Good afternoon folks. My name is William Squires. I’ve been the Missoula Area Engineer in Road Design for about 28 years. Today we’re going to talk about the Orange Street I-90 roundabout from its inception all the way through construction. I’ll discuss the preconstruction phase, Shane Stack will talk about the R.W acquisition phase, and Bob Vosen will tell us about the construction phase.
IM 90-2(104)94
Msla – E & W – Orange St Intchg
UPN 4855002
The Missoula area was growing rapidly in the late 1990’s. In response, District staff nominated a project to evaluate the existing operation of the I-90 corridor in the Missoula area and to identify future needs. **IM 90-2(104)94, Missoula – East & West [4855]** was programmed in early 2002 to do a corridor study on Interstate 90 from Reference Post (RP) 94.4± to 110.2±.

The Preliminary Field Review Report distributed in May 2002 noted that the study would be assigned to a consultant.
The consulting firm of CH2M Hill was selected to complete the corridor study.

Phase One of the study:
1) Collection and evaluation of traffic data and crash data;
2) Operational and capacity analyses based on current and 2022 traffic data, and;
3) Identification of existing and potential problem areas based on the results of 1) and 2)

These tasks were completed on the I-90 mainline, all seven interchanges, and seven connecting arterials:
- Airport Road
- Orange Street
- US 93
- Van Buren Street
- Airway Boulevard
- Broadway
- Reserve Street

Phase One was completed in April 2004.
I-90 mainline: sufficient capacity to carry the traffic volumes observed (21,000
Operational issues identified at the seven I-90 interchanges, particularly Orange Street and Van Buren. MDT should consider the potential reconfiguration of these interchanges.
Project History

Phase One of the study:
1) Collected and evaluated traffic and crash data;
2) Performed operational and capacity analyses based on current and 2022 traffic data, and;
3) Identified existing and potential problem areas based on the results of 1) and 2)

These tasks were completed on the I-90 mainline, all seven interchanges, and seven connecting arterials: Airport Road, US 93, Airway Boulevard, Reserve Street, Orange Street, Van Buren Street, and Broadway.
Project History

Phase One was completed in April 2004. It found that the I-90 mainline had sufficient capacity to carry the traffic volumes observed (21,000 vehicles per day). However, operational issues were identified at the seven I-90 interchanges, particularly Orange Street and Van Buren. It recommended that MDT consider the potential reconfiguration of these interchanges.

Here is a link to the Phase One study on MDT’s website:

Project History

Phase Two (Traffic Operations Report), completed in July 2007, recommended that design improvements be programmed for the Orange Street and Van Buren Street interchanges. The Orange Street eastbound ramps warranted a traffic signal based on 2005 traffic volumes, while the westbound ramps would not warrant a signal until beyond 2030. The Van Buren Street eastbound ramps also warranted a traffic signal in 2005, and the westbound ramps would warrant a traffic signal in 2016.

The report also analyzed roundabouts at each of the four ramp termini as an alternative to signalized intersections. Overall, roundabouts performed better than traffic signals at each location.

Two single lane roundabouts were determined to be appropriate at Orange Street. The report also offered a conceptual drawing of a single five-spoke roundabout that would require two new structures and radical realignment of the westbound ramps.

Here is a link to Phase Two:
Phase Two (Traffic Operations Report), completed in July 2007:
  Program design improvements for the Orange St. and Van Buren St. interchanges.
  Orange Street EB ramps: warranted a traffic signal based on 2005 traffic volumes
  WB ramps would not warrant a signal until beyond 2030.

The report also analyzed roundabouts as an alternative to signalized intersections. Overall, roundabouts performed better than traffic signals at each location.

Two single lane roundabouts were determined to be appropriate at Orange Street.
The report also offered a conceptual drawing of a single five-spoke roundabout that would require two new structures and radical realignment of the westbound ramps.
Van Buren Street EB ramps: warrant a traffic signal in 2005,
WB ramps: warrant a traffic signal in 2016.

The vast majority of public comment supported roundabouts at both interchanges.

Van Buren - dual lane roundabouts would be required to meet 2030 traffic demands.

Local citizens had concerns about the increased potential for bike/pedestrian conflicts that a dual lane roundabout would pose.

Suggested that single lane roundabouts be constructed initially, and the additional lanes added when needed.

Single-lane roundabouts would operate adequately if a northbound to eastbound slip-lane was included on the south roundabout.
Project History

The vast majority of public comment supported roundabouts at both interchange locations. At Van Buren Street the report noted that dual lane roundabouts would be required to meet 2030 traffic demands. Concerns were raised about the increased potential for bike/pedestrian conflicts that a dual lane roundabout would pose.

It was suggested that single lane roundabouts be constructed initially, and the additional lanes added when needed. The report determined that single-lane roundabouts would operate adequately if a northbound to eastbound slip-lane was included on the south roundabout.
October 2007 - Consultant Design Bureau submits the final report for the corridor study to Missoula District staff. The District decides to pursue a design project based on the study’s recommendations.

October 2008 - The project is re-assigned to the Road Design Section to develop the plans for eventual letting to contract for construction. Consultant Design will continue to provide project management duties.

December 2008 – A preliminary field review is held.

March 2009 – Road Design distributes a revised Preliminary Field Review Report with a proposed scope to reconstruct and reconfigure the ramp intersections to include two roundabouts at each interchange.

July 2009 – The ready date is set at February 2013.
September 2009 – Missoula District provides engineering survey; preliminary design begins.
Road Design meets with Traffic Engineering to review preliminary geometrics.

Traffic Engineering informally directs Road Design that a roundabout will not be included for the westbound ramps (north of I 90):
    those ramps will operate acceptably with the current stop condition at the exit ramp,
    a roundabout would complicate access to the parking for the open space trailhead.

2010 and 2011 – Most project activities are focused on the Van Buren Interchange segment as MDT engages in an intensive public involvement process to assess the need and local desire for a noise barrier between the I-90 corridor and the Lower Rattlesnake neighborhood. The local bike/ped community engages with MDT to see that the roundabout design addresses their concerns.
Project History

September 2009 – Missoula District provides engineering survey; preliminary design begins. Road Design meets with Traffic Engineering to review preliminary geometrics. Traffic Engineering informally directs Road Design that a roundabout will not be included for the westbound ramps (north of I 90) because those ramps will operate acceptably with the current stop condition at the exit ramp, and because a roundabout would complicate access to the parking for the open space trailhead.

2010 and 2011 – Most project activities are focused on the Van Buren Interchange segment as MDT engages in an intensive public involvement process to assess the need and local desire for a noise barrier between the I-90 corridor and the Lower Rattlesnake neighborhood. The local bike/ped community engages with MDT to see that the roundabout design addresses their concerns.
Project History

Early 2012 – Traffic Engineering retains the firm of Sanderson Stewart to do a traffic study of the Orange Street intersections with the I-90 eastbound ramps, N 3rd St. W (the east approach), and N 3rd St. W (the west approach). The firm is tasked with assessing if there are operational issues with the intersection, and if so, evaluate options and make a recommendation for improving the intersection.

June 2012 – The Alignment & Grade Review Report that covers both interchanges is distributed. Project management duties are re-assigned to Road Design and the approved. At Orange Street, no changes are proposed for the westbound ramps and minor revisions are anticipated for the eastbound ramps, pending final geometrics from Traffic Engineering.

The project is about five months behind schedule to meet the December, 2013 ready date.
Early 2012 – Sanderson Stewart is retained to do a traffic study of the Orange Street intersections with the I-90 EB ramps, N 3rd St. W (the east approach), and N 5th St. W (the west approach). Identify operational issues with the intersection, evaluate options and recommend improvements.
June 2012 – AGR Report that covers both interchanges is distributed.
Project management duties are re-assigned to Road Design.
Orange Street: No changes for WB ramps
Minor revisions are anticipated for the EB ramps, pending final geometrics from Traffic Engineering.

The project is about five months behind schedule to meet the December, 2013 ready date.
Project History

September 2012 – Sanderson Stewart delivers the Traffic Report to MDT. Three design alternatives were investigated: No Build; Roundabout, and a Signalized Intersection. The recommended improvements include:

- A 5-legged, single-lane roundabout and modified geometry/allowable movements at the 3rd St W approaches
- A 4-legged, single-lane roundabout at the EB I-90 on/of ramps with access restrictions at the N 5th St W and N 3rd St W intersections

MDT staff meets with City of Missoula staff to review the traffic study and the recommended improvements. We realized that the primary purpose of the project (to maintain acceptable capacity on the interstate ramps) could conflict with our desires to avoid negative impacts to local business access and to avoid major changes in traffic patterns of the local street network in the interchange area.
Project History

October 2012 – The District Preconstruction Engineer requests that the project be split for remaining preconstruction activities and construction. Road Design distributes the approved Split Report in November. The splits are:

IM 90-2(104)94, Missoula E & W (Van Buren St. Interchange) [4855001]
IM 90-2(104)94, Missoula E & W (Orange St. Interchange) [4855002]

The two interchanges would not have been constructed in the same construction season anyway. It made sense to split them so that unforeseen issues that could arise on a given split would not jeopardize our ability to deliver the other one.
November 2012: MDT staff meets several times with the City of Missoula and Sanderson Stewart to review and evaluate the roundabout options.

The five-legged design: optimal choice to perpetuate capacity of the interstate ramps
provide acceptable access and operation of the nearby streets without undesirable impacts to the nearby businesses.

Traffic Engineering begins working on the detailed geometric layout.

Meanwhile, Road Design requests additional survey to augment the original aerial photogrammetry.
Project History

November 2012: MDT staff meets several times with the City of Missoula and representative of Sanderson Stewart to review and evaluate the roundabout options. The five-legged design is determined to be the optimal choice to perpetuate capacity of the interstate ramps and to provide acceptable access and operation of the nearby streets without undesirable impacts to the nearby businesses.

With the basic layout decided, Traffic Engineering begins working on the detailed geometric layout.

Meanwhile, Road Design requests additional survey to augment the original aerial photogrammetry.

November 2012: MDT staff meets several times with the City of Missoula and Sanderson Stewart to review and evaluate the roundabout options. The five-legged design: optimal choice to perpetuate capacity of the interstate ramps provide acceptable access and operation of the nearby streets without undesirable impacts to the nearby businesses.

With the basic layout decided, Traffic Engineering begins working on the detailed geometric layout.
Project History

March 2014: The Programmatic Categorical Exclusion is approved by the FHWA

April 2014: The preliminary roundabout layout is sent to the City for comment. The City requests that better access to the business west of N 5th St. W be provided if possible.

June 2014: An updated roundabout layout is developed that provides better access to the business.

Road Design asks Traffic Engineering to revise the alignment of the Shared Use Path under the east side of I 90 so that it is behind the piers of the Interstate structures instead of in front.

Road Design also determines more areas where the photogrammetry mapping was inadequate, so more pick-up survey is requested.
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Road Design also identified more areas where the photogrammetry mapping was inadequate, so more pick-up survey is requested.
Project History

Late June 2014: The Scope of Work Report is distributed for comment/concurrence.

The scope is approved in mid-August after several issues raised by the City are resolved.

One week later the City requests that overheight sensors with Variable Message Signs be added to each off-ramp. Overheight trucks are driving through the neighborhoods to avoid the low clearance at the MRL underpass south of the project. Headquarters and District staff agree the signs should be added.
Project History

Late September 2014: The District Preconstruction Engineer meets with the North Side Neighborhood Council to share information and get their input on the project. Headquarters staff prepares a display board to show the locals. Subsequent meetings with the Missoula Bike & Pedestrian Advisory Board led to several requests/concerns that were not entirely resolved until May of 2015:

**Increase the sidewalk width from 6' to 10' — done**

**Add a Rectangular Rapid Flashing Beacons (RRFB's) at the 2nd St — No, pedestrian crossings volumes do not to warrant RRFB's**

**Is there room for bike lanes on Orange from 2nd to 3rd? — No. There could be significant R/W impacts.**

**Sidewalks possible around the roundabout on the west and north sides? — No, this would require a crosswalk north of the roundabout that would be difficult to see for motorists turning onto Orange from the westbound exit ramp. A crosswalk will be provided south of the roundabout.**
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Sharrows in approach to roundabout? — No

Will vehicles (motor and bikes) be allowed to make a left turn from southbound Orange onto eastbound N. 3rd? — No

How do vehicles best access N. 2nd St. eastbound? Northbound turn right; southbound turn left from TWLTL

Turning radii on 3rd for trucks? Based on movements of a Single Unit Vehicle and a school bus

Request for tunnel under the interstate. Request it be included in next Long Range Transportation Plan
Late September 2014: The District Preconstruction Engineer meets with the North Side Neighborhood Council to share information and get their input on the project. Headquarters staff prepares a display board to show the locals. Subsequent meetings with the Missoula Bike & Pedestrian Advisory Board led to several requests/concerns that were not entirely resolved until May of 2015:

Increase the sidewalk width from 6’ to 10’ – done

Add a Rectangular Rapid Flashing Beacons (RRFB’s) at the 2nd St – Initially, we said No, but RRFB’s were later added.

Is there room for bike lanes on Orange from 2nd to 3rd? - No. There could be significant R/W impacts.

Sidewalks possible around the roundabout on the west and north sides? – No, this would require a crosswalk north of the roundabout that would be difficult to see for motorists turning onto Orange from the westbound exit ramp. A crosswalk will be
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Turning radii on 3rd for trucks? Based on movements of a Single Unit Vehicle and a school bus

Request for tunnel under the interstate. Request it be included in next Long Range Transportation Plan
February 2015: Hydraulics provides storm drain recommendations that include the usual inlets and connections to the existing storm drain. New MS4 regulations for small redevelopments greater than one acre also require features that *infiltrate*, *evapotranspire*, or *capture* for reuse the runoff generated from the first 0.5 inches of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation, where practicable.

*This will be achieved by constructing four small ponds around the perimeter of the roundabout.*
Project History

March 2015: Maintenance Chief raises concerns about uncontrolled access from the westbound ramps to the informal parking area north of them.

Some vehicles leaving the parking area travel in the wrong direction for a short distance to head south on Orange Street. Design staff asked to look at measures to alleviate the risk.

Traffic Operations Engineer notes that we are supposed to have 150 feet of access control along either side of the ramp.

A review of the crash history for three years shows no crashes related to vehicles traveling wrong-way or were attributed to the parking area.
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Traffic Operations Engineer notes that we are supposed to have 150 feet of access control along either side of the ramp.

A review of the crash history for three years shows no crashes related to vehicles traveling wrong-way or were attributed to the parking area.
Project History

March 2015 - MDT staff meets with FHWA several times to resolve access issues at parking lot.

July 2015 – The Plan-in-Hand Review is held. The major items resolved include:

The proposed landscaping detail for the roundabout will be sent to the City for their input.

The sign bridge on the eastbound exit ramp has to be relocated to accommodate the exit ramp extension. We decided to move it to the west of the Reinforced Soil Slope.

The conceptual layouts for the parking lot were reviewed. Concept 1 was favored by Geometrics because it would reduce the chance of wrong-way travel on the ramps. The District favored Concept 2 – it would provide two more parking spaces.
The sign bridge on the eastbound exit ramp has to be relocated to accommodate the exit ramp extension. We decided to move it to the west of the Reinforced Soil Slope.
Concept 1: favored by Geometrics because it would reduce the chance of wrong-way travel on the ramps.
District Preconstruction Engineer observes 30 vehicles parked at the lot on a weekday. Requests Traffic Engineering to consider a larger lot to avoid parking on the ramp.

Traffic Engineering responds that they can only support Concept 1 or Concept 2 to provide access control. The decision to proceed with Concept 2 is documented in the Plan-in-Hand Report that is distributed in early August.

In August 2015, the District Preconstruction Engineer sends a letter to the Montana Division Administrator of the FHWA that requests a “change in use” for the right-of-way adjacent to the ramps to allow parking as depicted in Concept 2.

The change in use is approve, and final design of the parking area begins.
Project History

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Traffic Engineering responds that they can only support Concept 1 or Concept 2 to provide access control. The decision to proceed with Concept 2 is documented in the Plan-in-Hand Report that is distributed in early August.

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The change in use is approved, and final design of the parking area begins.
The Director of Parks & Rec subsequently asks about the parking area and trail links to the North Hills Trail. A link to the project website is sent back to her.
Project History

In early August of 2015, the generic landscaping plan for the center of the roundabout is sent to the City Parks & Recreation Department for comment. The plan features a mounded center covered in landscape rock (i.e large gravel) and plantings featuring medium height trees near the center and smaller shrubs around the perimeter. Drought-resistant species are called for, since no irrigation is planned.

City Forester
January 2016: MDT’s botanist provides guidance on the “standard” roundabout landscaping plan that MDT will adopt statewide. It requires native species of trees and shrubs, and an irrigation system. The plant list is sent to the City Forester, who OK’s it, except that the American Plum should be removed from the list.
In early August of 2015, a generic landscaping plan for the center of the roundabout is sent to the City Parks & Recreation Department for comment. The plan features a mounded center covered in landscape rock (i.e. large gravel) and plantings featuring medium height trees near the center and smaller shrubs around the perimeter. Drought-resistant species are called for, since no irrigation is planned.

In late September, the City Forester responds that since no irrigation is proposed, we should expect 70% - 80% failure rate of plants installed from containers. Include provisions for replacement in contract.
January 2016: MDT’s botanist provides guidance on the “standard” roundabout landscaping plan that MDT will adopt statewide. It requires native species of trees and shrubs, and an irrigation system. The plant list is sent to the City Forester, who OK’s it, except that the American Plum should be removed from the list.
Mid-August 2015: Final construction limits are submitted to Right-of-Way Design, and subsequently updated in early September.

Early October 2015: The Right-of-Way plans are completed and the project is authorized for right-of-way acquisition.

Late October 2015 thru early May 2016: The R/W plans are revised three times, to add a construction permit for the parking lot adjacent to City of Missoula property, revise parcels from acquisition, and to revise parcels to “Owner Notification Only”. The final plans require acquisition of 33 sf from the St. Patrick Hospital Corporation.
Project History

Early January 2016: The Final Plan Review is held. Aside from the usual number of plan corrections, the primary unresolved issues include:

How to handle the required tree removal without violating the Migratory Bird Treaty Act (forbids tree and shrub clearing from April 16th through August 15th.), given the proposed letting date of May 12, 2016?

We tentatively pursue a separate tree clearing contract through Purchasing to avoid hindering the contractor’s sequence of operation. The issue is rendered moot when the letting date is moved to July 14th with a Notice to Proceed of September 12th.

We have to prepare a suggested Sequence of Operation for the roundabout construction. It is agreed that the $12,600/day incentive/disincentive based on user delay costs for the construction of the roundabout is reasonable.
Road Design staff meets with Construction twice in late January to finalize a plausible construction staging plan
Project History

Late March, 2016: The road plans and special provisions are submitted to Contract Plans.

March – mid June 2016: Minor plan revisions are completed, and the special provisions involving traffic control and sequence of operation are refined and coordinated with the Public Awareness Campaign special provision.

Mid-June to mid July: The project is advertised for letting. Suggested responses for relatively minor Q&A items are provided to Contract Plans.
## Project History

**July 14, 2016**: The project is let to contract: one bidder

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