagstaff (Skabalund, 2019, 2019).



Temporary bus stop in Flagstaff.




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Fleet Characteristics

4.1 Mountain Line Vehicles

Mountain Line operates two types of service: fixed-route service and paratransit service. The fixed-route service uses both 40' buses and 60' articulated buses. The paratransit service uses cutaway buses. The following table summarizes the characteristics of Mountain Line's transit vehicle fleet. Please see Appendix D for exact fleet specifications, dimensions, and turning radii.

Table 4-1: Fleet Characteristics

Type	Service Type	Description and Operating Environment
<p>40' Gillig</p> 	Fixed-Route Service	40' Gilligs make up the majority of vehicles on Mountain Line's fleet. Gilligs serve Flagstaff's main corridors, business areas, neighborhoods and schools.
<p>60' New Flyer Articulated</p> 	Fixed-Route Service	60' New Flyers increase the capacity of transit service on frequent and rapid transit routes. New Flyers serve Flagstaff's main corridors and major activity centers, including Northern Arizona University.
<p>Cutaway Bus</p> 	Paratransit	Cutaway buses provide transportation services for individuals with disabilities. Cutaway buses provide origin to destination services and mostly operate on main roads and residential neighborhoods. Since paratransit services do not have a fixed-route, the paratransit operating environment varies from day-to-day.

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Appendix

Appendix A: Bus Stop Layout

Appendix B: Amenities

Appendix C: Curb and Signage

Appendix D: Fleet Specification

Appendix E: References



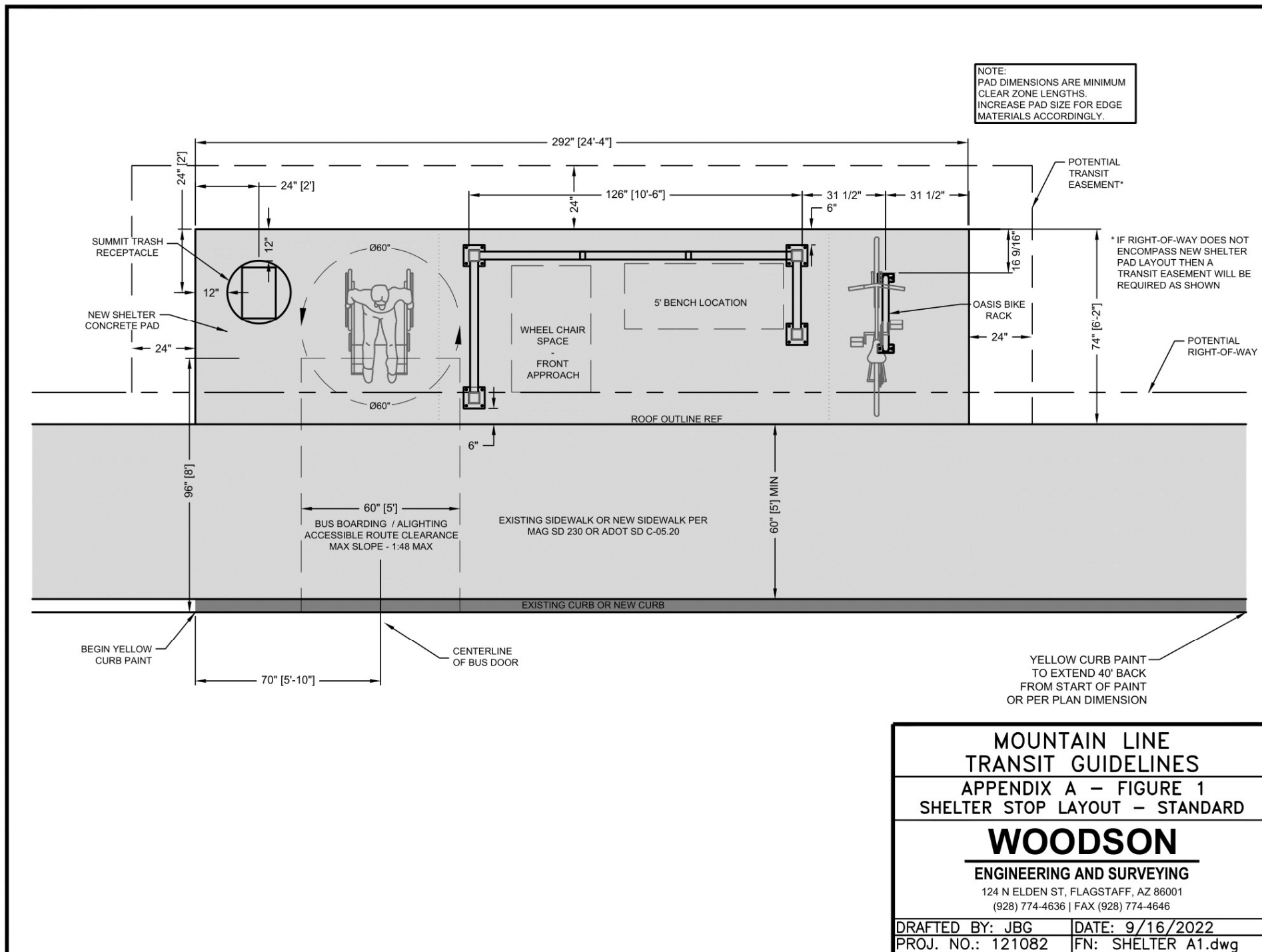
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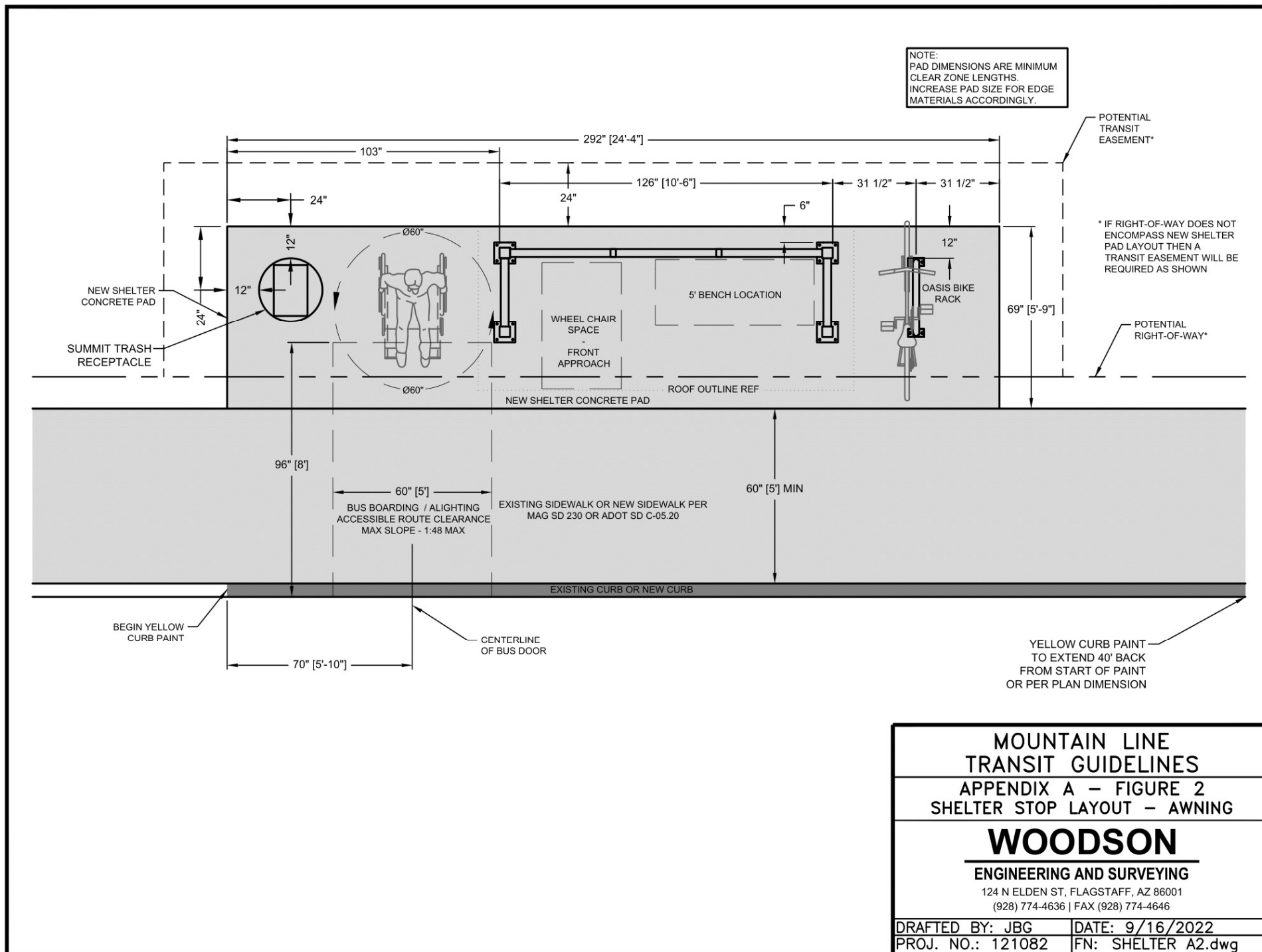


Appendix A: Bus Stop Layout



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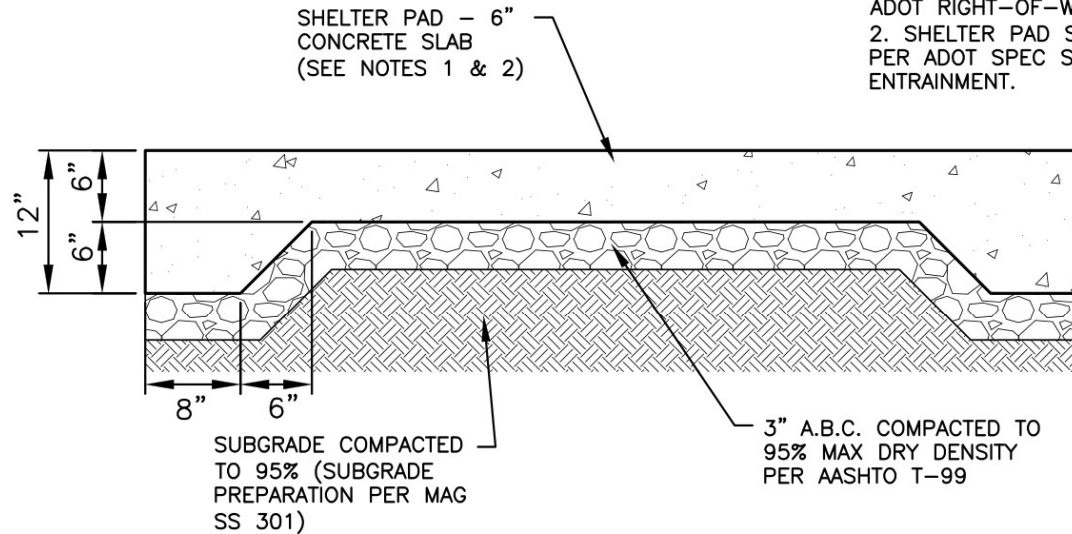
NOTES:

CITY OF FLAGSTAFF RIGHT-OF-WAY:

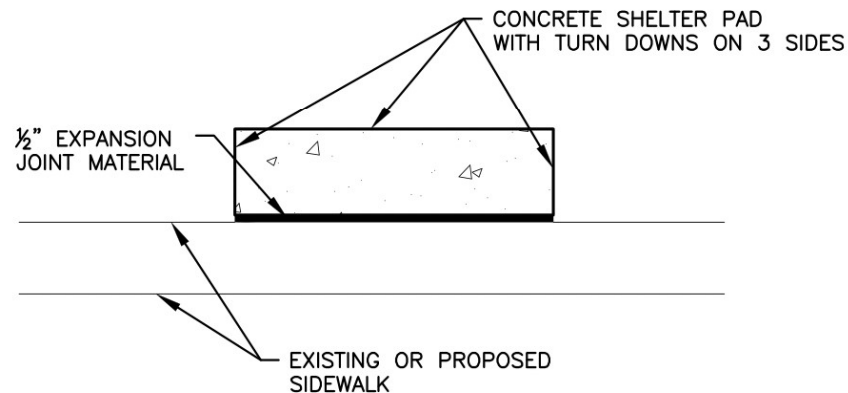
1. SHELTER PAD SHALL BE CLASS 'A' CONCRETE PER MAG SS 725 CONTAINING 5-7% AIR ENTRAINMENT.

ADOT RIGHT-OF-WAY:

2. SHELTER PAD SHALL BE ADOT CLASS 'S' 3500 PSI CONCRETE PER ADOT SPEC SECTION 1006 CONTAINING 4-7% AIR ENTRAINMENT.

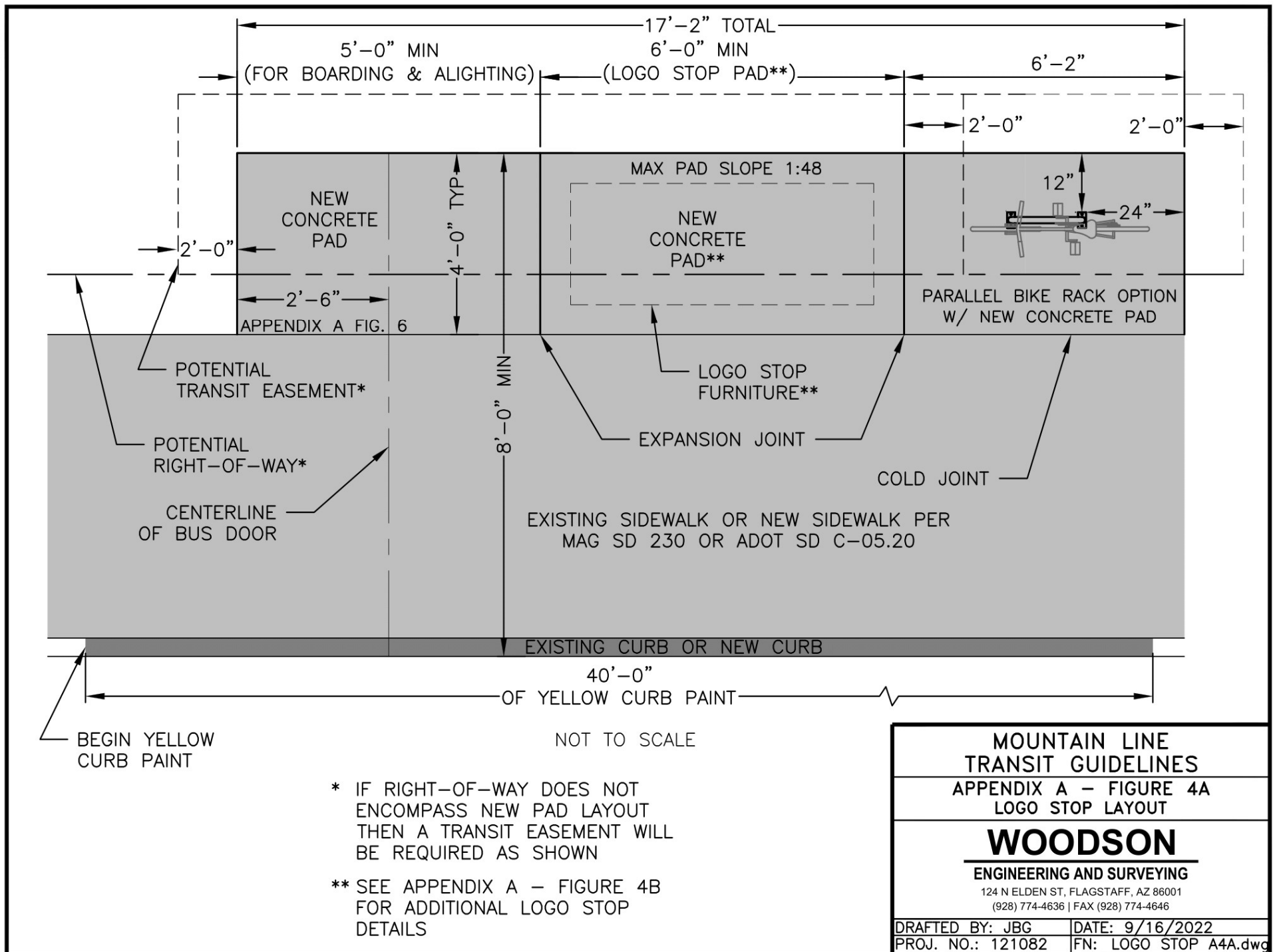


SECTION VIEW
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

MOUNTAIN LINE TRANSIT GUIDELINES	
APPENDIX A – FIGURE 3 SHELTER PAD STRUCTURAL SECTION	
WOODSON	
ENGINEERING AND SURVEYING	
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DRAFTED BY: JBG	DATE: 9/16/2022
PROJ. NO.: 121082	FN: SHELTER A3.dwg



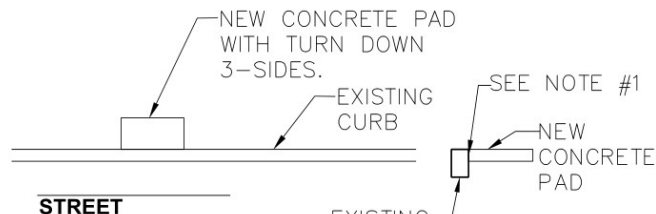


EXHIBIT A

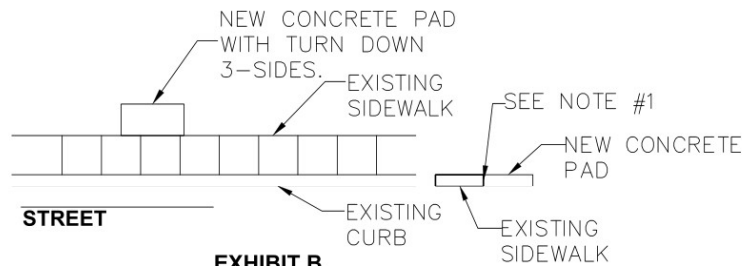


EXHIBIT B

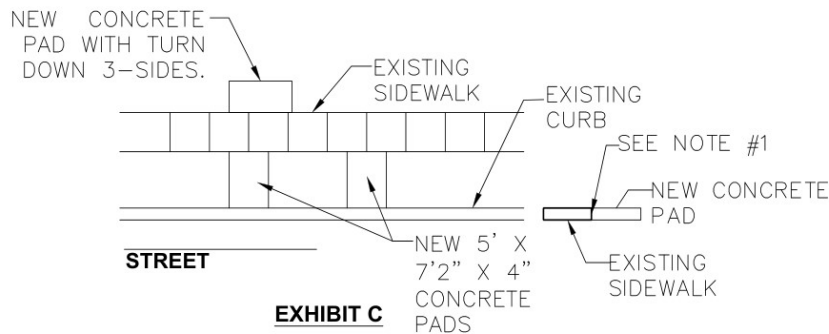


EXHIBIT C

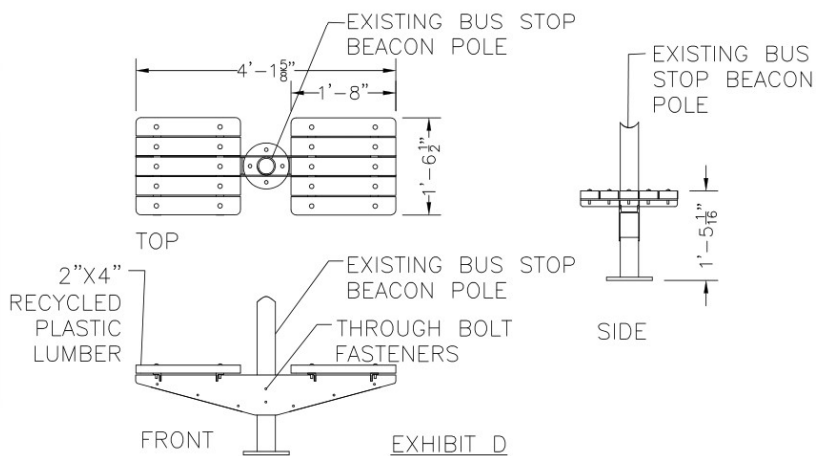
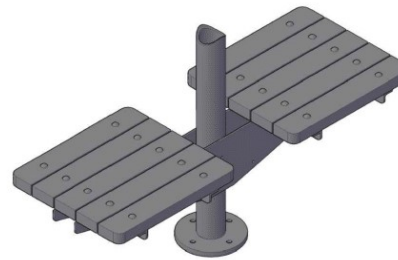
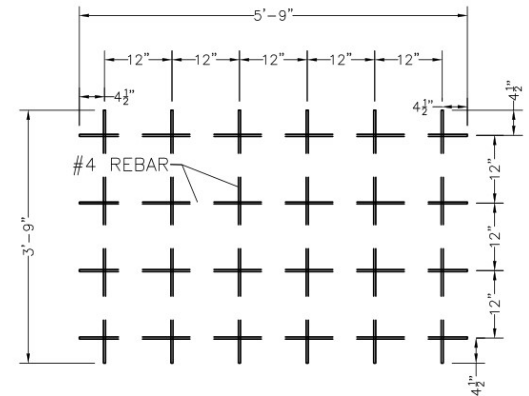


EXHIBIT D



**RETROFIT TRANSIT SEAT
EXHIBIT E**



REBAR PAD

NOTES:

1. REBAR PAD TO BE USED ONLY WITH BUS STOP BEACON
2. REBAR PAD LOCATION VARIES. HOWEVER, IT SHALL BE A MINIMUM OF 1 1/2" FROM ALL EDGES OF CONCRETE PAD AND BE PLACED SO AS TO HAVE A MINIMUM COVER OF 3" OF CONCRETE, BOTH TOP AND BOTTOM

DETAIL 1

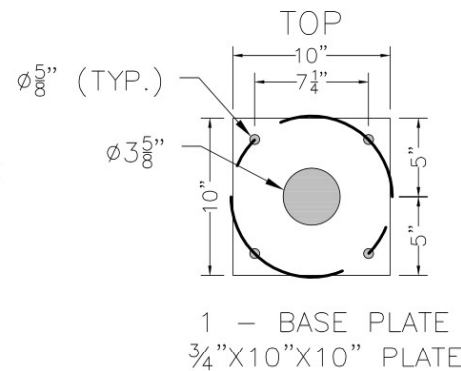


EXHIBIT E

NOTES:

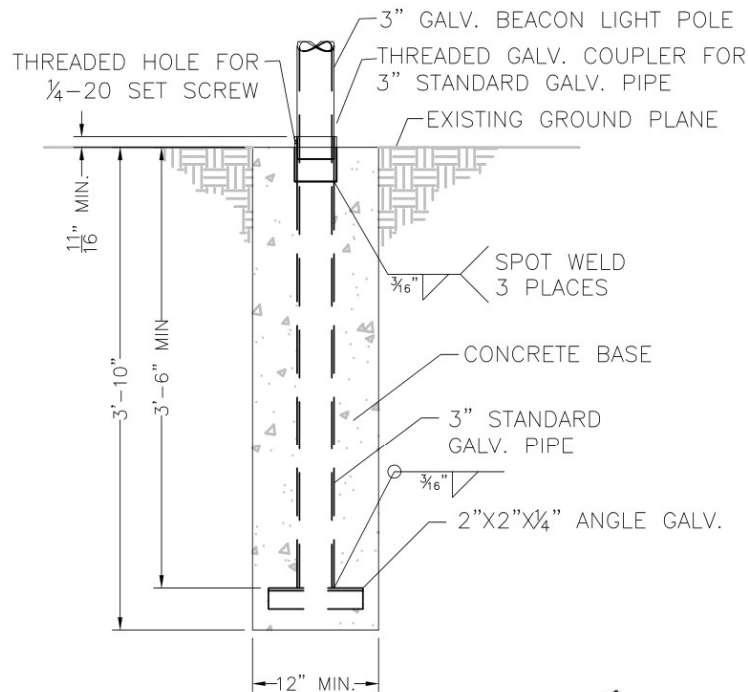
1. SEE APPENDIX 4A FOR LOGO STOP PAD LAYOUT
2. WHERE CONCRETE JOINS EXISTING CONCRETE SIDEWALK (SEE DET. A, B, & C) DOWEL WITH #4 REBAR ON C OF EXISTING CONCRETE MINIMUM 4" EMBEDMENT AND MAXIMUM 24" ON CENTER. ADHISIVE FOR ANCHORS SHALL COMPLY WITH HILTI HIT HY 150 I.C.C. #ESR-3013 OR EQUAL.

**MOUNTAIN LINE
TRANSIT GUIDELINES
APPENDIX A – FIGURE 4B
LOGO STOP PAD – DETAILS 1**

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ENGINEERING AND SURVEYING**

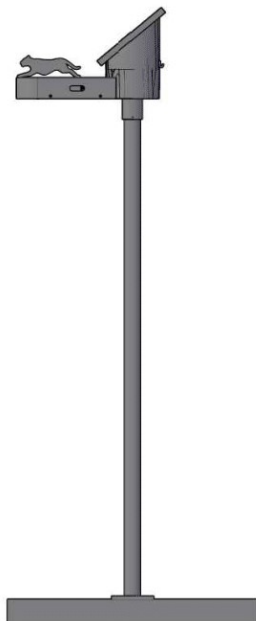
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DRAFTED BY: JBG DATE: 9/16/2022
PROJ. NO.: 121082 FN: LOGO STOP A4B.dwg



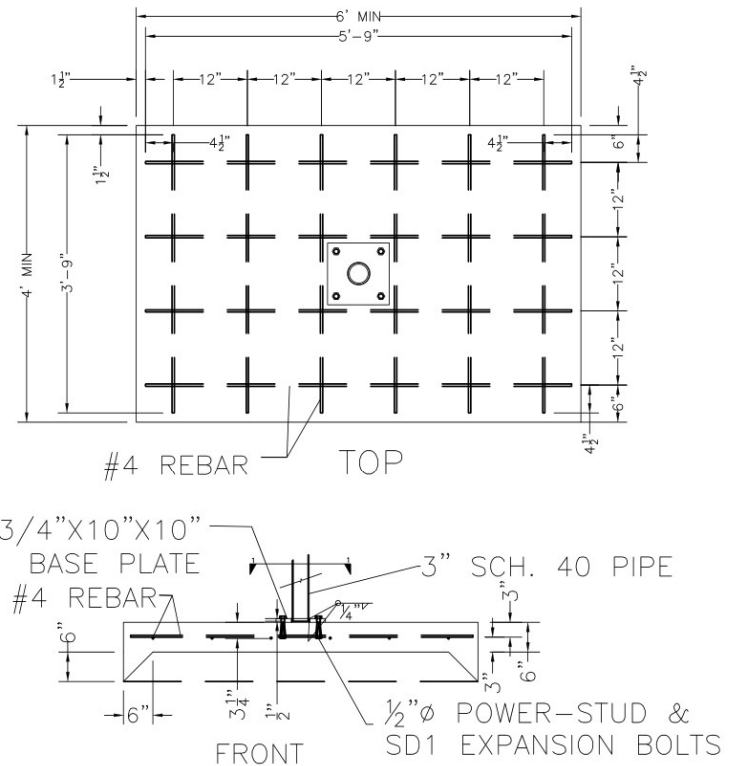
ALTERNATE POLE
INSTALLATION

DETAIL 3



BUS STOP BEACON
EXHIBIT E

1 - POLE
3" SCH 40 PIPE
SIDE



CONCRETE PAD WITH BASE PLATE
ATTACHMENT FOR BUS STOP BEACON

NOTES:

1. CONCRETE PAD 4'x6'x6" MINIMUM
2. CENTERLINE OF POST MAY BE MOVED IN ANY DIRECTION TO WITHIN 12" OF EDGE OF CONCRETE PAD.

DETAIL 2

MOUNTAIN LINE TRANSIT GUIDELINES APPENDIX A – FIGURE 4C LOGO STOP PAD – DETAILS 2

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PROJ. NO.: 121082 FN: LOGO STOP A4B.dwg

GENERAL STRUCTURAL NOTES

DESIGN CRITERIA:

CODE: 2006 INTERNATIONAL BUILDING CODE (IBC)
2009 AASHTO, 5TH EDITION

WIND:
V (3-SECOND GUST SPEED) = 90 MPH
IMPORTANCE FACTOR, I_w = 1.00
EXPOSURE = C

NOTES TO CONTRACTOR:

PROJECT SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR OR PERSONS IN CHARGE OF THE DAY-TO-DAY CONSTRUCTION. COMPLY WITH ALL OSHA REQUIREMENTS. PROVIDE TEMPORARY BRACING, SHORING, GUYING OR OTHER MEANS TO AVOID EXCESSIVE STRESSES AND TO HOLD STRUCTURAL ELEMENTS IN PLACE DURING ERECTION.

FOUNDATION:

CONCRETE SLAB ON UNDISTURBED SOIL OR APPROVED ENGINEERED FILL. SOIL PRESSURE 1,500 PSF PER IBC 1804.2, CLASS 5 MATERIAL.

A SITE SPECIFIC GEOTECHNICAL EVALUATION HAS NOT BEEN COMPLETED FOR THIS PROJECT. SOUTHWEST FABRICATION AND SML ENGINEERS ASSUMES NO LIABILITY WITH REGARD TO DIFFERENTIAL SETTLEMENT THAT COULD RESULT DUE TO THE POSSIBLE PRESENCE OF EXPANSIVE OR COLLAPSIBLE SOILS.

IF THE SUPPORTING SOILS APPEAR QUESTIONABLE IN ANY WAY, THE EXPOSED SUB-GRADE BENEATH THE PAD SHALL BE OBSERVED AND APPROVED BY A GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. COMPACTION TESTING MAY BE REQUIRED.

CONCRETE:

A.C.I. MANUAL OF CONCRETE PRACTICE. TYPE II-V CEMENT. MINIMUM 28 DAY STRENGTH OF 4,000 PSI. NO ADMIXTURES WITHOUT APPROVAL. NO ADMIXTURES CONTAINING CHLORIDES. FLY ASH: ASTM C-618 CLASS F, NOT TO EXCEED 15 % OF THE CEMENTITIOUS MATERIALS BY WEIGHT. AIR-ENTRAINMENT: PROVIDE AIR ENTRAINING ADMIXTURE PER ASTM C-260 IN ORDER TO ACHIEVE 4%-5% ENTRAINED AIR.

CONCRETE (CONT.):

REINFORCING: ASTM A615, GRADE 60 DEFORMED BARS. PLACE REBAR PER C.R.S.I. STANDARDS.

CONCRETE COVER TO REINFORCING:

1. CONCRETE AGAINST EARTH----- 3"

STRUCTURAL STEEL:

ROLLED SECTIONS, ANGLES, PLATES AND BARS: ASTM A36
STEEL PIPE: ASTM A53, GRADE B (F_y = 35 KSI)
BOLTS AND PLAIN ANCHOR: ASTM F1554, GRADE 36

ALL STRUCTURAL STEEL SHALL BE GALVANIZED OR POWDER-COATED.

ALL HARDWARE TO BE CORROSION-RESISTANT. STAINLESS STEEL HARDWARE IS AN ACCEPTABLE ALTERNATIVE.

POST-INSTALLED ANCHORS:
DO NOT USE IMPACT WRENCH TO SET OR TIGHTEN POST-INSTALLED ANCHORS. ALL POST-INSTALLED ANCHORS SHALL BE INSTALLED AND TORQUED PER MANUFACTURER'S REQUIREMENTS. SEE DRAWINGS FOR TYPE AND MANUFACTURER OF POST-INSTALLED ANCHORS.

WELDERS SHALL HOLD VALID CERTIFICATES AND HAVE CURRENT EXPERIENCE IN THE TYPES OF WELDS REQUIRED. USE E-70 SERIES LOW HYDROGEN RODS OR GMAW A5.18. CONFORM TO AMERICAN WELDING SOCIETY STANDARDS.

COATING: OVEN-BAKED POWDER COATING, COLOR AS REQUESTED.

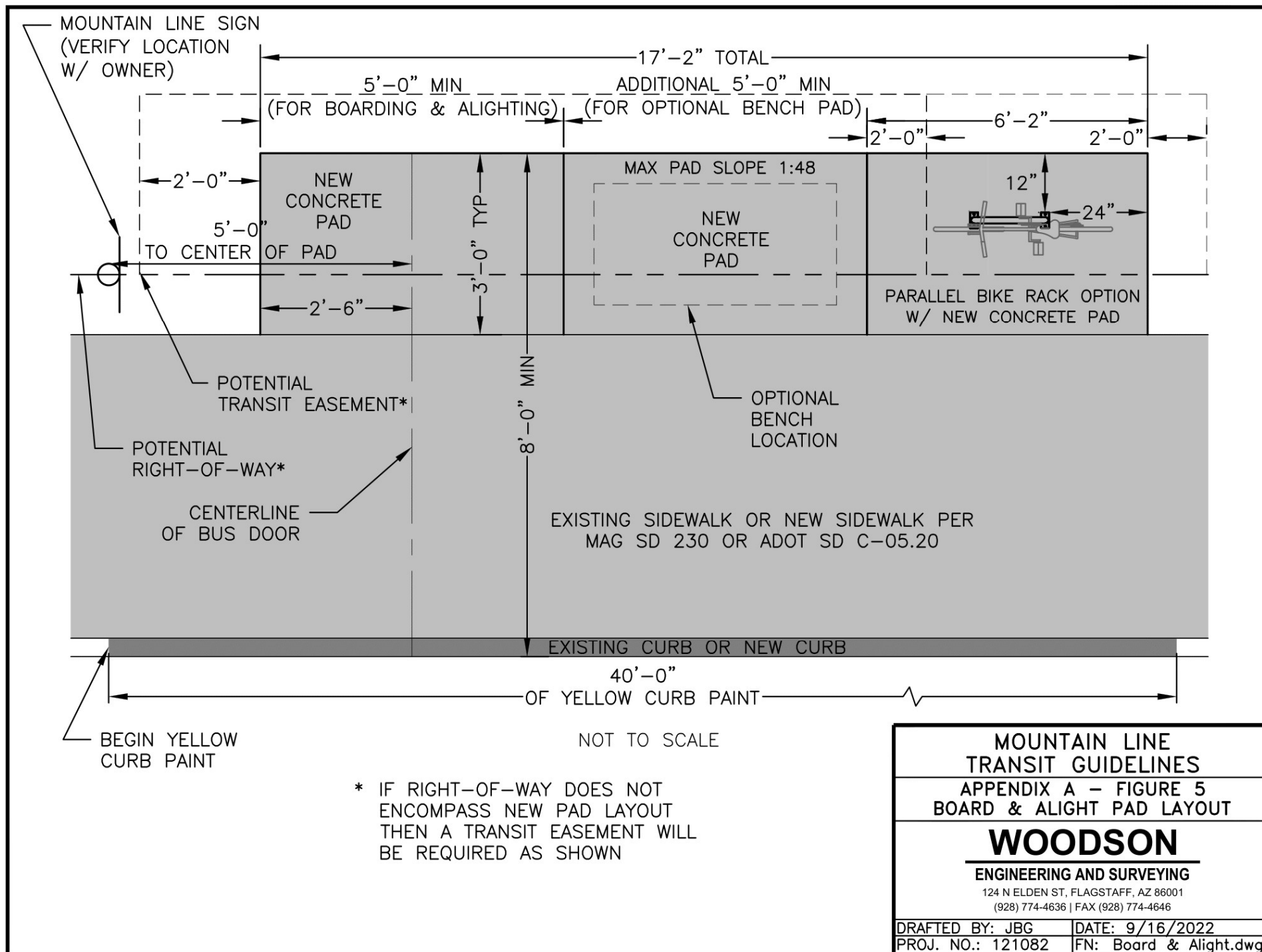
CENTERLINE OF POST MAY BE MOVED IN ANY DIRECTION TO WITHIN 12" OF EDGE OF CONCRETE PAD.

**MOUNTAIN LINE
TRANSIT GUIDELINES**
APPENDIX A – FIGURE 4D
LOGO STOP PAD – NOTES

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**MOUNTAIN LINE
TRANSIT GUIDELINES**
APPENDIX A – FIGURE 5
BOARD & ALIGHT PAD LAYOUT

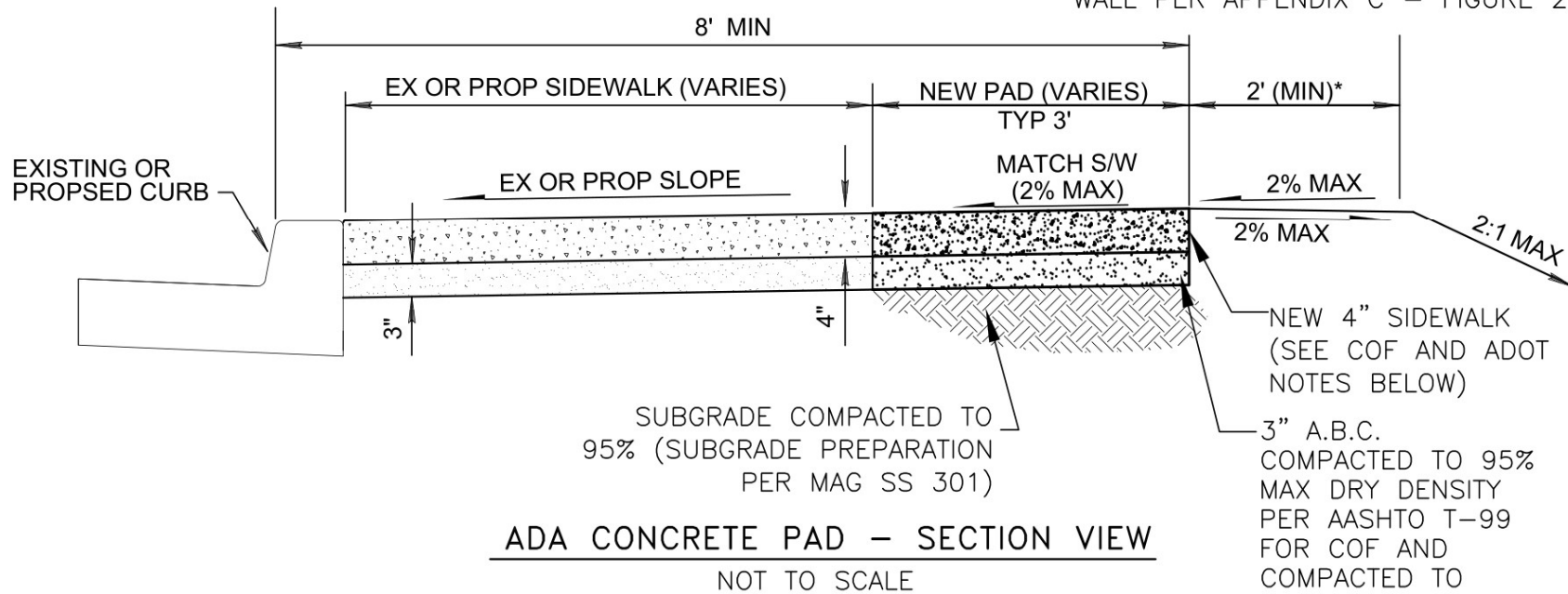
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PROJ. NO.: 121082	FN: Board & Alight.dwg

* WHEN THE ADJACENT GRADES ARE ABOVE THE NEW PAD ELEVATION, THE 2' BENCH SHALL BE OMITTED AND A CURB SHALL BE CONSTRUCTED AROUND THE PERIMETER OF THE PAD PER APPENDIX C – FIGURE 1. FOR ADJACENT GRADES HIGHER THAN 12", INSTALL WALL PER APPENDIX C – FIGURE 2B.



NOTES:

CITY OF FLAGSTAFF RIGHT-OF-WAY:

1. SIDEWALK AND PAD CONSTRUCTION SHALL CONFORM TO MAG SS 340 AND MAG SD 230.
2. CONCRETE SHALL BE CLASS A, CONTAINING 5 TO 7% AIR ENTRAINMENT, AND CONFORMING TO APPLICABLE REQUIREMENTS OF MAG SS 725.
3. SLOPE OF ADA CONCRETE PAD PARALLEL TO EXISTING ROADWAY TO MATCH THE EXISTING ROADWAY SLOPE.

NOTES:

ADOT RIGHT-OF-WAY:

1. SIDEWALK AND PAD CONSTRUCTION SHALL CONFORM TO ADOT SPECIFICATIONS SECTION 1006 AND ADOT SD C-05.20.
2. CONCRETE SHALL BE ADOT CLASS 'S' 3500 PSI, CONTAINING 4 TO 7% AIR ENTRAINMENT, AND CONFORMING TO APPLICABLE REQUIREMENTS OF ADOT SPECIFICATIONS SECTION 1006.
3. SLOPE OF ADA CONCRETE PAD PARALLEL TO EXISTING ROADWAY TO MATCH THE EXISTING ROADWAY SLOPE.

NEW 4" SIDEWALK
(SEE COF AND ADOT
NOTES BELOW)

3" A.B.C.
COMPACTED TO 95%
MAX DRY DENSITY
PER AASHTO T-99
FOR COF AND
COMPACTED TO
100% MAX DRY
DENSITY PER ADOT
SPECIFICATIONS
SECTION 303 FOR
ADOT

NAIPTA TRANSIT GUIDELINES	
APPENDIX A – FIGURE 6	
BOARD & ALIGHT PAD STRUCTURAL SECTION	
WOODSON	
ENGINEERING AND SURVEYING	
124 N ELDEN ST, FLAGSTAFF, AZ 86001 (928) 774-4636 FAX (928) 774-4646	
DRAFTED BY: JBG	DATE: 9/16/2022
PROJ. NO.: 121082	FN: Board & Alight.dwg

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Appendix B: Amenities



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NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 1A
TRASH RECEPTACLE AMENITY

WOODSON

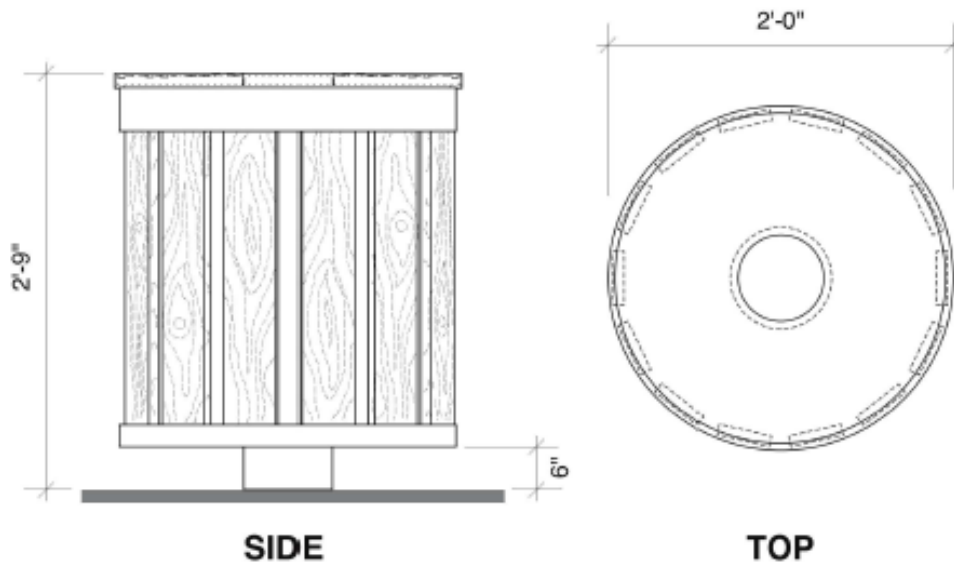
ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: GGE	DATE: 12/20/16
PROJ. NO.: 115049	FN: Trash B1A.dwg

Trash receptacle constructed with vertical 100% recycled plastic lumber and pin-fastened pipe pedestal. Includes steel lid secured with vandal-resistant hardware.

- Coating: oven-baked powder coating, color as requested.
- Vertical Slats: 1" x 4" recycled plastic lumber, assorted colors available
- Size: (30 Gallon) – 2' wide x 2'9" high
- Anchoring: 1/2" anchor bolt through bottom of pedestal.
- Shelter side-mounting available with some shelter/receptacle combinations.
- Available with top mounted ash urn.



NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 1B
TRASH RECEPTACLE AMENITY

WOODSON
ENGINEERING AND SURVEYING

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(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: GGE	DATE: 12/20/16
PROJ. NO.: 115049	FN: Trash_B1B.dwg



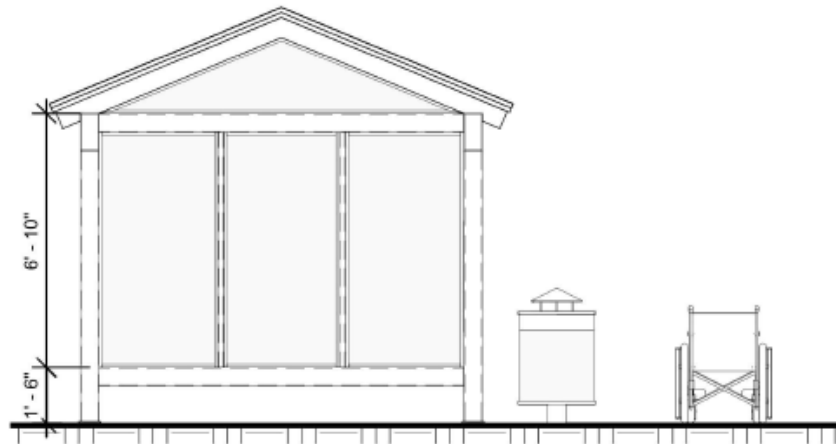
NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 2A
SHELTER AMENITY – AWNING TYPE

WOODSON

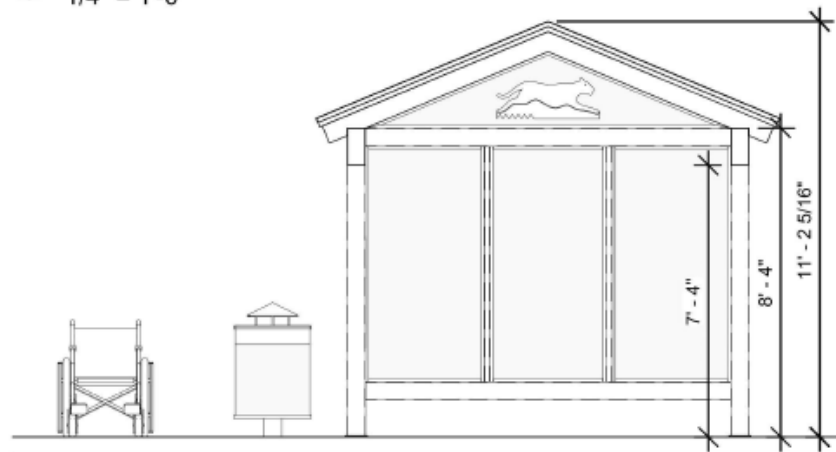
ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

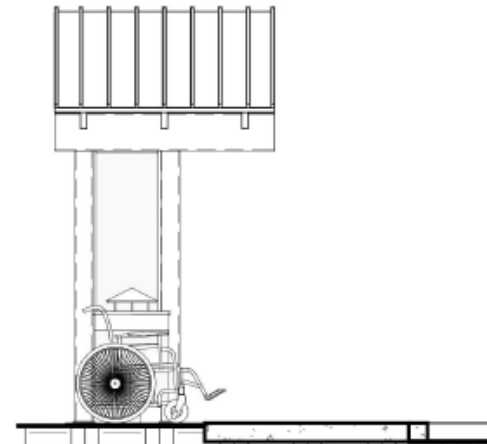
DRAFTED BY: GGE	DATE: 11/16/16
PROJ. NO.: 115049	FN: Shelter B2A.dwg



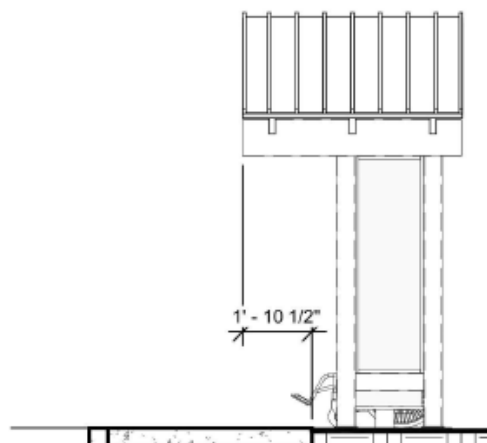
3 BACK
1/4" = 1'-0"



1 FRONT
1/4" = 1'-0"



4 L. SIDE
1/4" = 1'-0"



2 R. SIDE
1/4" = 1'-0"

NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 2B
SHELTER AMENITY – AWNING TYPE

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ENGINEERING AND SURVEYING

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(928) 774-4636 | FAX (928) 774-4646

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PROJ. NO.: 115049	FN: Shelter B2B.dwg



NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 3A
SHELTER AMENITY – STANDARD TYPE

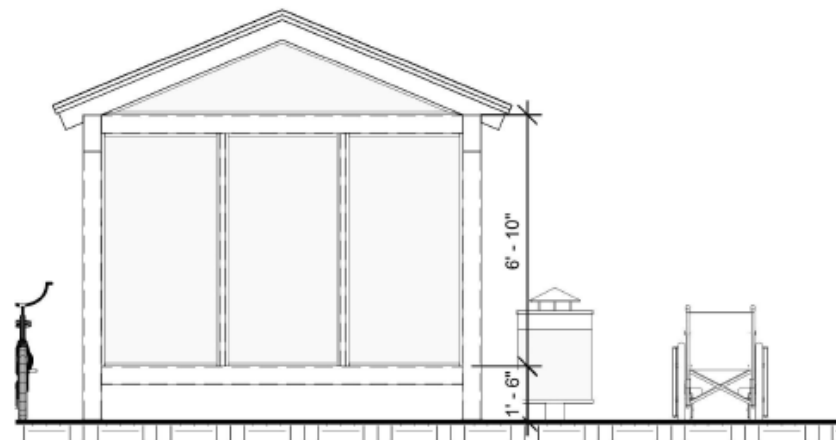
WOODSON

ENGINEERING AND SURVEYING

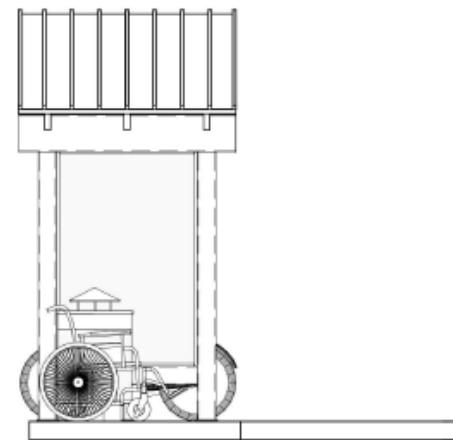
124 N ELDEN ST, FLAGSTAFF, AZ 86001

(928) 774-4636 | FAX (928) 774-4646

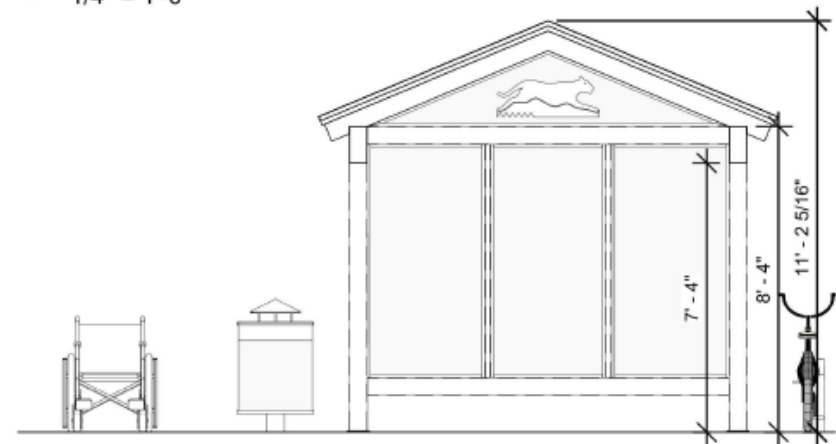
DRAFTED BY: GGE	DATE: 11/16/16
PROJ. NO.: 115049	FN: Shelter B3A.dwg



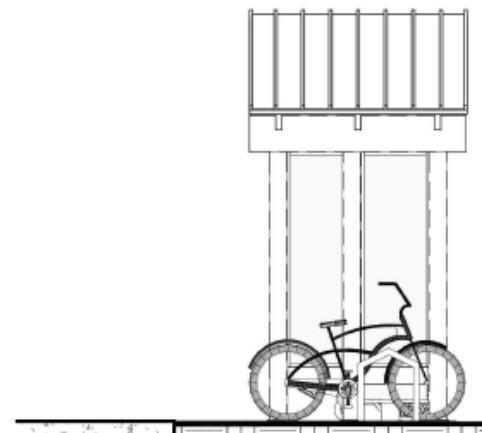
③ BACK
1/4" = 1'-0"



④ L. SIDE
1/4" = 1'-0"



① FRONT
1/4" = 1'-0"



② R. SIDE
1/4" = 1'-0"

NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 3B
SHELTER AMENITY – STANDARD TYPE

WOODSON
ENGINEERING AND SURVEYING

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(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: CGE	DATE: 11/16/16
PROJ. NO.: 115049	FN: Shelter B3B.dwg

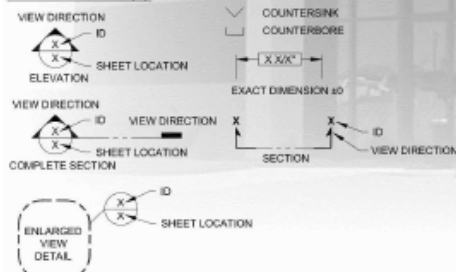
GENERAL NOTE(S):

1. ALL WRITTEN DIMENSIONS SUPERCEDES SCALED DIMENSIONS.
2. ALLOWED TOLERANCE FOR MANUFACTURING IS $\pm 1/16"$ UNLESS OTHERWISE NOTED.
3. IF DRAWING IS NOT PRINTED 1:1 ON THE PAGE SIZE LISTED ON THE DRAWING: D-SIZE SHEET (24"x36"), B-SIZE SHEET (11"x17"), THEN DRAWING IS NOT TO SCALE SHOWN.
4. SOME HIDDEN LINES OMITTED FOR CLARITY.
5. ALL HATCH AREA'S ARE REPRESENTATIVE ONLY.
6. NO CHANGES TO DESIGN WITHOUT THE AUTHORIZATION OF THE DESIGNING ENGINEER SHALL BE PERMITTED.
7. ALL DESIGN CHANGES MUST BE SUBMITTED IN WRITING FOR ENGINEERING APPROVAL.
8. ALL MATERIAL WEIGHTS ARE APPROXIMATE.
9. INSTALLATIONS SHALL BE INSTALLED PER ALL APPLICABLE STATE AND LOCAL CODES.
10. ALL UNITS ARE PREFABRICATED AND WELDING IS PREFORMED WITHIN MANUFACTURER'S SHOP. ONLY BASE ANCHORAGE IS PERFORMED IN THE FIELD. SOME ADDITIONAL FIELD BOLTING MAY BE NECESSARY IN ADDITION TO THE BASE ANCHORAGE.
11. CONCRETE STRENGTH ASSUMED TO BE A MINIMUM (3000 PSI) FOR EXISTING FOUNDATION BY OTHERS.
12. ALL WELDING SHALL COMPLY WITH (AWS) AMERICAN WELDING SOCIETY STANDARDS (D1.1) AND SHALL BE COMPLETED BY CERTIFIED WELDERS.
13. ALL STRUCTURAL STEEL CONSTRUCTION SHALL COMPLY WITH THE ABC MANUAL OF STEEL CONSTRUCTION.

WELDING NOTE(S):

1. ALL PIPE SHALL BE SCH-40 COPIED AND WELDED ALL AROUND. WELD SHALL BE $3/16"$ MIN. UNLESS OTHERWISE NOTED.

DRAWING SYMBOL(S):



LINETYPES:

- HIDDEN (THIN)
- OBJECT (THICK)
- PHANTOM (THIN)
- DIMENSIONS (THIN)

DRAWING PACKAGE FOR:

OASIS BICYCLE RACK MODEL: OABKU

DRAWING INDEX

DESC	SHEET
COVER	1
LAYOUT / ASSEMBLY	2
BILL OF MATERIALS	3

SOUTHWEST FABRICATION ENGINEERING DEPARTMENT

DRAWN BY: JGH DATE: 13JUL2015

REVIEWED BY: DATE:

APPROVED BY: DATE:

LAST REVISION: DATE:

ABBREVIATIONS:

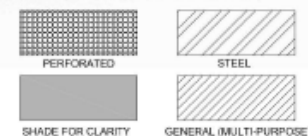
AB	= ANCHOR BOLT	INT	= INTERIOR
ABV	= ABOVE	J-BOX	= JUNCTION BOX
ADJ	= ADJUST	JCT	= JUNCTION
AFG	= AT FINISHED GRADE	LBX(S)	= LOUNG(SH)
ALUM	= ALUMINUM	LRG	= LARGE
ASM	= ASSEMBLY	LT	= LIGHT
BD	= BOLT CIRCLE	LTG	= LIGHTING
BTM	= BOTTOM	MFG	= MANUFACTURING
BOP	= BOTTOM OF PIPE	MIN	= MINIMUM
BRKT	= BRACKET	MTL	= METAL
S OR CL	= CENTER LINE	NIS	= NOT TO SCALE
CONC	= CONCRETE	NO OR #	= NUMBER
CONN	= CONNECTION	OC	= ON CENTER
CR	= COLD ROLLED	OD	= OUTSIDE DIAMETER
CTR	= CENTER	OR	= OUTSIDE RADIUS
DBL	= DOUBLE	P	= PAINT
DESC	= DESCRIPTION	PAV	= PAVEMENT
DA OR S	= DIMETER	PC	= POWDER COAT
DM	= DIMENSION	PERF	= PERFORATED
DN	= DOWN	PML	= PANEL
DR	= DOOR	PLT	= PLATE
EA	= EACH	QTY	= QUANTITY
ELEV	= ELEVATION	RAD	= RADIUS
ELECT	= ELECTRICAL	REF	= REFERENCE
EQUIP	= EQUIPMENT	REQD	= REQUIRED
EXIST	= EXISTING	REV	= REVISION
EXT	= EXTERIOR	RND	= ROUND
FAB	= FABRICATION	RO	= ROUGH OPENING
FC	= FIELD CUT	SCH	= SCHEDULE
FDN	= FOUNDATION	QIT	= SHEET
FIN	= FINISH	SM	= SIMILAR
FG	= FINISHED GRADE	SLO	= SOLID
FLG	= FLANGE	SP	= SOLAR PANEL
FUR	= FLOOR	SQ	= SQUARE
FM	= FIELD MEASURE	SQ FT	= SQUARE FEET
FRP	= FIBERGLASS	SQ IN	= SQUARE INCHES
FV	= REINFORCED PLYWOOD	SS	= STAINLESS STEEL
GA	= FIELD VERRY	STD	= STANDARD
GALV	= GALVANIZED	STL	= STEEL
GL	= GLASS	SUPP	= SUPPORT
HST	= HEIGHT	SYM	= SYMMETRICAL
HCR	= HORIZONTAL	SYS	= SYSTEM
HR	= HOT ROLLED	TB	= THROUGH BOLT
HOLW	= HOLLOW	TBD	= TO BE DETERMINED
HSS	= HOLLOW STRUCTURAL	TH	= THROUGH HOLE
ID	= INSIDE DIAMETER	TS	= TUBE STEEL
IR	= INSIDE RADIUS	TYP	= TYPICAL
		WA	= WEDGE ANCHOR
		WID	= WITHOUT
		VERT	= VERTICAL
		W	= WITH

ANNOTATION SYMBOL(S):

- = CODED NOTES
- = ID LETTER, REFER TO INDIVIDUAL SHOP DRAWINGS FOR DETAILS

HATCH PATTERNS:

(REPRESENTATION ONLY - NO SCALE)



NAIPTA TRANSIT GUIDELINES APPENDIX B – FIGURE 4A BICYCLE RACK AMENITY

WOODSON ENGINEERING AND SURVEYING

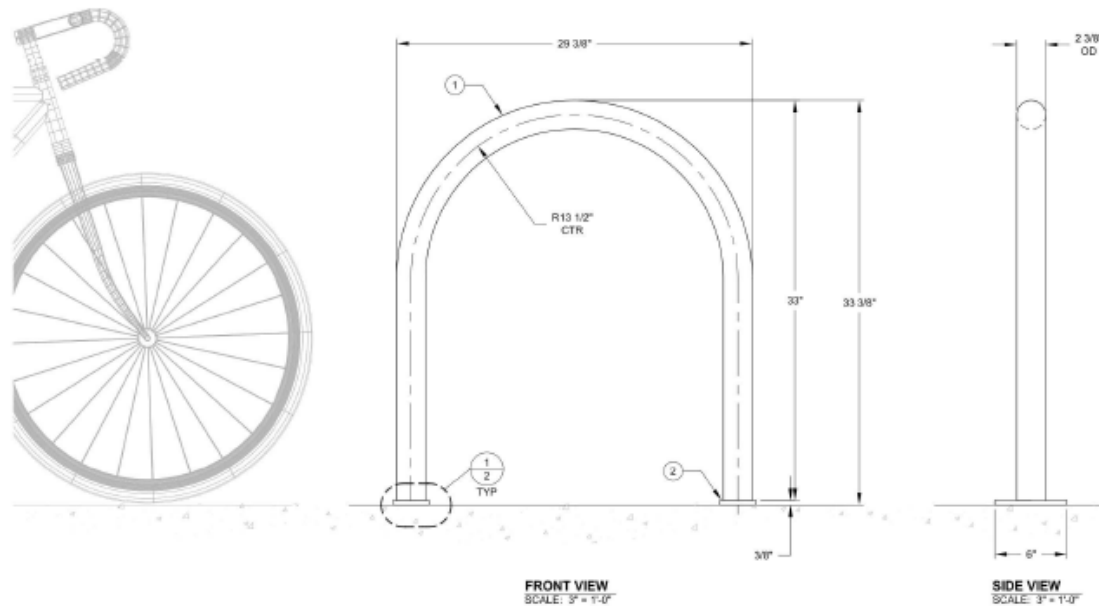
124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: GGE DATE: 12/20/16
PROJ. NO.: 115049 FN: Bike Rack B4A.dwg



- NOTE(S):
1. 3/8\"
 2. (AB) ANCHOR BOLTS TO BE INSTALLED PER STATE / LOCAL CODES

1 FOOTPAD DETAIL
SCALE: 1:2

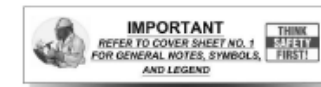


GENERAL NOTE(S):

1. POWDER COAT - COLOR TBD
2. EACH LOOP HOLDS UP TO (2) ADULT BICYCLES.
3. ANCHORING: 1/2\"

CODED NOTE(S):

1. 2\"
2. 3\"



REV	REASON	BY	CHK	APPR	DATE
SCALE:	AS NOTED	DRAWN:	JGH		
DATE:	13JUL15	CAD REF:	DRAWINGS\SHelters\OASIS\		

NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 4B
BICYCLE RACK AMENITY

WOODSON
ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: GGE	DATE: 12/20/16
PROJ. NO.: 115049	FN: Bike Rack B4B.dwg



NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 5A
BENCH AMENITY

WOODSON

ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: GGE

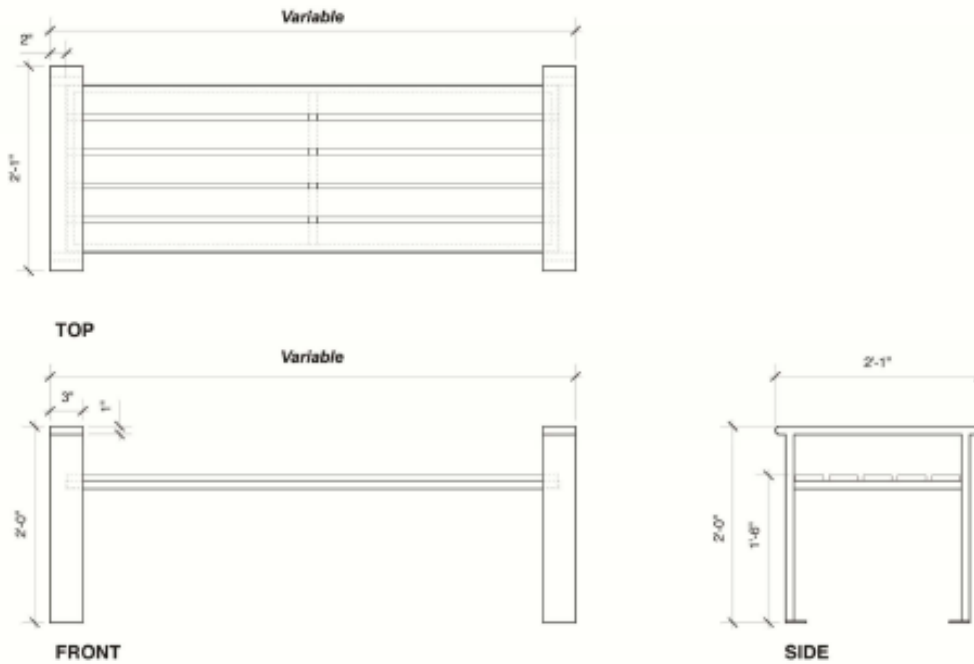
DATE: 12/20/16

PROJ. NO.: 115049

FN: Bench B5A.dwg

Steel bench with back, arms and 100% recycled plastic lumber back and seating surface.

- Coating: Oven-baked powder coating, color as requested.
- Seating Surface: 2" x 4" recycled plastic lumber, assorted colors available.
- Size: 4' 0" or 5' 4-1/4" long x 2' 1" deep, with a seating surface height of 1' 6" and an arm height of 2'.
- Frame: 1" x 3" rectangular steel tubing, welded.
- Anchoring: 1/2" anchor bolts through welded steel footing plate.
- Optional middle arm(s) available to prevent sleeping.



NAIPTA
TRANSIT GUIDELINES
APPENDIX B – FIGURE 5B
BENCH AMENITY

WOODSON

ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

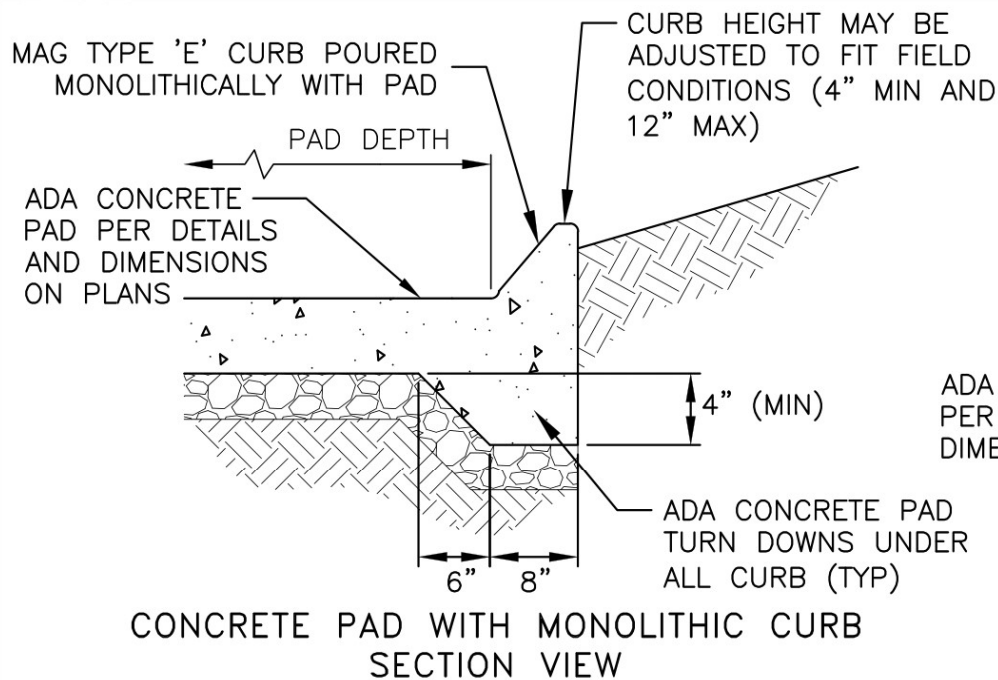
DRAFTED BY: GGE DATE: 12/20/16
PROJ. NO.: 115049 FN: Bench B5B.dwg



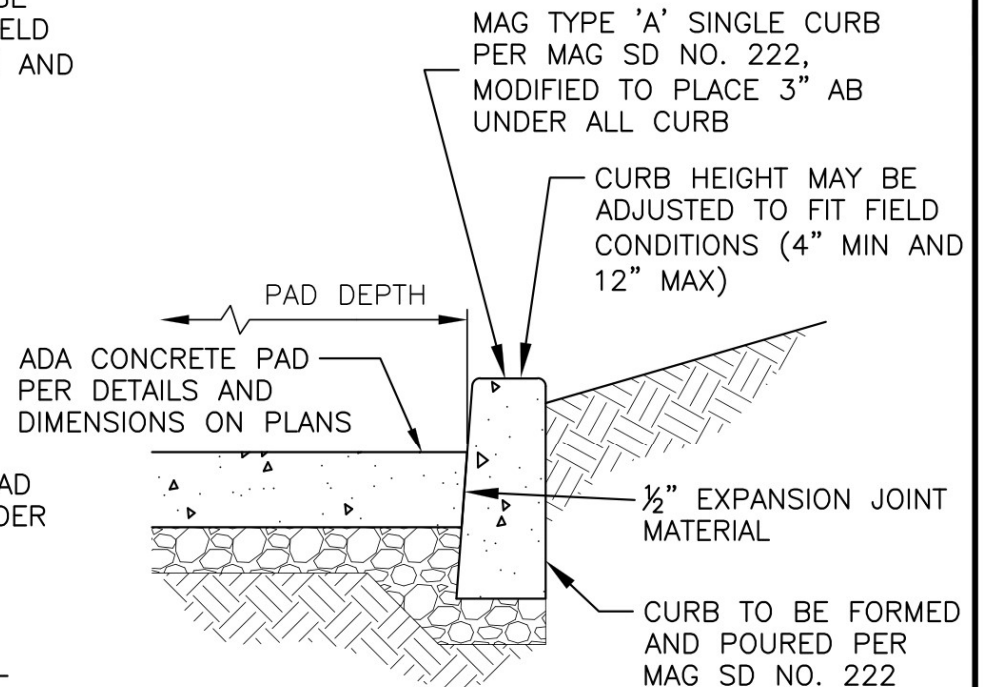
Appendix C: Curb and Signage



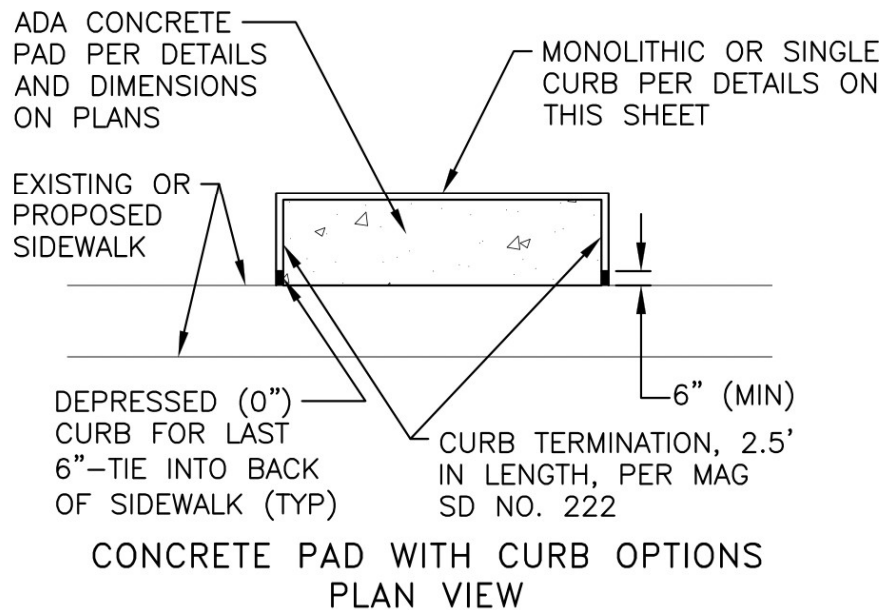
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NOT TO SCALE



NOT TO SCALE



NOT TO SCALE

**MOUNTAIN LINE
TRANSIT GUIDELINES**
APPENDIX C – FIGURE 1
PERIMETER CURBS FOR PADS

WOODSON

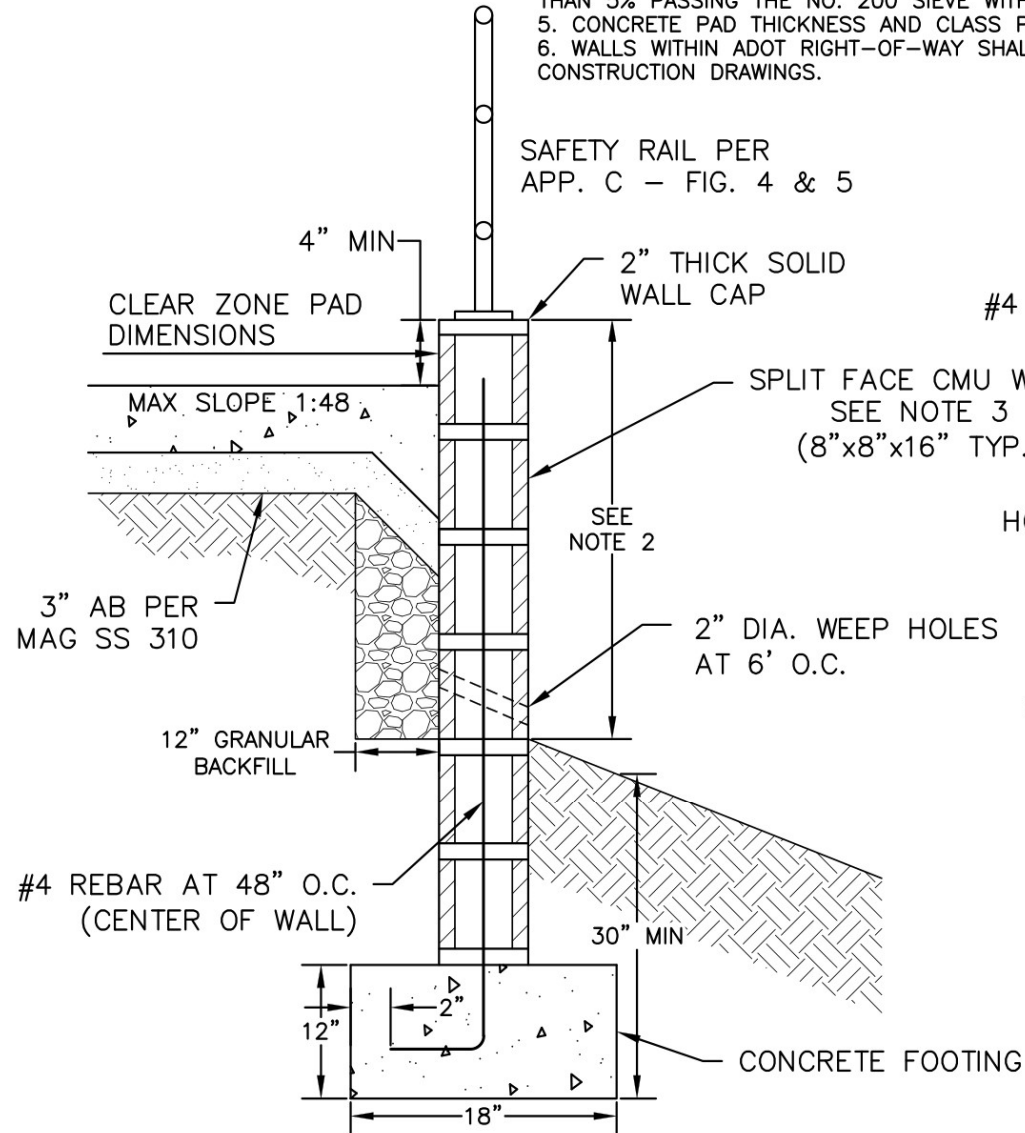
ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

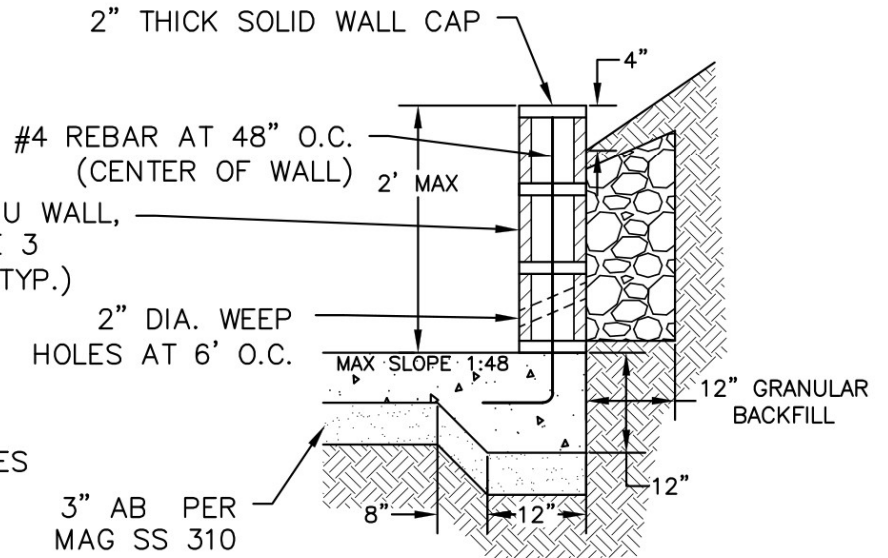
DRAFTED BY: JBG	DATE: 9/16/2022
PROJ. NO.: 121082	FN: Pads w/ Curbs.dwg

NOTES:

1. WHEN CONNECTING TO EXISTING WALLS, THE EXISTING WALL TYPE AND BLOCK DIMENSIONS SHOULD BE MATCHED.
2. MAX WALL HEIGHT IS 48". ANY WALLS OVER 48" IN HEIGHT SHALL BE ACCOMPANIED BY A STRUCTURAL DESIGN.
3. CMU WALL SHALL BE SPLIT FACE ON BOTH SIDES. COLOR SHALL BE GRAY.
4. GRANULAR BACKFILL SHALL BE FREE DRAINING CRUSHED STONE (3/8" TO 3/4"), OR COARSE GRAVEL (NO MORE THAN 5% PASSING THE NO. 200 SIEVE WITH MAX SIZE OF 3/4").
5. CONCRETE PAD THICKNESS AND CLASS PER MOUNTAIN LINE STANDARDS. GRADES PER PLAN.
6. WALLS WITHIN ADOT RIGHT-OF-WAY SHALL BE CONSTRUCTED PER ADOT STANDARD SPECIFICATIONS AND CONSTRUCTION DRAWINGS.

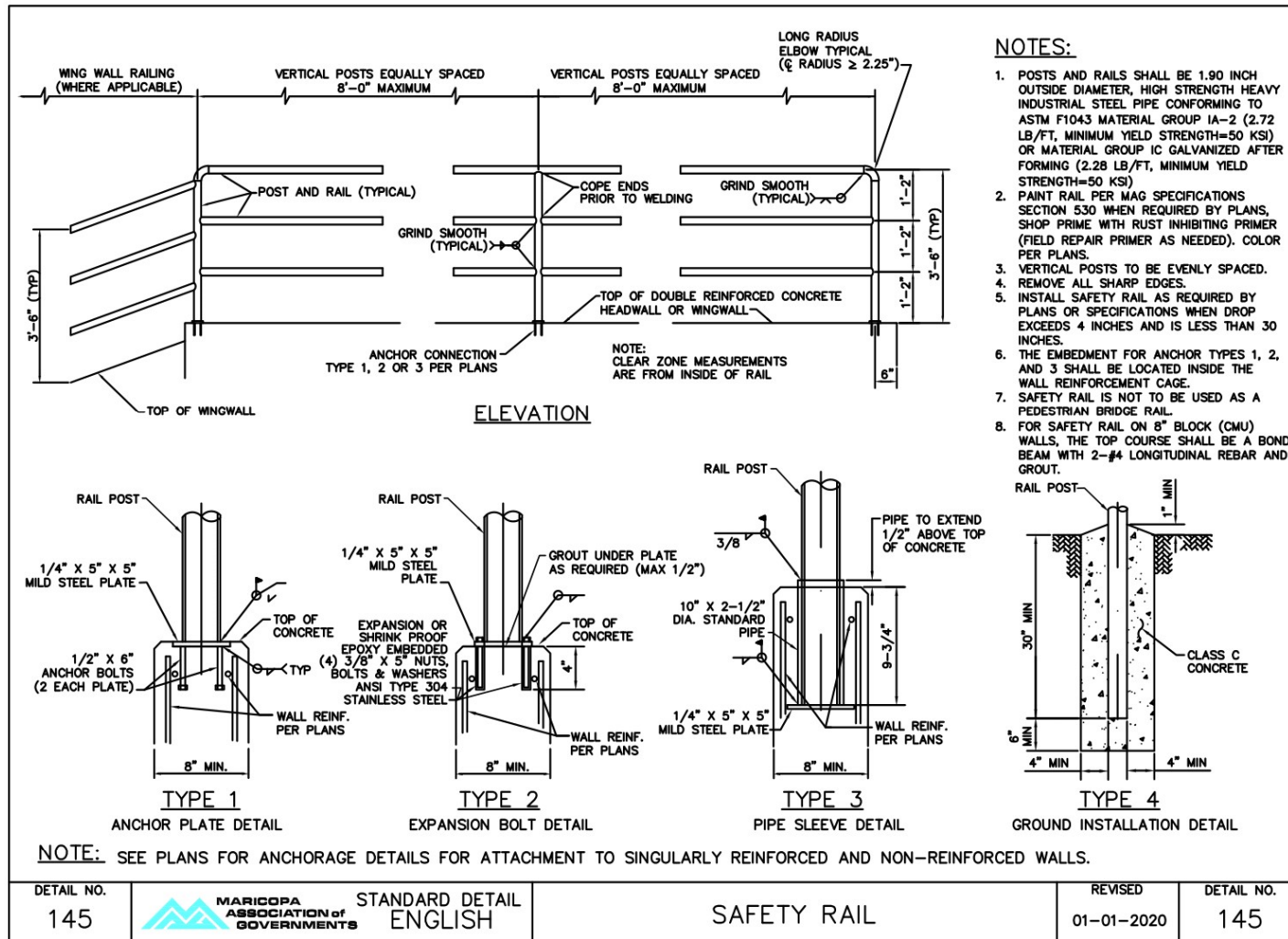


SPLIT FACE CMU BLOCK WALL – TYPE B (FILL)
NOT TO SCALE



SPLIT FACE CMU BLOCK WALL – TYPE C (CUT)
NOT TO SCALE

MOUNTAIN LINE TRANSIT GUIDELINES	
APPENDIX C – FIGURE 2B TYPE 'B' & 'C' TYPICAL WALL DETAIL	
WOODSON	
ENGINEERING AND SURVEYING	
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DRAFTED BY: JBG	DATE: 9/16/2022
PROJ. NO.: 121082	FN: Wall Details 1.dwg

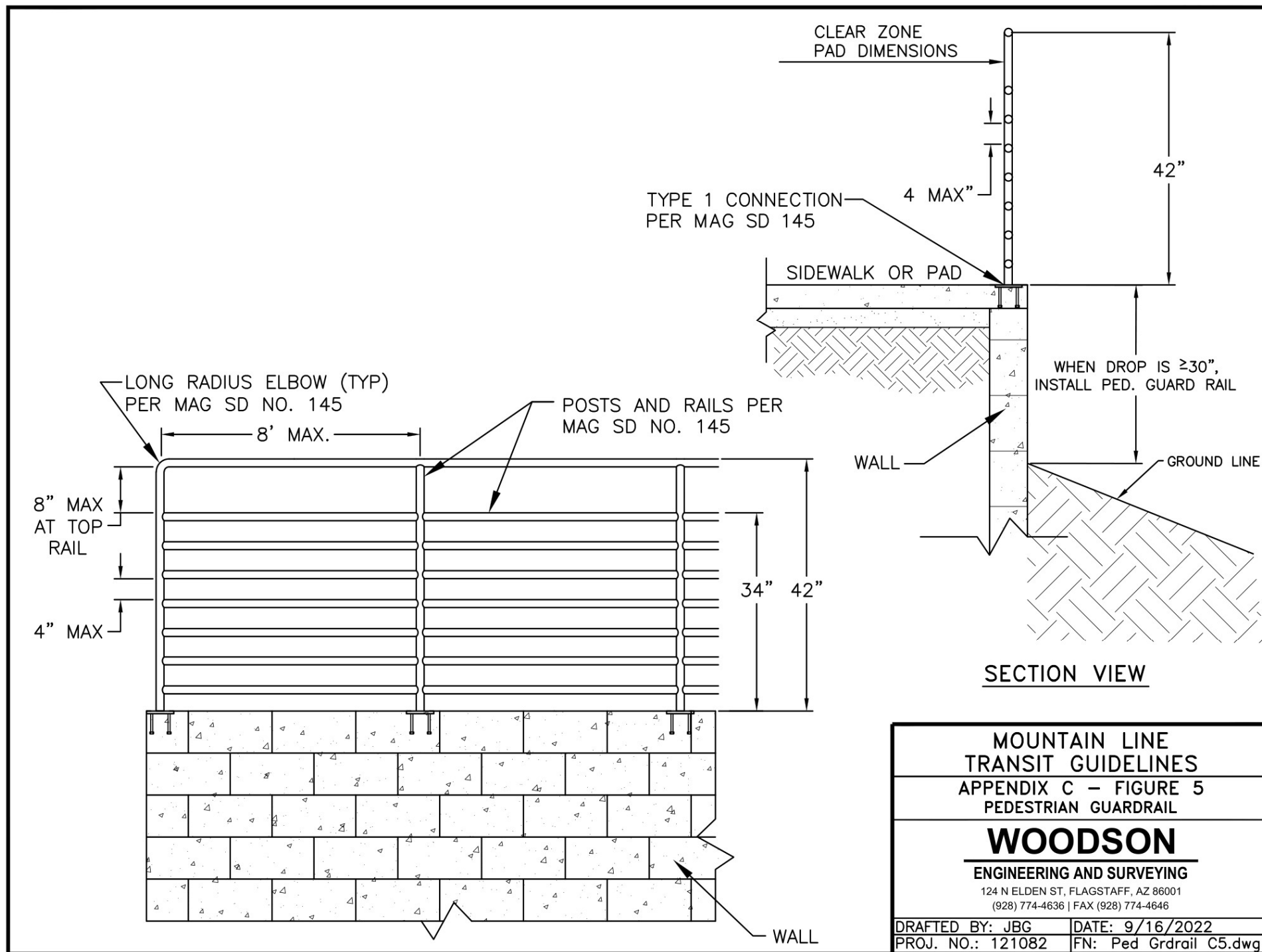


**MOUNTAIN LINE
TRANSIT GUIDELINES**
APPENDIX C – FIGURE 4
SAFETY RAIL

WOODSON
ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

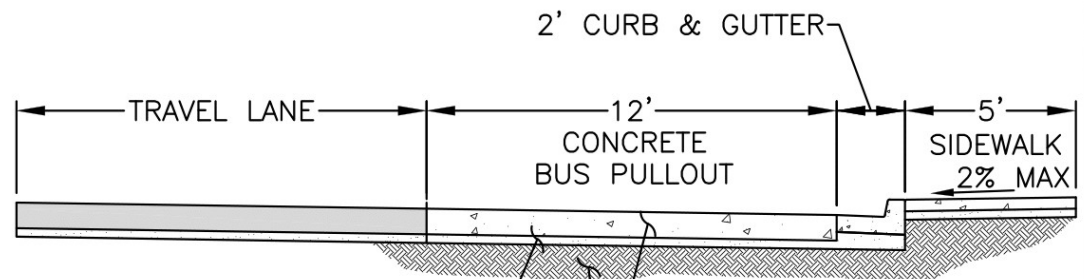
DRAFTED BY: JBG DATE: 9/16/2022
PROJ. NO.: 121082 FN: Safety Rail C4.dwg



BUS PULLOUT TANGENT LENGTH TABLE

BUS TYPE	TANGENT LENGTH REQ'D
STANDARD 35' HYBRID	65 FEET
60' ARTICULATED	85 FEET

NOTE: COORDINATE WITH MOUNTAIN LINE REPRESENTATIVE TO DETERMINE WHICH BUS TYPE WILL BE SERVICING EACH STOP



3" A.B.C. COMPACTED TO 95% MAX DRY DENSITY PER AASHTO T-99

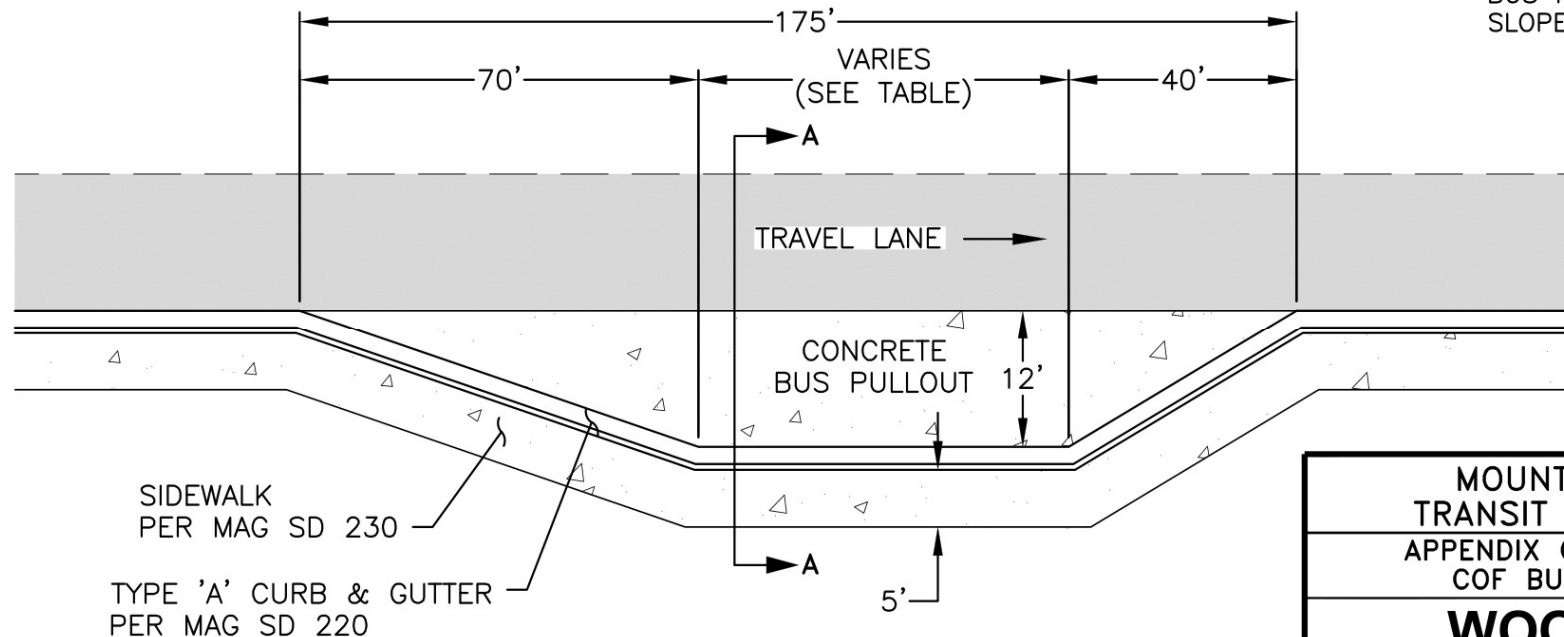
SUBGRADE COMPACTED TO 95% (SUBGRADE PREPARATION PER MAG SS 301)

9" CLASS 'A' CONCRETE CONTAINING 5 TO 7% AIR ENTRAINMENT AND CONFORMING TO APPLICABLE REQUIREMENTS OF MAG SS 725

SECTION A-A

NOT TO SCALE

NOTE: BUS PULLOUT CROSS SLOPE PER PLAN.



MOUNTAIN LINE TRANSIT GUIDELINES

APPENDIX C – FIGURE 6

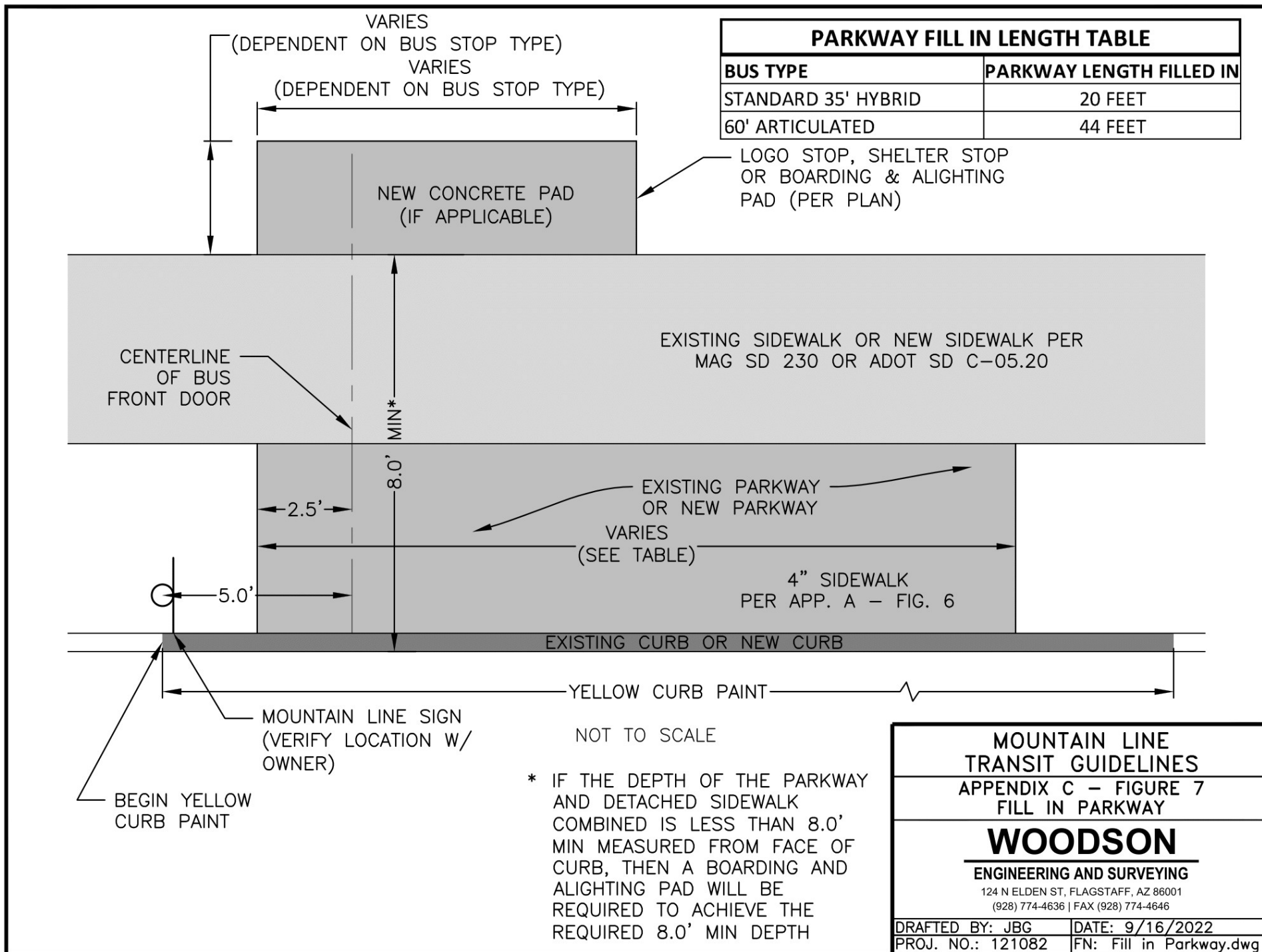
COF BUS PULLOUT

WOODSON

ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: JBG DATE: 9/16/2022
PROJ. NO.: 121082 FN: COF Pullout.dwg



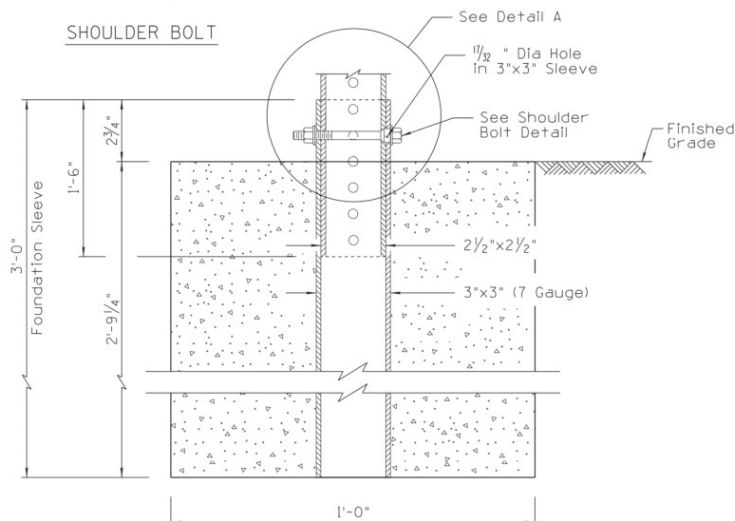
4:56:15 PM 6/3/2014 Y:\Traffic\Oex\tr-dex\english-stds\sign-mark\current-stds\S-03a.doc



Technical drawing of a bolt with the following dimensions:

- Diameter: $\frac{3}{8}$ "
- Hex Head Width: $\frac{5}{16}$ "
- Shoulder: $\frac{1}{2}$ "

SHOULDER BOLT

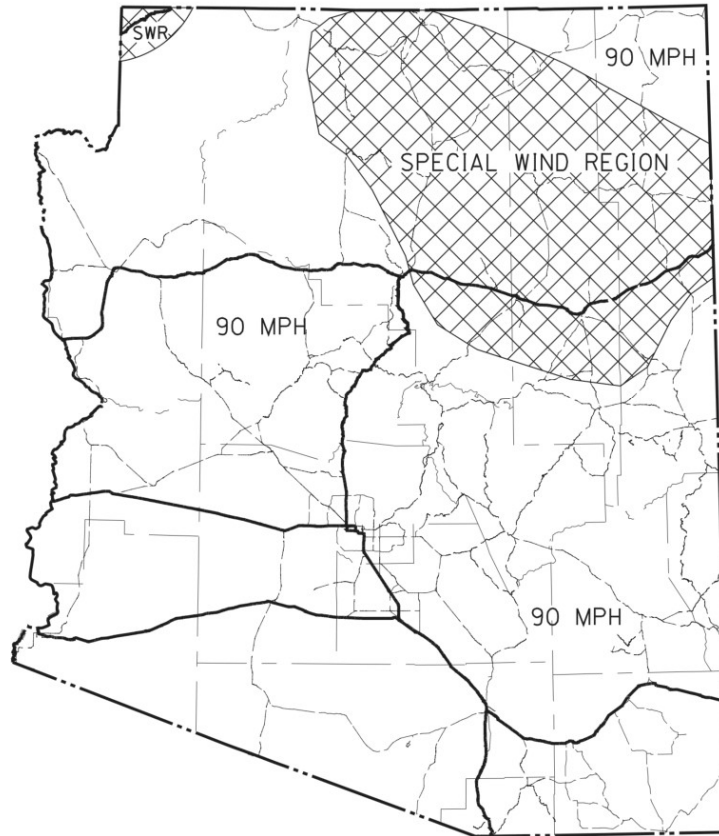


2 1/2" SINGLE POST CONCRETE FOUNDATION DETAIL
IN WEAK SOILS

NOT TO SCALE

DRAFTED BY: JBG	DATE: 9/16/2022
PROJ. NO.: 121082	FN: Signage C8A.dwg

DESCRIPTION OF REVISIONS		DATE	BY
1	CHANGED TEXT TO UPPER AND LOWER CASE, ADDED NEW BORDER.	6/14	L. LOPEZ
2	RE-ISSUE	6/14	L. LOPEZ
3	ADDED NEW BORDER	6/14	L. LOPEZ
4	ADDED NEW BORDER	6/14	L. LOPEZ
5	ADDED NEW BORDER	6/14	L. LOPEZ
6	ADDED NEW BORDER	6/14	L. LOPEZ
7	ADDED NEW BORDER	6/14	L. LOPEZ
8	ADDED NEW BORDER	6/14	L. LOPEZ
9	ADDED NEW BORDER	6/14	L. LOPEZ
10	ADDED NEW BORDER	6/14	L. LOPEZ



SPECIAL WIND REGION MAP

NOTES:

1. Post size recommendations for square tube and breakaway posts are derived from calculations based on AASHTO Standard Specifications for Highway Signs, Luminaires and Traffic Signals, using a base wind speed of 90 mph (24.5 psf wind load on sign panel). Sign structures and other supports may use different wind speeds as noted.
2. See the Special Wind Region map for areas of the state that may experience different wind speeds. In these areas, engineering judgment may be used in the selection and design of sign posts and supports.
3. Back to back signs should be installed centered on one another. The edges of a sign mounted back to back with a STOP, YIELD or warning sign should not protrude past the edges of the STOP, YIELD or warning sign. The STOP, YIELD or warning sign size may be increased in order to accommodate the size of a sign mounted back to back with that sign.
4. All signs or sign assemblies mounted at a height where the bottom of the lowest sign panel, plaque or auxiliary is less than 7 feet from the surface under the sign or sign assembly should be located so that the sign does not intrude into any sidewalk or pedestrian path.
5. Extruded panel signs on breakaway (S & W steel shape) posts are intended for use on freeways and expressways, and should not be used on conventional roadways except in the vicinity of freeway interchanges or expressway intersections. Exceptions shall be approved by the Regional Traffic Engineer.
6. Flat sheet panels should not be installed on breakaway posts, and extruded panels should not be installed on square-tube posts, except as specifically allowed by the Engineer.
7. All signing materials shall conform to the Standard Specifications or project special provisions.

NOT TO SCALE

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION TRAFFIC SIGNING & MARKING STANDARD DRAWINGS	REVISION	6/14
SIGNATURES		DRAWING NO.	S-1
APPROVED FOR DISTRIBUTION	ON FILE	GENERAL SIGNING NOTES	
		SHEET NO.	1 of 1

MOUNTAIN LINE TRANSIT GUIDELINES APPENDIX C – FIGURE 8B SIGNAGE

WOODSON

ENGINEERING AND SURVEYING

124 N ELDEN ST, FLAGSTAFF, AZ 86001
(928) 774-4636 | FAX (928) 774-4646

DRAFTED BY: JBG DATE: 9/16/2022
PROJ. NO.: 121082 FN: Signage C8B.dwg

SIGN PANEL BOLT HOLE DRILLING (SINGLE POST - RECTANGULAR)				
Panel Height†	6"-12"	18"	18"-36"	48"-60"
Hole Drilling (top or bottom of panel to center of hole)	1"	1½"	3"	6"

1. Slip bases shall be installed in accordance with the slip base selection chart, except that slip bases may be omitted on signs installed behind guardrail or barrier, or outside the clear zone.
2. The use of splices in aluminum flat-sheet panels should be avoided. If a splice is necessary, it shall be performed in accordance with the panel splice detail.
3. The use of splices in retroreflective sheeting shall only be permitted on signs with a minimum dimension of 54 inches or greater.
4. Where telescoping posts (2T and 2½T) are used in location at elevations above 5,000 feet, the outside post shall extend the entire length of the sign post. In other locations, the outside post may be discontinued between 2 and 6 inches below the bottom edge of the lower sign panel (See Std Dwg S-3, sheet 14).
5. For signs not in the tables in areas outside special wind regions, the following formula may be used:
Bending Stress (ft-lb) = Total Sign Size (sq-ft) x Weighted Average Centroid Height (ft) x 24.5 psf.
For calculation purposes, use the following maximum allowable bending stresses per post:

2S: 1,240 ft-lb

2½S: 2,130 ft-lb

2½T: 3,610 ft-lb

For signs in special wind regions, the wind pressure may be adjusted based on engineering judgement. A default value of 30 psf may be used for special wind regions if a site-specific value is not available.

6. For maintenance activities, 2T posts may be substituted for 2½S posts with the approval of the Regional Traffic Engineer.
7. Mounting holes should be pre-drilled in sign panels intended for mounting on one post. See the chart for spacing. Sign panels mounted on multiple posts may be field drilled to match existing posts and stringer spacing.
8. For post recommendations for special sign assemblies (multiple route markers side by side, divided highway STOP / ONE WAY assemblies, etc.), see sheets 12 and 13.

For signs in special wind regions, the wind pressure may be adjusted based on engineering judgement. A default value of 30 psf may be used for special wind regions if a site-specific value is not available.

6. For maintenance activities, 2T posts may be substituted for 2½S posts with the approval of the Regional Traffic Engineer.

7. Mounting holes should be pre-drilled in sign panels intended for mounting on one post. See the chart for spacing. Sign panels mounted on multiple posts may be field drilled to match existing posts and stringer spacing.

8. For post recommendations for special sign assemblies (multiple route markers side by side, divided highway STOP / ONE WAY assemblies, etc.), see sheets 12 and 13.



- A) Splice plates, if used, shall be fabricated of the same material as the sign panel, with a minimum thickness equal to the sign panel.
- B) Fasteners shall be evenly spaced no greater than 15" on centers. The centers of the fasteners on the ends of each splice plate shall be located 1" from the edge of the splice plate.
- C) Fasteners may be rivets or bolts. All hardware for fasteners shall be non-corrosive or plated.

NOT TO SCALE

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION TRAFFIC SIGNING & MARKING STANDARD DRAWINGS	REVISION	6/14
SIGNATURES		DRAWING NO.	S-3
APPROVED FOR DISTRIBUTION	FLAT SHEET SIGNS SQUARE TUBE POST GENERAL NOTES	SHEET NO.	1 of 16
ON FILE			

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SEPTEMBER 2022

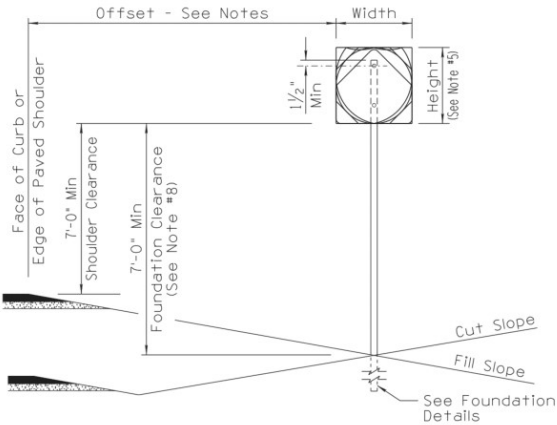
TABLE NOTES:

- a) For fill slopes 2:1 or greater at a 12 ft offset, use 2½S post.
- b) For fill slopes 4:1 or greater, or offset greater than 12 ft, use 2½S post.
- c) For fill slopes 2:1 or greater at a 12 ft offset, use 2½T post.
- d) For fill slopes 4:1 or greater, or offset greater than 12 ft, use 2½T post.
- e) May not be advisable for fill slopes 2:1 or greater at a 12 ft offset, or in special wind regions.
- f) May not be advisable for fill slopes 4:1 or greater, or offset greater than 12 ft, or in special wind regions.
- g) Use only with signs in level (less than 6:l) or cut sections.

12" WIDTH			
Type	Total Sign Assembly Height (inches)	Post Type	Total Post Length (ft) (See Note 2)
RI1206	6	2S	10
RI1212	12	2S	10
RI1218	18	2S	11
RI1224	24	2S	11
RI1230	30	2S	12
RI1236	36	2S	12
RI1242	42	2S ^a	13
RI1248	48	2S ^b	13
RI1254	54	2½S	14

18" WIDTH			
Type	Total Sign Assembly Height (inches)	Post Type	Total Post Length (ft) (See Note 2)
RI1806	6	2S	10
RI1812	12	2S	10
RI1818	18	2S	11
RI1824	24	2S	11
RI1830	30	2S ^b	12
RI1836	36	2S ^b	12
RI1842	42	2½S ^c	13
RI1848	48	2½S ^c	13
RI1854	54	2½S ^d	14
RI1860	60	2½T	14
RI1866	66	2½T ^e	15
RI1872	72	2½T ^e	15

24" WIDTH			
Type	Total Sign Assembly Height (inches)	Post Type	Total Post Length (ft) (See Note 2)
RI2406	6	2S	10
RI2412	12	2S	10
RI2418	18	2S	11
RI2424	24	2S ^b	11
RI2430	30	2½S	12
RI2436	36	2½S ^c	12
RI2442	42	2½S ^d	13
RI2448	48	2½T	13
RI2454	54	2½T ^e	14
RI2460	60	2½T ^f	14
RI2466	66	2½T ^f	15
RI2472	72	2½T ^f	15



NOTES:

1. These tables are to be used for rectangular, square, triangular, pentagonal, octagonal, round and route marker signs, including auxiliaries and plaques. For diamond-shape warning signs, use charts for warning signs.
2. Post lengths in tables are for estimating purposes only. Post lengths will be determined in field at the sign location to satisfy minimum mounting height requirements. Actual post length will vary depending on offset, ground slope and other factors.
3. Calculations in table are based on a 12 ft offset from near edge of sign to edge of pavement and a 6:l fill slope away from pavement. Different offsets or slopes may affect post type and length. See Table Notes.
4. Sign offset is generally a minimum of 12 ft from edge of pavement to near edge of sign, but may be as close as 6 ft based on site conditions. Signs behind guardrail are generally placed 6 ft behind the face of guardrail. Signs generally should not be placed closer than 6 ft from the edge of paved shoulder or face of curb, except on urban streets where such an offset is impractical, in which case an offset of as small as 2 ft may be used.
5. For multi-sign assemblies (including signs with auxiliaries and/or plaques), the height in the table is the cumulative height of all signs, auxiliaries and plaques in the assembly.
6. For multi-sign assemblies, the width table to be used should be defined by the widest sign panel in the assembly.
7. For special sign assemblies (multiple route markers side by side, divided highway STOP, ONE WAY assemblies, etc.), see sheets 12 and 13.
8. The foundation clearance may be reduced if the shoulder clearance is greater than 10 ft and the sign does not overhang any sidewalk or pedestrian path.

NOT TO SCALE

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION TRAFFIC SIGNING & MARKING STANDARD DRAWINGS	REVISION 6/14
APPROVED FOR DISTRIBUTION	SINGLE POST FLAT SHEET RECTANGULAR SIGN ASSEMBLY 12, 18 AND 24 INCH WIDTHS	DRAWING NO. S-3
ON FILE		SHEET NO. 2 of 16

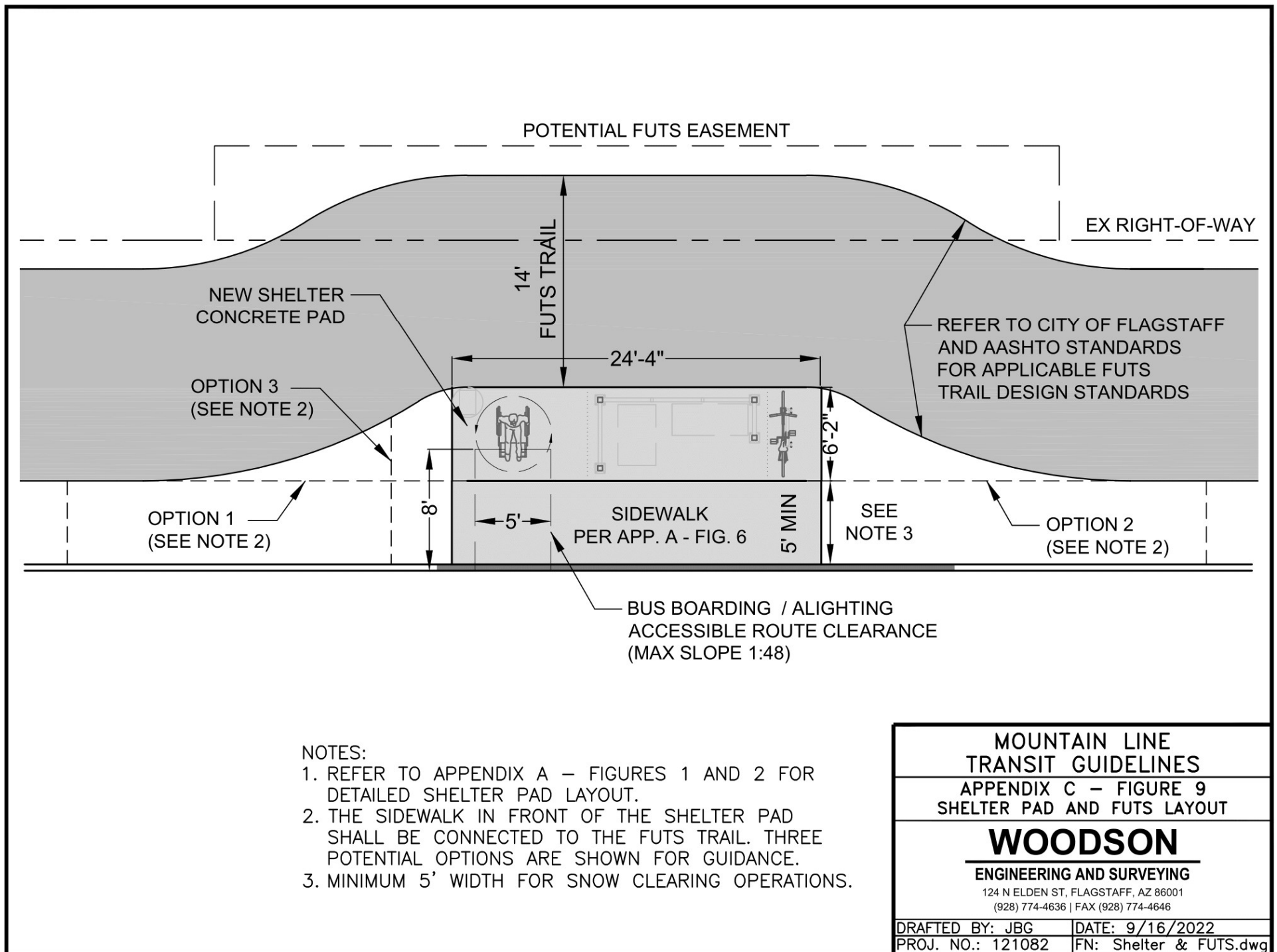
MOUNTAIN LINE
TRANSIT GUIDELINES
APPENDIX C – FIGURE 8D
SIGNAGE

WOODSON

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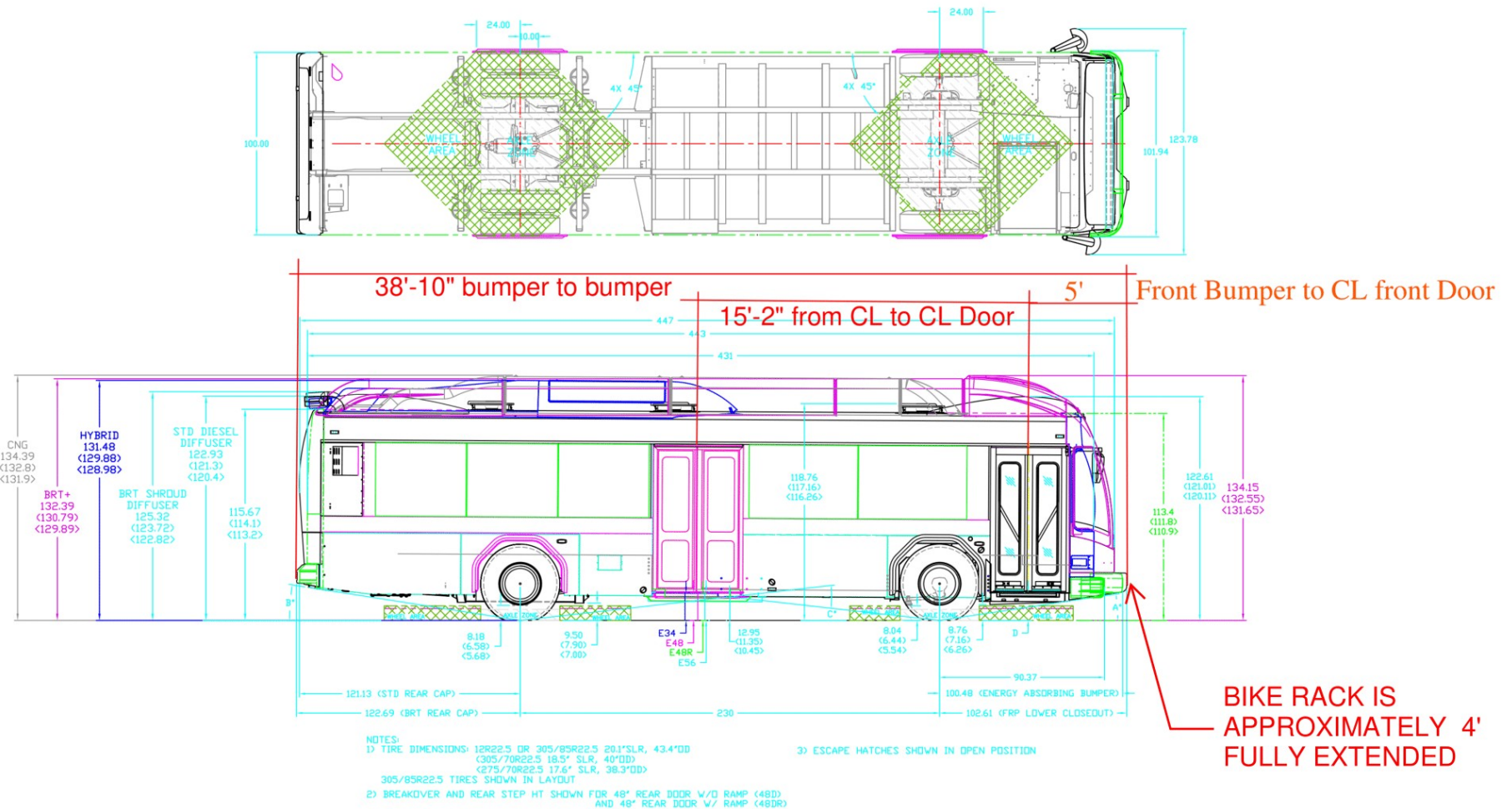
DRAFTED BY: JBG DATE: 9/16/2022
PROJ. NO.: 121802 FN: Signage C8D.dwg





Appendix D: Fleet Specifications





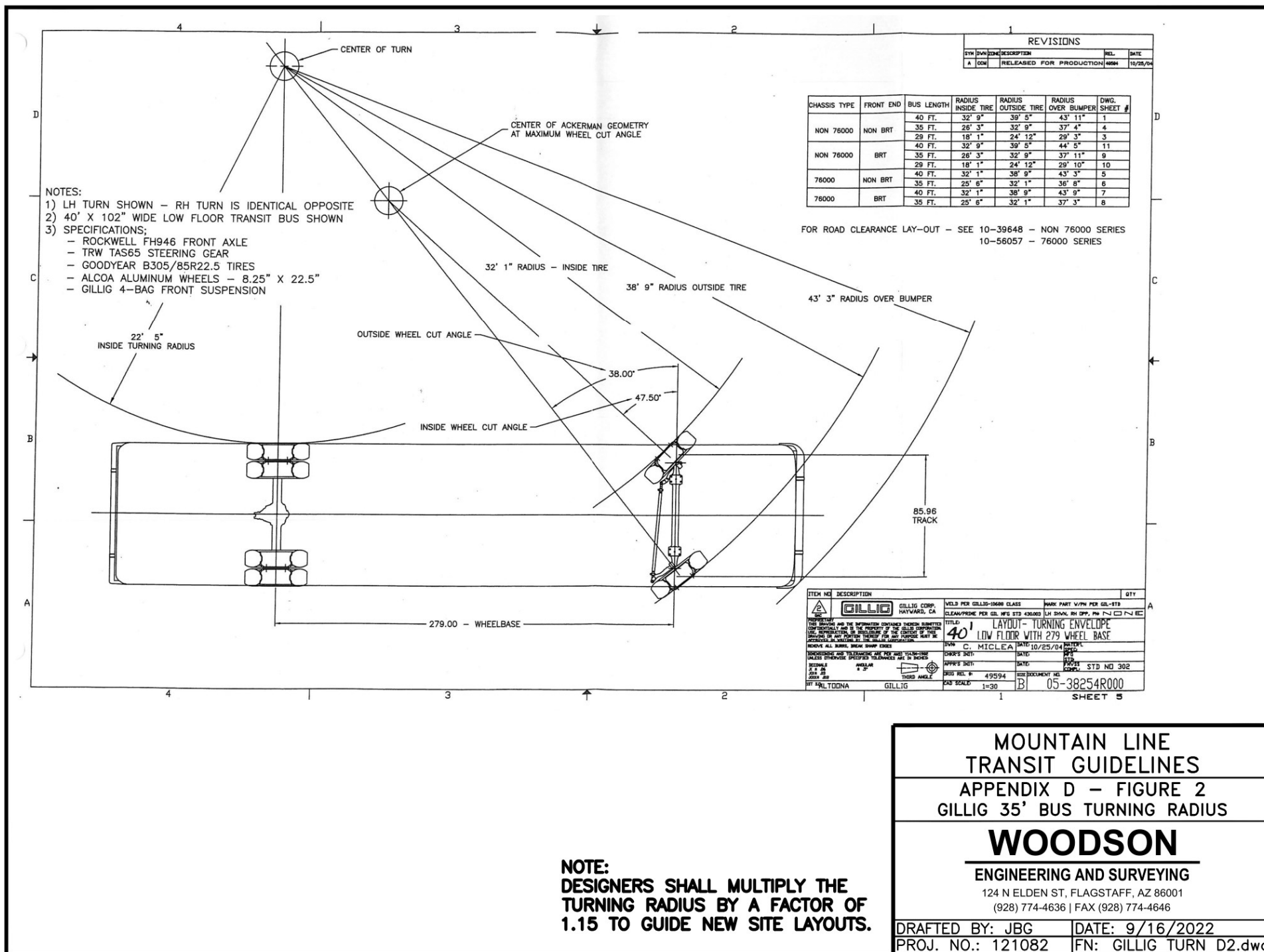
NOMINAL DIMENSIONS ARE PROVIDED FROM THE MANUFACTURER. MEASURED DIMENSIONS ARE IN RED.

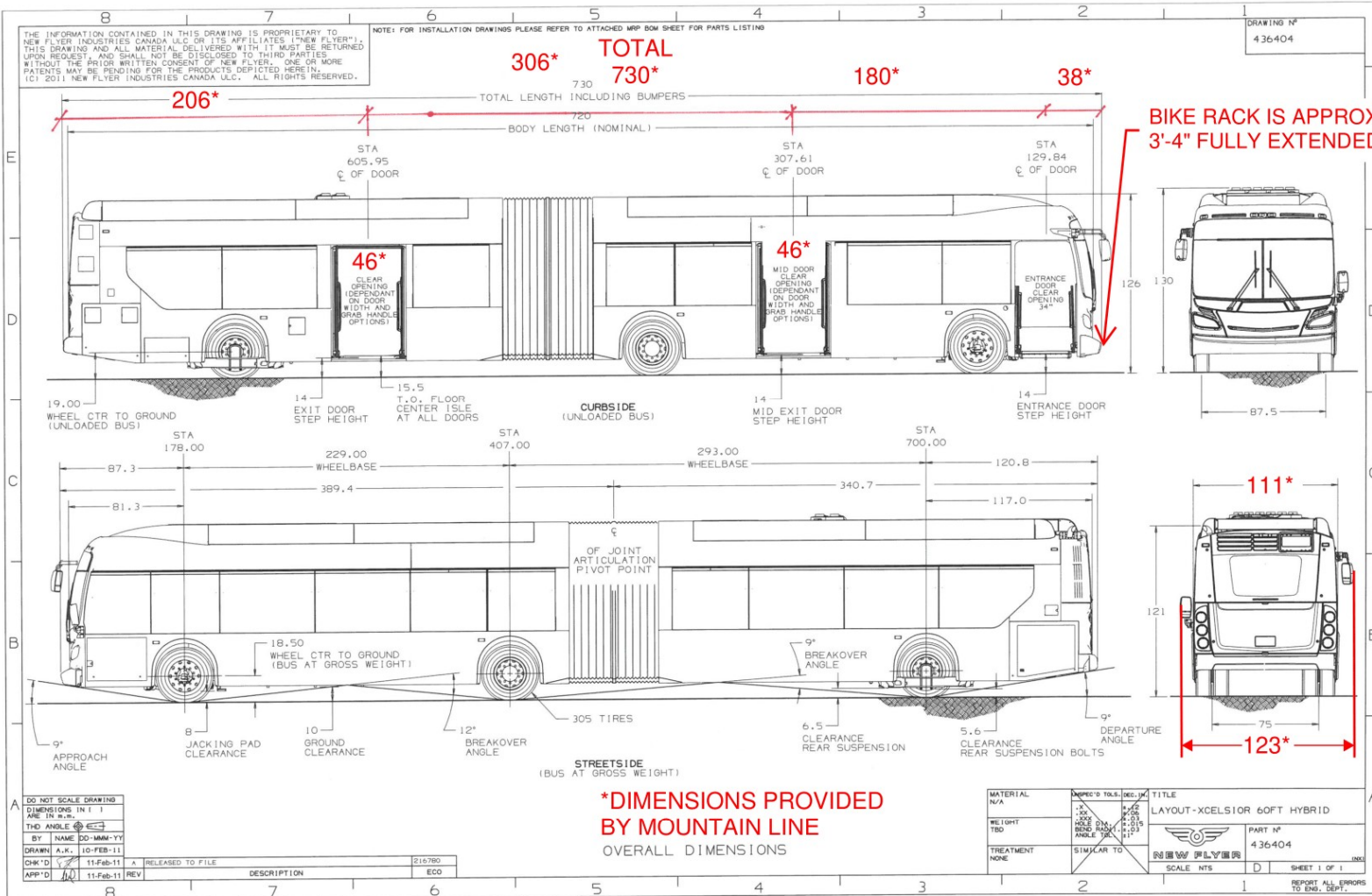
MOUNTAIN LINE TRANSIT GUIDELINES APPENDIX D – FIGURE 1 GILLIG 35' BUS DIMENSIONS

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PROJ. NO.: 121082 FN: GILLIG DIMS D1.dwg





**MOUNTAIN LINE
TRANSIT GUIDELINES**

**APPENDIX D – FIGURE 3
NEW FLYER ARTICULATED DIMENSIONS**

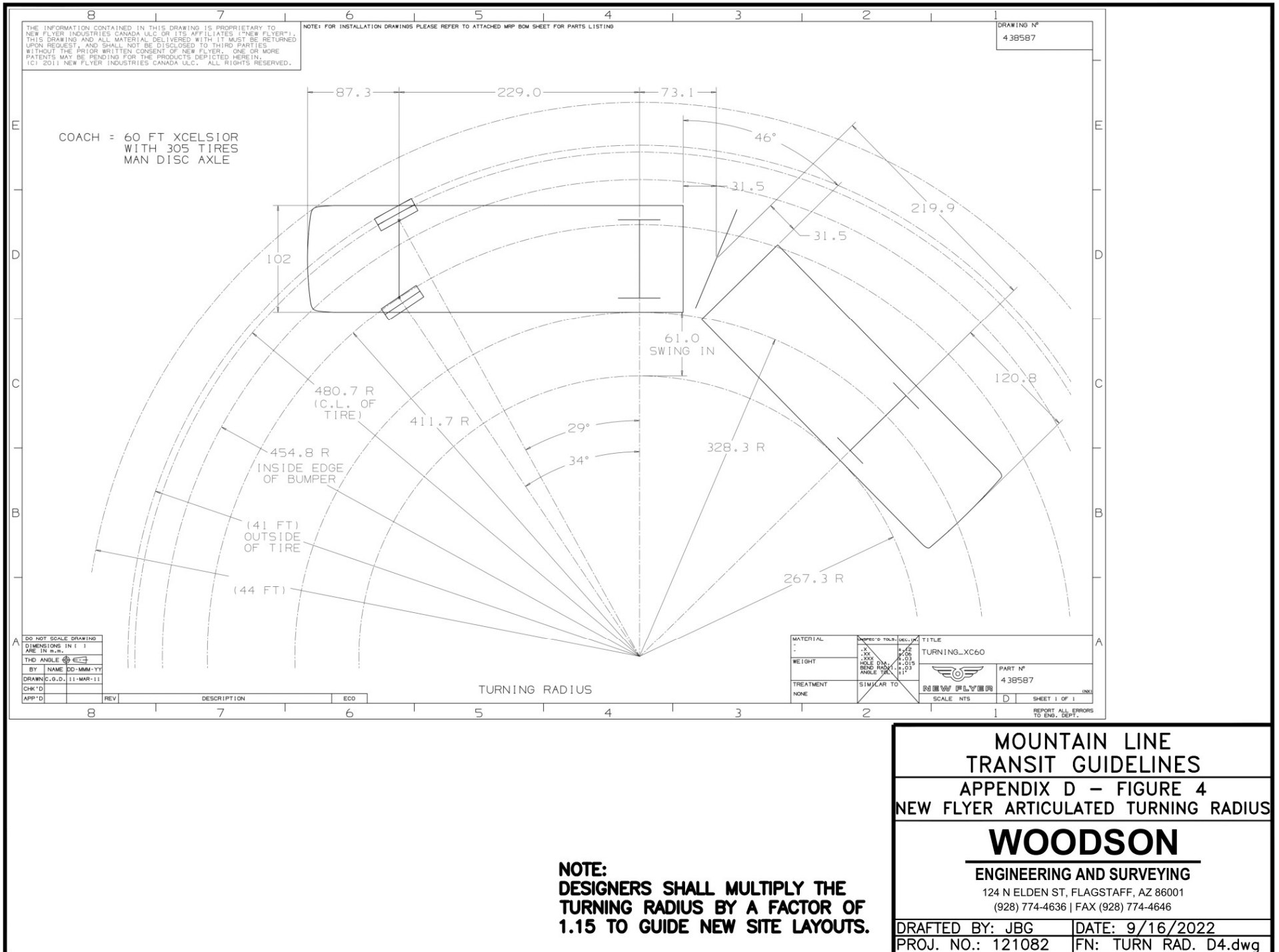
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PROJ. NO.: 121082 FN: NEW FLYER D3.dwg



NOTE:
DESIGNERS SHALL MULTIPLY THE
TURNING RADIUS BY A FACTOR OF
1.15 TO GUIDE NEW SITE LAYOUTS.

MOUNTAIN LINE TRANSIT GUIDELINES

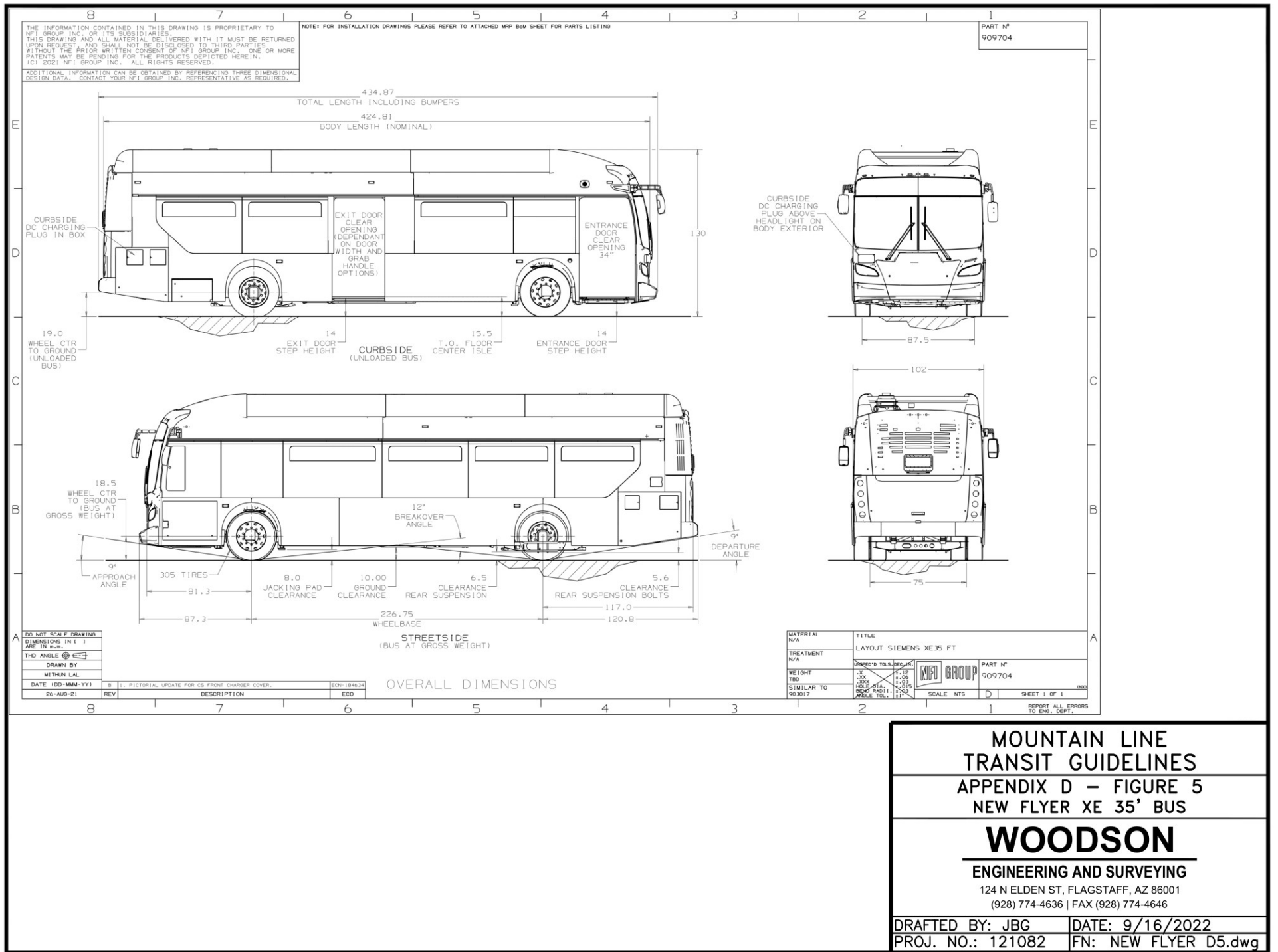
APPENDIX D – FIGURE 4 NEW FLYER ARTICULATED TURNING RADIUS

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PROJ. NO.: 121082	FN: TURN RAD. D4.dwg





Appendix E: References



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