APPENDIX B

Worksession Meeting Minutes and Presentation
**EVENT NOTES**

<table>
<thead>
<tr>
<th>SUBJECT:</th>
<th>Work Session</th>
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<tbody>
<tr>
<td>PROJECT NUMBER:</td>
<td>CFHWY00359</td>
</tr>
<tr>
<td>GROUP:</td>
<td>Project team, DOT&amp;PF and Municipality of Anchorage representatives</td>
</tr>
<tr>
<td>DATE:</td>
<td>Tuesday, April 10, 2018</td>
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<tr>
<td>TIME:</td>
<td>Noon to 3:30 p.m.</td>
</tr>
<tr>
<td>LOCATION:</td>
<td>DOT&amp;PF Main Conference Room, 4111 Aviation Avenue, Anchorage</td>
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<tr>
<td>OUTREACH:</td>
<td>Email invitation</td>
</tr>
<tr>
<td>ATTENDANCE:</td>
<td>See below</td>
</tr>
<tr>
<td>MATERIALS:</td>
<td>Slideshow presentation, interchange concepts, aerial photo of project area, interchange score card</td>
</tr>
<tr>
<td>PROJECT TEAM PRESENT:</td>
<td>DOT&amp;PF: Kevin Jackson, Jonathan Knowles, Steve Rzepka</td>
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<tr>
<td></td>
<td>Lounsbury &amp; Associates: Tom Adams, Joseph Taylor, Susan Acheson</td>
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<tr>
<td></td>
<td>Kittelson &amp; Associates: Andrew Ooms, Brian Ray, Wende Wilber</td>
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<td></td>
<td>Brooks &amp; Associates: Anne Brooks, Camden Yehle</td>
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**EVENT INFORMATION:**

**Informational Session:** Noon to 12:30

1) **Welcome and Safety Moment** – Kevin Jackson/Tom Adams
   - Safety Moment: Watch for pedestrians and cyclists now that spring is here. Share the roadway with non-motorized users.
   - Lounsbury appreciates the opportunity to work on this project. Good group of expertise represented at this meeting to provide information relevant to project.

a) **Introductions**
   - Name, Affiliation, Project Role
   - See attendance list at end of notes.

b) **Meeting Goals**
   - Agree on the problems with the existing interchange and obtain concurrence on the problem(s) we’re trying to solve
   - Identify the teams “top 3 most preferred” concepts for a more in-depth evaluation
• Don’t want to get down in the weeds on traffic related details, but to get input from the collected group.
• Share findings with group.

c) Project Overview
• General Scope & Project Parameters
  • Take fresh look at interchange and recommend replacement.
  • Submit draft Preliminary Engineering Report (PER) by June 1, 2018; finalize PER by August 1, 2018.

• Schedule
  • Certify by November 2019 – before Phase 2 of Seward Highway project
  • Funding may not be available, management may decide to change schedule.

• Public Involvement (summary provided for completeness, not presented at meeting).
  • Public involvement began shortly after the NTP at the February 8, 2018 Anchorage Transportation Fair.
  • In February we launched a survey, chiefly to get public perceptions of the existing interchange and other interchange types. We received 280 responses
  • Our next public meeting, to present draft preliminary engineering report, is scheduled for early summer.
  • We are meeting with individual stakeholders, such as the emergency service providers, to gather information specific about use of the interchange.
  • A project website is active.
  • We will receive and respond to public comments throughout the project.
  • We have created a mailing list to include residents, property owners and businesses in the project area.

2) Project History – Roundtable Discussion
• New project number assigned to interchange reconstruction.
• Separate project under Categorical Exclusion (CE); like an assignable CE; for reference, Muldoon diverging diamond interchange accomplished under CE.
• No environmental concerns.
• Once the preferred alternative is selected, environmental can move forward preparing the document. We have an advantage because we have monies for design and will not have to reassess at another step.
• The team met with DOT&PF construction folks last week. They were planning on a $0.5 million maintenance project for approaches and the bridge. This money could be saved if the bridge will be replaced with the interchange reconstruction project.

Planning Framework Session: 12:30 to 1:15
3) Moving Forward: Planning Framework
   a) Known Opportunities and Constraints – Roundtable Discussion
      • From Jim Amundsen, Chief of Highway Design:
        o Preserve frontage road to provide access/detour/bypass ability.
        o Address the choke point on the Seward Highway with reduced lane count and shoulder width. This requires replacing the bridge.
      • What is the funding strategy? National Highway Performance Program (NHPP) funding is anticipated.
   b) Right-of-Way (ROW)
      • Several pieces of ROW have been acquired on the north side of the interchange.
      • Additional ROW will likely be needed, depending on the design.
      • In the past, ROW acquired from willing participants; some acquisitions didn’t go forward because the ROW was not needed for the then-current project. ROW was based on a tight diamond interchange recommendation.
      • The ROW phase is already open; property acquired in the north half of interchange.
      • The Dimond to Dowling project recommended purchase of several parcels based on a tight diamond interchange. The alternatives will define future ROW requirements.
      • We can get more ROW if we need it, but sellers may not be willing sellers
      • Frontier auto – no purchase, turned into easement
      • Never approached NAPA with earlier project, however, may be needed for this one
      • Polaris School has no environmental issues; already acquired a strip of land, but not along Dowling
   c) Bridge
      • Original construction in 1976 to then current standards HS20 live load – a normal highway truck load.
      • Currently load rated at HS15 which is 75% of the design live load and doesn’t require load posting at this time. It will likely require posting in the next five years if not replaced. Load rating reductions due to shear. There are ways to improve structural strength but wouldn’t work for shear especially in our cold climate. If project objective was to use the bridge for another 5 or 10 years the bridge could survive. It is not in critical condition.
      • We don’t want to post load restrictions on a bridge on the Seward Highway which is a main route for the DOT&PF.
      • Bridge has a shallow foundation, which is not allowed under current design guidance. Underlying soils are subject to liquefaction under earthquake conditions. A new bridge would require densification of existing soil or use deep foundations like driven piles; both are costly.
• Bridge inspection every two years assigns scores to components. The current scores are 5 on the deck, 5 for superstructure, and 6 for the substructure. Any score of 4 or lower will list the bridge as structurally deficient. This bridge will likely be structurally deficient in 4-5 years.
• Replacement will provide flexibility for interchange selection and design.
• Current height clearance is less than 16 feet. The preferred height is at least 17 feet. Clearance was enhanced by lowering the roadway at this location after construction.
• This bridge has one replacement girder due to an oversized load strike.
• The main line has a pinch point at this bridge – less lanes and deficient shoulder width.
• DOT&PF still has piling from the Gravina Access project that could be used as match if the piling are the correct size.

d) Maintenance Issues
• Both the mainline and the roundabouts are challengingly narrow for modern maintenance equipment.
• Adequate shoulders are needed for snow storage on highway and bridge.
• There are maintenance issues with the speed humps at the roundabouts.
• Would prefer to not have vegetation in roundabouts because of root systems and required clearing.
• Drainage problem on the east side in the snow storage area causing ponding issues near ramp.
• To clear the roundabouts, crews plow road snow onto the sidewalk, then return with small sidewalk plows. Snow has to be hauled away because there is little snow storage area. With more snow storage, crews could move faster and reach other portions of the city more quickly.
• Every summer maintenance corrects bridge deficiencies which cost about $1 million per year from maintenance budget. Replacing the old bridge would assist maintenance.
• Consider the recent lessons learned from Eagle River bridge – such as off ramps for emergency access, detours, etc.
• No other drainage issues, resolved one on the southwest corner.

e) Transmission Lines
• Some current interchange concepts keep the utilities in place, some concepts avoid the transmission line poles.
• Poles are expensive to relocate—on the order of $1 million per pole (in 2013).
• Poles accommodate high voltage transmission and sub-transmission lines.
• Fiber optics exist in the corridor between Polaris and NAPA, underground in the roundabout area.
• Per Bridge Design, on past projects the contractor didn’t want to work under powerlines citing safety reasons. Plan on moving the poles if the contractor must work on the bridge under powerlines or get proper offset from the powerline for construction. Contractors historically want at least a boom height’s separation from the powerline for safety reasons.
• Current roundabout concept shifts only 20-30 feet away from the powerlines.
• There are constructability issues to resolve with power poles.
• May be able to move sub transmission lines from the power poles.
• The powerline will affect time of year construction is completed because part of the year there is too much demand to divert power to another location.
• The West Dowling the transmission line generated inductive current in nearby construction equipment.
• A temporary reroute could be considered. On West Dowling we built a shoe fly to take the powerlines around the construction area and then put the transmission lines back on main poles when complete. It cost $600,000 to $700,000 to complete. The shoe fly solution did save money in the long run because of the crane selected for the project.

f) Pedestrians and Cyclists
• There are no reported bike or pedestrian related crashes at these roundabouts over the last five years, but there have been at other locations along Dowling.
• Departing traffic speed at roundabout is bad for pedestrians; entering traffic is better.
• People driving cars yield to people in the crosswalk when entering the roundabouts, but not when leaving.
• Pedestrians and cyclists are using other routes. During traffic peaks Dowling is very difficult to cross.
• Perception of quality of service is an issue.

g) Vehicular Crashes
• The team is working with five years of crash data.
• The roundabouts experience 20 crashes per year.
• Nationally, up to 60-70 Property Damage Only (PDO) per roundabout per year is unheard of.
• Crashes are a function of volume too. When these roundabouts are compared to traffic signals they are breaking the traffic signal crash rates. This is consistent across the nation.
• Roundabouts may see high quantity of crashes, but not higher severity. DOT&PF wants to do better.
• What we are finding is a congestion improvement with roundabout but still getting higher PDO crashes than before.
• 15-20 PDO at a high-volume roundabout is a good record.
• Recognize that the roundabout is better than what was there before.
• The existing roundabout has less than 25 mph sight distance at some approaches.
• People are driving more aggressively. The split-second time between ramps is important and design should buy people time to react to roundabout.

h) Public Perceptions (historic and recent)
• New interchange types are met with skepticism and initially receive negative comment. We saw this when we opened the Dowling roundabouts and it came out in the survey regarding to the diverging diamond interchange at Muldoon Road/Glenn Highway.
• Roundabouts, partial cloverleaf and diverging diamonds move traffic quickly – per survey results.
• Diamond, roundabouts and partial cloverleaf interchange types are easiest to drive per survey feedback.
• Asked about intuitive flow, survey respondents listed diamond, roundabouts and partial cloverleaf interchange types.
• The diamond, roundabouts and partial cloverleaf interchange types were judged highest in the “feel safe” category.
• Least favorite interchange types: included diamond, diverging diamond, and single point.
• The survey asked respondents to rate the relative importance of cost, construction impacts, right-of-way impacts, and pedestrian and non-motorized accommodations. The following chart summarizes these responses.

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• Respondents provided the following feedback when asked about various interchange types.
• We are continuing to analyze the open-ended written responses. A sample of the comments follow:
  o Partial cloverleaf – icy in winter conditions; poor for bicyclists; lack of signals is appreciated, etc.
  o Diamond – does not move traffic efficiently/quickly; backs up at high traffic times; something I’m use to; lefts can be difficult for large vehicles, etc.
  o Single Point – confusing, lose signal in shadow; not familiar; three light signals are too much; etc.
  o Diverging Diamond – all turns at unsignalized ramps; confusing at first; hard to determine lanes in snow covered roadway; bike/ped accommodations are poor; more driver education, etc.
  o Roundabout – safest interchange; cycling the interchange at C and Minnesota is easier on bikes; I like this best; require more concentration and cooperation from drivers; safe if no ‘idiots’ driving at the same time; keeps traffic slow and steady; need to be bigger, more driver education, etc.

4 Traffic & Safety
  a. Existing Traffic Conditions
    • Stop and go traffic on Dowling was bad before construction of roundabouts.
- Same constraints exist today – overhead power, expensive relocation, ROW squeeze. The project needs to remove the constraints.
- Past project ended up with highest crash roundabout in state—higher than some traffic signals.
- Speed humps and other measures were added to the roundabouts in an attempt to reduce crash rates.
- Make more room for driver decisions by improving sight distance.
- Fix capacity but look at capacity along corridor and maintain consistency. Do not overbuild capacity at this location.
- Increase deflection in existing roundabout to lower speeds. The public complains about speed and speed humps.
- Because of Dowling roundabouts/speed humps, the MOA gets requests for speed humps on other arterials which is not a desired practice, would like to remove speed humps from this corridor.
- Improve efficiency of the roadway.
- For MOA, operation of signals is a consideration, would prefer not to add signals to inventory and maintenance.
- Pedestrian and bicyclists are uncomfortable at the roundabouts.
- Consider Public Rights-of-Way Accessibility Guidelines (PROWAG) and signalization for pedestrians at multilane roundabouts. Recognize impacts on capacity and consider requirements that may lead to a signal for ped/bike users.
- Existing roundabouts function well but break down at peak periods.
- Keep the frontage road from backing up onto Seward Highway.
- Keeping the frontage access in both directions is important for access and circulation.
- Seward Highway construction last year required a diversion of all Homer Drive (frontage road) traffic to Old Seward which was problematic.
- Using frontage road for bypass helps with construction and school traffic in the corridor. School traffic uses the frontage road and roundabouts for turning movements, etc. Keeps school traffic from doing left turns on Dowling.
- Consider standards for gaps and sight distance, under current traffic manual.
- Consider bike/ped use ability to get across and along Dowling corridor.
- Business and residential access and access control may be considered along Dowling Road in the future. At locations such as NAPA, drivers don’t use the roundabouts for U-turns. The chosen interchange may influence the need for additional access control.
- MOA is looking at local connections/new roads to consider as part of capital improvement projects in the vicinity for improved connectivity.
(1) One-way frontage roads and through movement
   (a) Alpine Apartments and Homer Drive Businesses
   (b) Emergency vehicles
      • Team met with Anchorage Fire Department Station 12; Station 4 is the primary responder using access from Lake Otis to Waldron, etc.
      • Lots of industrial uses along Homer, it would be significant if they have to access the frontage in a different way.
      • Frontage continuity is important for emergency service response.
      • Resiliency of facility is important.

(2) Safety Performance (crash frequency and severity)
   • Safety – high rate of crashes for roundabouts in Alaska. Look at addressing constraints.
   • No high severity crashes and no weave related issues; will review in more detail in the Traffic and Safety analysis.
   • The data shows rear end crashes on approaches to roundabout.

(3) Pedestrian/Bicycle
   • Ped/bikes a concern – MOA Bicycle and Pedestrian Plans call for improvements along Dowling Road corridor.
   • Ped/bike facilities connect to Campbell Creek/Elmore trails.

ii) Traffic Projections
   • The team is working on traffic volume projections.
   • Initial concept volumes are complete and will do a reality check with travel demand models, land use and traffic assignments.
   • Restrictions on other intersections along Dowling – building additional capacity may be a waste of money in terms of payoff – moves congestion to Old Seward or Lake Otis – match capacity on rest of corridor rather than increase capacity.

Break: 1:15 to 1:30

Concept Review Session and Presentation: 1:30 to 3:30 – Brian Ray/Mark Johnson

2) Sketch Planning Level Concepts – Consultant Team Presentations
   a) Design Team Screening Criteria – High-Level to Weed Out Concepts that Clearly Fail
      i) Traffic Capacity
         • Do not create a bigger pipe at Dowling than we have in other locations on the corridor.
      ii) Safety Performance
         • Severity and frequency of crashes part of safety analysis. Design should work on solving severity/frequency crash problems.
         • Vision Zero should be design consideration.
iii) Continuity with Corridor
   - Anchorage is roadway rich but continuity poor. The frontage road continuity is important.

iv) Multi-Modal
   - Need people to feel comfortable and secure in the new interchange.

3) Full Range of Concepts Considered - Advantages and Disadvantages of Each

   a) Past Concepts Not Recommended to be Carried Forward
      i) Diamond Form (tight or compressed) with existing bridge (wouldn’t serve existing volumes)
         - Vehicle storage on interior can become too tight on the compressed diamond.
         - Compressed diamond with roundabout adds capacity at the nodes.
         - Tight diamond could accommodate frontage through movements.
      
      ii) Single Point Diamond that accommodates a through movement (all the penalties, none of the rewards)

   b) Current Concepts (Least Promising)
      i) Partial Cloverleaf Forms (substantial ROW required, loss of utility on the frontage road)
      ii) Single Point Diamond (other diamond forms are more promising and less expensive)
         - Requires three phases of signal control.
         - Requires a wider and deeper bridge and more roadway needs to be constructed/reconstructed.
         - Could add Texas U-turn for additional capacity.
         - Option removes frontage road continuity.

   General Comments:
   - Look at signalization of the diverging diamond interchange (DDI). The way with the ramp terminals, left and right turns become critical for progression, ramps or through streets, signalization and timing is more sophisticated.

   c) Current Concepts (Front Runners)
      i) High Capacity Diamond Forms
         (1) Roundabout Terminals (new and existing bridge)
         - Shifts north 25 feet with new bridge, more impact on north.
         - Maintains frontage road continuity.
         - Improves separation, increases size, improved alignment to approaches.
         - 22% capacity increase with roundabout and existing bridge.
• New bridge allows for more flexibility and better ped/bike accommodation.
• New bridge would allow us to have more flexibility with the frontage road.

(2) Diverging Diamond (existing bridge)
• With diverging diamond we lose continuity of frontage roads.
• Is there a version that includes frontage road continuity? Team is not aware of the through movement but acknowledged that Arizona DOT is putting some in. Pedestrian movements are challenging and would lose benefit of the interchange.
• Geometry and pedestrian crossings are challenging.
• The advantage of this interchange type was to get high capacity while maintain existing bridge. This will no longer be considered if we replace the bridge.

(3) Signalized Tight Diamond (new bridge)
• Keeps within existing ROW.
• Maintains frontage road continuity.
• Requires expensive (MSE) retaining walls on poor soils.
• Mitigating left turns and keeping the area under bridge clear is a challenge with any type of tight diamond interchange.
• Per team, the tight diamond form, with overlapping signal phases, is set up to not keep any vehicles stored between the terminals.
• Look at signal phasing, different for the tight diamond interchange.
• Maintenance & Operation costs increase because of the signalization.

4) Final Discussion – What Concepts Should Move Forward
• There was group consensus to compare roundabout and tight diamond interchanges.
• DOT & MOA identified right turn slip lanes, or right turn on red, as problematic. People do not comply with yielding to cyclists and pedestrians and the dual right does not work well. Driver behavior is a problem.
• Carry pedestrian improvements on recommendations for all future presentations/reports.
• For multimodal accommodation, choose to not have movement be a free movement. Optimize the quality of service for ped/bike users.
• Look at locations where components of design might be a problem and fix them with good design.
• We have aggressive drivers and aggressive right turners to design for.
• For roundabout, consider multimodal when adding capacity with right turn bypass.
• Look at interchanges – is there anything breaking here that you could pull out of the interchange?
• If we don’t design considering compliance/driver expectancy along with multi-modal/capacity DOT may have to retrofit to make people behave. That is where the speed humps came in on the existing roundabouts.
• Plan for truck movement. At O’Malley and C the roundabouts were oversized for trucking and generally considered a better design by the public.
• What do you design for/what do you accommodate?
• Interchange configurations would be tuned up and adjusted for the turn radii of trucks.
• Dowling is a major bike corridor. Make sure the users are accommodated in the design.
• Design to get a WB-67 through the roundabout but let the trucks straddle lanes in the roundabout.
• Access points along Dowling may become a problem. If we begin taking turns out with access control we may push U-turns to Lake Otis or Old Seward Highway, where we don’t want them.
• Access control on Dowling – the tight diamond ties MOA’s hands for access.
• Interested in intersection design that eliminates backing up traffic on ramps onto Seward Highway. The ramp length and capacity will be a big concern for DOT and MOA.
• Another area, such as the Walmart parcel may generate more traffic than we can possibly accommodate given proximity to 56th Avenue and the highway ramp. This will need consideration. May look at another signal at 56th and Old Seward and how it interacts with a big box user and determine what kind of spacing is needed. Lounsbury was actively engaged with Walmart and can say Walmart is not considering development at this time.
• What can we do with weaving at this 56th Avenue? At 64th Avenue? Lots of school circulation exists at these locations.
• ASD going through an analysis of revising school start times. This is a concern for MOA in locations that create more traffic problems. Currently ASD peak does not equal commuter peak.
• Updated land use plan for the MOA looked at vacant parcels –uses and zoning changes. Consider what this will do to long term development in vicinity of Dowling/Seward Highway.
• Is there a problem with environmental if you touch school property with ROW acquisition? Only a problem if a resource is used for recreation, like a playground. A sliver acquisition may require extra effort and we may not want to take half of the resource.
• Snow storage. Need to accommodate ditch or snow storage and identify a space for the snow storage. If we are purchasing property – be sure to add the snow storage/ditching.
• Need to think about Gary’s Trucking and their access and proximity to Dowling Road interchange.
• Add space behind sidewalk for snow storage, drainage, and utilities, etc.
• Do the work in three dimensions to show all impacts to property, protected resources such as wetlands and parks.
• The team sees two concepts remaining and will work with DOT&PF to identify evaluation criteria.
• Additional ROW purchases may require additional permitting. Be sure to show on the maps any filling of wetlands so we can demonstrate to US Army Corps of Engineers how we have avoided/minimized.
• Can we pull the roundabouts in (toward bridge) with the new bridge scenario? The team will look at it. May find on the east side if the roundabout is shifted, the shift may achieve everything we need.
• Utility poles – temporarily move or permanent move. Consider how maintenance would access the bridge to replace a damaged girder with high voltage power nearby. The group agreed to consider whether it would be best to permanently move the poles.
• For both roundabout scenarios, we missed the existing poles but probably not enough per comments about constructability around transmission lines/poles.
• Get Chugach Electric Association (CEA) working on the pole relocation sooner rather than later. The voltage is too high to underground, however some sub transmission could go underground. Can the poles get taller? It may be possible to convert them to taller metal poles. On West Dowling the poles were very tall and it was ok to work under them, however the contractor didn’t think the work conditions were safe.
• Safety is a tough thing to fight our way around.
• Roundabout designer would rather not have the poles as a constraint.
• Is there a likelihood of sound mitigation? It depends on the addition of lanes, modeling and the noise policy. The noise policy is changing to be a little less restrictive.
• One versus two bridges? Bridge Design could provide cost for each. Maintenance preference? Recent Seward Highway bridge replacements provide one wide bridge.

Wrap Up
Joe indicated that conversations with different groups will continue as needed to develop the PER and groups will have an opportunity to review the draft PER.

Kevin wants the project ready for construction before next phase of Seward Highway construction. PER draft release in June time frame with concept recommendations.
Complete the PER and Traffic & Safety with an endorsed recommendation for a build alternative by August 2018.

What kind of field work would be required for the PER? Mitch (DOT&PF Materials) said a lot of subsurface data is available in the project area. We would drill for new bridge design but have adequate information for PER.

The team will share draft PER with groups and seek comments to finalize.

**Attendance:** (see sign in sheets attached)

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<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Project Role</th>
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<tr>
<td>Acheson, Susan</td>
<td>Lounsbury</td>
<td>Project Engineer</td>
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<td>Adams, Tom</td>
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<td>Amundsen, Jim</td>
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<td>Central Region Highway Design</td>
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<tr>
<td>Taylor, Joe</td>
<td>Lounsbury</td>
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<td>Thomas, Scott</td>
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<td>Central Region Traffic &amp; Safety</td>
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<td>Kittelson</td>
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<td>Yehle, Camden</td>
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*Dowling Road/Seward Highway Interchange Reconstruction – April 10, 2018 Work Session*

*Page 14 of 15*
Related documents on file: Sign-in sheets, Project graphics, Survey summary
April 2nd, 2018

Summary Memorandum Regarding: Construction Group coordination - Dowling Road Interchange Concepts

Attendees: For the Department – Kevin Jackson, Steven Rzepka, Tom Dougherty, Tony Sprague, Brian Shumaker, Mitch Miller, Elmer Marx (via teleconference)

For the Consultant Team: Joe Taylor, Susan Acheson (Lounsbury), Andrew Ooms (Kittelson)

Introduction: The Department of Transportation and Public Facilities (DOT&PF) is reconstructing the interchange at Dowling Road and the Seward Highway. The purpose of the project is to address current and future travel demands by providing increased capacity, enhanced mobility and safety improvements.

A concept planning work session/design charrette meeting was conducted on April 10th. The meeting included a presentation of different interchange alternatives that were being considered in preliminary design. A broad range of representatives from the Department attended the meeting, provided feedback on each alternative, and discussed how each alternative met their functional group’s needs.

Representatives from the Department’s Construction Section were unable to attend the work-session meeting as it conflicted with their annual “Spring Fling”. The purpose of this meeting was to present the various interchange concepts and solicit feedback from the construction group, focusing on constructability issues and traffic maintenance considerations for each alternative.

Critical Decision Factors: A broad range of alternatives were being considered for the interchange. These alternatives were categorized as falling under two distinct scenarios:

1. Replace the existing bridge or maintain the existing bridge.
2. Maintain the through movement on the frontage road, or break the through movement

Concepts Presented: While each alternative has unique challenges with respect to traffic maintenance and constructability, replacing the bridge presents the most complex construction scenario. Breaking the through movement was discussed, but was not thought to be a critical issue for the construction section. As such, the presentation of the concepts focused on new bridge alternatives.

Specifically:
1. A Tight Diamond Signalized Interchange with vertical walls retaining the embankment.
2. A Compressed Diamond interchange with reconstructed roundabout terminals constructed on a fill slope embankment.
3. A Cloverleaf or “loop” ramp alternative on fill slope embankments
4. A Single Point Diamond Interchange (SPDI)
Alternatives that maintained the existing bridge included a retrofitted Diverging Diamond Interchange (DDI), a revised compressed diamond form with roundabout terminals, and a revised compressed diamond with signalized terminals.

**Discussion:** The discussion focused on different types of bridges that might be considered, the foundations anticipated, and the approach to traffic control for each scenario. Items of note included:

1. A single span bridge is relatively simple from a traffic maintenance perspective. A two span bridge would significantly complicate traffic maintenance.

2. The existing interchange and embankment are stable. Changing the grade of the mainline or lowering the grade of Dowling Road should be avoided if possible.

3. There is peat under the existing embankment that would have to be removed if the grades change appreciably.

4. Spread footings would be very difficult at this location and should not be proposed for any scenario that involves a new structure.

5. Any new bridge alternative will need to consider potential safety issues associated with using cranes in the vicinity of the east-west overhead transmission main, similar to a conflict that developed during the West Dowling Road Reconstruction project.

**Conclusion:** Alternatives that maintain the existing structure through a retrofit design are relatively straightforward from a traffic and maintenance perspective. New bridge concepts have appreciably more complexity. The design team should focus on alternatives that can be constructed with a single span and that do not change the grades on the mainline or cross street. The design should coordinate closely with the Construction Section once a build alternative is selected.
Presentation Outline

• Acknowledge previous studies
• Screening Criteria and Constraints
• Service Interchange Categories
• Present our concepts
• Compare Diamond Forms and Parclo Forms Capacity
• Summarize our findings
• Roundabout Details
• Make our recommendations
2012 Previous Study

Diamond Forms

- Compressed Diamond w/ Roundabout Terminals (Existing Bridge)
  - Advanced for detailed analysis

- Diverging Diamond – (Existing Bridge)
  - Screened out and not drawn due to breaking the frontage road, and corridor consistency

- Tight Diamond – (New Bridge)
  - Advanced for detailed analysis and **Recommended as the Build Alternative**

- Single Point Diamond – (New Bridge)
  - Advanced for detailed analysis with provision for frontage road through movement

- Partial Cloverleaf Forms

- Two Loops – (New Bridge)
  - Screened out and not drawn due to ROW impacts
Presentation Outline

• Acknowledge previous studies
• **Screening Criteria and Constraints**
• Service Interchange Categories
• Compare Diamond Forms and Parclo Forms Capacity
• Present our concepts
• Summarize our findings
• Roundabout Details
• Make our recommendations
SCREENING CRITERIA

TRAFFIC CAPACITY

SAFETY PERFORMANCE

MULTI-MODAL

CONSTRUCTABILITY

Integrity • Excellence • Respect
MAJOR CONSTRAINTS

FRONTAGE ROAD

BRIDGE

UTILITIES

ROW IMPACTS

Dowling Road / Seward Highway
Interchange Reconstruction
Presentation Outline

• Acknowledge previous studies
• Screening Criteria and Constraints
• **Service Interchange Categories**
• Present our concepts
• Compare Diamond Forms and Parclo Forms Capacity
• Summarize our findings
• Roundabout Details
• Make our recommendations
Service Interchange Categories

- Diamond
  - Compressed
    - Signalized
    - Roundabout
  - Tight
  - Single Point
  - Diverging
    - Maintain Frontage Road Continuity
    - No Frontage Road Continuity
  - Single
  - Double

- Parclo
2018 First Round Concepts

• Diamond Form Alternatives Under Existing Bridge
  ▪ Compressed Diamond w/ Signals
  ▪ Compressed Diamond w/ Roundabout Terminals ✓
  ▪ Diverging Diamond ✓

• Diamond Form Alternatives with a New Bridge
  ▪ Compressed Diamond w/ Roundabout Terminals
  ▪ Tight Diamond ✓
  ▪ Single Point Diamond
  ▪ Single Point Diamond (Frontage Road Continuity) ✓

• Partial Cloverleaf Forms with a New Bridge
  ▪ Two Loops - New Bridge ✓
  ▪ One Loop - New Bridge

✓ = Also in 2012
Are there other forms to consider?

Do these forms fall under same categories as previously listed?
Presentation Outline

• Acknowledge previous studies
• Screening Criteria and Constraints
• Service Interchange Categories
• **Present our concepts**
• Compare Diamond Forms and Parclo Forms Capacity
• Summarize our findings
• Roundabout Details
• Make our recommendations
Compressed - Signalized Terminals (Existing Bridge)

General Notes
- Inefficient diamond form
- Difficult signal coordination
- Left turn movements between ramp terminal intersections commonly fail

Integrity • Excellence • Respect
Compressed - Roundabout Terminals (Existing Bridge)

- General Notes:
  - Adds capacity at nodes
  - Current configuration has capacity limitations
  - Additional turn lanes meet traffic growth
• General Notes:
  • Provides room for future Bypass Lane
  • Shift’s Dowling Road North
• General Notes
  • 4 phase overlap
  • High-capacity from closely spaced, coordinated signals

• Left turns are stored outside ramp terminals
• Simple bridge construction
• Could include Texas U-turns
Single Point - New Bridge

General Notes
- 3 phase control is efficient
- Longer bridge is more expensive
- Deeper bridge section creates higher mainline profile
- More mainline construction and higher retaining walls
- Could include Texas U-Turn

Loss of frontage road continuity
- NB - 225 peak hour /2000 daily
- SB – 125 peak hour /1500 daily
What is a Texas U-turn?

- Removes U-turning movements from ramp terminal intersection
- U-turn lanes can be on underpass or overpass (shown on right)
- Could be added to Tight and Single Point forms
Single Point - New Bridge
(Maintain Frontage Rd Continuity)

General Notes
• 4 phase control reduces efficiency to LOS F
• Longer bridge is more expensive
• Deeper bridge section creates higher mainline profile
• More mainline construction and higher retaining walls

Traffic Notes
• No benefit over Tight form
• More Dowling Rd through lanes would be needed
• Inferior to tight and single point forms
Tight and Single Point

Tight

- Less efficient
- Allows Frontage road continuity
- Simple Bridge Construction

Single

- More efficient
- More mainline construction
- Larger, complex bridge
- Higher retaining wall
- More expensive

Two viable concepts but tight form is a better value
General Notes

- Highest capacity diamond form
- Loss of frontage road continuity
  - NB - 225 peak hour /2000 daily
  - SB – 125 peak hour /1500 daily

Integrity • Excellence • Respect
Comparing Diamond Forms*

- Compressed
  - Signalized (Going backward in time)
  - Roundabouts (Enhancing the current form)
- Tight
- Single point
  - With frontage Rd. Continuity (Loses benefits)
- Diverging

* Organized (loosely) by increasing interchange capacity
Service Interchange Categories

Diamond
- Compressed
  - Signalized
  - Roundabout
- Tight
- Single Point
- Diverging
  - Maintain Frontage Road Continuity
  - No Frontage Road Continuity
Parclo
- Single
- Double

Integrity ∙ Excellence ∙ Respect
Double Loops - New Bridge

**General Notes**
- NB to WB loop not needed for traffic
- Typically one of the highest capacity forms

**Traffic Notes**
- NB to EB Parclo B loop would serve 750 vph
- Frontage road connection possible as shown
- Frontage road continuity is highly impacting

Integrity · Excellence · Respect
General Notes

- NB to WB loop not needed for traffic
- Frontage road connection possible as shown
- Frontage road continuity is highly impacting on west side
Service Interchange Categories

Diamond
- Compressed
  - Signalized
  - Roundabout
- Tight
- Single Point
- Diverging
  - Maintain Frontage Road Continuity
    - No Frontage Road Continuity
- Single
- Parclo
  - Single Point
  - Double
Presentation Outline

• Acknowledge previous studies
• Screening Criteria and Constraints
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• Compare Diamond Forms and Parclo Forms Capacity
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• Roundabout Details
• Make our recommendations
Comparing Diamond and Parclo Form Capacity

- Diverging
- Single Point
- Tight

Three concepts with more capacity than Single Quadrant Parclo Form
Roundabout form could use existing bridge if needed
Service Interchange Categories

- Diamond
  - Compressed
    - Signalized
      - Roundabout
  - Tight
  - Single Point
  - Diverging
    - Maintain Frontage Road Continuity
    - No Frontage Road Continuity
- Parclo
  - Single
  - Double

Integrity · Excellence · Respect
Front Running Concepts

- Compressed with Roundabouts
  - Existing Bridge
  - New Bridge
- Tight
  - New Bridge
- Diverging
  - Existing Bridge
• General Notes:
  • Adds capacity at nodes
  • Current configuration has capacity limitations
  • Additional turn lanes meet traffic growth
Compressed - Roundabout (New Bridge)

- Allows for 3rd EB Thru Lane Expansion
- Avoids Utility Poles
- Improves Ped/Bike Accommodations
Tight - New Bridge

- General Notes
  - 4 phase overlap
  - High-capacity from closely spaced, coordinated signals
- Left turns are stored outside ramp terminals
- Simple bridge construction
- Could include Texas U-turns

Integrity • Excellence • Respect
General Notes

- Highest capacity diamond form
- Loss of frontage road continuity
  - NB - 225 peak hour /2000 daily
  - SB – 125 peak hour /1500 daily
Presentation Outline

• Acknowledge previous studies
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• Roundabout Details
• Make our recommendations
Roundabout Outline

• Traffic Analysis
  ▪ 2018 & 2040

• Concept Design Development
  ▪ Design Principles
  ▪ Capacity Improvements
  ▪ Overlay with Existing
The Roundabout Design Objectives include:

- **Increase Capacity**
  - Accommodate 2040 Traffic

- **Improve Large Truck Accommodations**

- **Achieve Optimal Safety Design Principles**
  - Accommodate all modes

- **Minimize Adverse Impacts**
  - Utility Poles
  - Polaris School Property
  - Existing vs New Bridge
May require structural treatments to fit under the existing structure (similar to DDI)
Overlay with Existing Conditions
(Existing Bridge)

NOTES
Revised Design
- Larger ICDs
- Widened entries (painted gore; all entries)
- More separation; median between roundabouts
- Improved sight decision distance
- Improved approach/entry alignment
- Added capacity
Overlay with Existing Conditions (Existing Bridge)

NOTES

Revised Design
- Larger ICDs
- Widened painted gore; all entries
- More separation; median between roundabouts
- Improved approach/entry alignment
Concept Design Development (Existing Bridge)

- Added dual RT lanes (capacity +++)
- Added widened truck gore (capacity +)
- Extended RT lane (avoids lane starvation)

Example Geometrics - Kimber’s Equations

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<td>$L'$</td>
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<tr>
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Entry Capacity Increase = 22%
Performance Checks

- Sight Distance
- View Angles
- Speed Control
- Truck Accommodations
Overlay with Existing Conditions (New Bridge)

NOTES

Revised Design
- Larger ICDs
- Widened entries (painted gore; all entries)
- More separation; median between roundabouts
- Improved sight decision distance
- Improved approach/entry alignment
- Added capacity
• Increases Capacity
• Improves Truck Accommodations
• Avoids Utility Poles
• Maintains Ex Ped/Bike Accommodations
Compressed - Roundabout (New Bridge)

- Allows for 3rd EB Thru Lane Expansion
- Avoids Utility Poles
- Improves Ped/Bike Accommodations

Integrity • Excellence • Respect
Presentation Outline

• Acknowledge previous studies
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Summarizing our Front Runners

Existing Bridge Concept – Roundabout

Pros
- Driver expectations met at this location
- Maintains frontage road movement
- Can preserve existing bridge (may require some work) while maintaining transmission line

Cons
- Impacts to ROW
- Cross section restrictions for peds/bikes
- Constrained diameter at the east terminal
- Limited opportunity to address ramp/frontage road weave
Summarizing our Front Runners

Existing Bridge Concept – Diverging Diamond

Pros
• High capacity diamond form
• Consistent with other interchange plans on the corridor
• Can preserve existing bridge with work

Cons
• Breaks through movement on the frontage road
• Impacts to ROW and transmission line
• Requires maintaining signals
• Limited opportunity to address ramp/frontage road weave
Summarizing our Front Runners

New Bridge Concept – Compressed with Roundabouts

Pros
- Driver expectations met at this location
- Maintains frontage road movement
- Could accommodate a third lane in the future
- Opportunity to improve weave at ramp/frontage road

Cons
- Requires ROW
Summarizing our Front Runners

New Bridge Concept – Tight Diamond

Pros
• High capacity diamond form
• Consistent with interchange plans on the corridor
• ROW purchased to accommodate prior recommendation
• Opportunity to improve weave at ramp/frontage road

Cons
• Relatively expensive construction for retaining walls
Recommendations

Advance Diamond Forms:
• Compressed with Roundabouts
• Tight
• Diverging