

I-70 Traffic and Revenue Study
Technical Team (TT) Meeting #4
Meeting Minutes
February 26, 2014
Frisco – County Commons Buffalo Mountain Room

Handouts for the meeting included:

An information packet was sent to TT members on February 19, 2014 that included the following: Level 1 Base Cost Estimates (draft 2/17/14) and Level 1 Summary Cost Estimates (draft 2/17/14).

Welcome and Opening

Ben Acimovic (CDOT) kicked-off the meeting. Self introductions were made. The agenda was reviewed.

Agenda

Ben Acimovic (CDOT) summarized the items on the agenda for the I-70 Traffic & Revenue study.

Item 1 - Level 1 Process Overview & Alternatives & Cost Estimating Process

Item 2 - Alternatives Costs

Item 3 – Small Group Sessions

Item 4 – Schedule Review & Next Meetings

Agenda Item 1 – Level 1 Process Overview & Alternatives & Cost Estimating Process

Ben Acimovic (CDOT) gave the Level 1 Process Overview:

- A Level 1 T&R is mainly to generate financial feasibility information based on conceptual design no greater than 5%. The alternatives that pass the screening criteria can change and nothing is locked in after Level 1 results are generated.
- Alternatives Level 1 cost estimates have been developed and will be reviewed today. The team is soliciting input from the Technical Team, the Project Leadership Team, and any stakeholders that review and have questions.
- Louis Berger traffic and revenue data will be received by CDOT next week and released to the PLT & TT on March 19.
- CDOT Website should be up to date; please send any comments to Ben Acimovic.
- David Singer (CDOT) Reviewed the CSS Process. We are currently on Step 5 of the CSS Process “Evaluate, Select, Refine Alternative or Option”.

- No decisions on the design and construction will be made with the Level 1 Process. Decisions will not be made independently; CDOT intends to have internal discussion on the Level 1 T&R results and decisions will be made with consensus and collaboration from the TT and PLT. No decision has been made about moving to Level 2.
- Upcoming Level 1 schedule includes March PLT & TT review of alternatives' costs, and April PLT & TT review of screening.
- *Sara Richardson (Parsons)* reviewed all six alternatives under consideration. These six alternatives include: 2 Managed Lanes (2 options), 3 Managed Lanes (3 options), PEIS Minimum Improvements (4 options), PEIS Maximum Improvements (2 options), Permanent Peak Period Shoulder Lane, Temporary Peak Period Shoulder Lane. Requested questions after each alternative was described. Fact sheets for each alternative are posted on CDOT project website.
- Commissioner Tim Mauck's (CCC) Question – Asked for managed lanes width/footprint clarification. Sara Richardson (Parsons) responded by reading the alternatives' widths from the fact sheets shown in the powerpoint presentation.
- A request for a sheet for all alternative lane width/footprints for quick and easy comparison was submitted to the project team. CDOT will work to develop this sheet for the March and April meetings.

Ralph Trapani (Parsons) described the cost estimating process:

- Developed general concepts for capital costs that included roadway, structures, tunnels, transit, CDOT unit costs, allowance for unallocated items (known items but not quantifiable), allowance for CSS factor (15%), and AGS system costs from CDOT AGS Feasibility Study (February 2014), Preconstruction & Administration (NEPA, design, CSS, construction engineering), and Operations & Maintenance costs.
- Ralph Trapani asked Ben Acimovic to describe the process used to derive the CSS factor. Ben Acimovic summarized the process which primarily consisted of looking at project CSS cost data along the I-70 corridor and breaking out what portion of the costs was used to address CSS, and then averaging these for an average parametric percentage used to address CSS. A better way to approach developing the CSS factor will be developed in a higher level study, if initiated; our current parametric approach works well for this Level 1 study. Vail Pass, Glenwood Canyon, I-70 Frontage Road, EB and WB Twin Tunnels, and the Twin Tunnel EA were all analyzed for this effort.
- Validated costs using Transportation Risk and Uncertainty Estimating (TRUE) method. This method takes a comprehensive look at the project, employing a collaborative team approach that focuses on key issues. This method helps to quantify uncertainty, apply risk management strategies, and document estimated costs. A Monte Carlo simulation calculates thousands of scenarios, and develops a probability distribution curve for each alternative's cost. For this analysis, 50,000 iterations were performed.

Agenda Item 2 – Alternatives Costs:

Ralph Trapani (Parsons) discussed each alternative's costs:

- Costs ranged from \$4-5B for managed lanes alternatives, \$1-2B Minimum Program + \$6.8B AGS alternatives, \$2-3B Maximum Program + \$6.8B AGS alternatives, and \$100M - \$2B + \$6.8B AGS Peak Period Shoulder Lane alternatives. A full cost breakdown was included in the information packet sent to the TT members prior to the meeting.
- The team clarified that the \$6.8B AGS cost is made up of \$5.8B capital cost + \$1B design/construction.
- O&M costs were reviewed for each alternative.
- Art Ballah (Colorado Motor Carriers) Question – Clarified range CDOT selected is 80% probability. No CDOT policy exists for selecting this percentage. This percentage will change (probably increase) as project costs are more defined at further levels.
- Rich Doak (White River US Forest Service) Question – Has a project ever done both cost estimating methods to compare the outcome? Research white papers have done this, but no known projects have. Ben Acimovic stated that the Twin Tunnel EB design/construction was done using typical cost estimating process with contingency; the project was underestimated. The Twin Tunnel WB design/construction used risk based estimating and it is coming out more accurate. Rich stated AGS was done with typical cost plus contingency methods, and this is being mixed with TRUE-developed numbers. David Krutsinger stated that at this level, CDOT was comfortable using the cost plus contingency method to estimate AGS numbers. Rich stated he feels the TRUE method is very good, and accepts the AGS method.
- Commissioner Tim Mauck (CCC) made statements to express their point of view. Alts 1 and 2 are unattainable; they do not want Alts 1 and 2 through their community. Feels if alternative is outside ROD, should start over with Collaborative Effort (CE). CCC has no problems with cost estimating. If Alts 1 and 2 are pursued, CCC will change their position in the process. CCC put in a letter of concern to CDOT dated February 20, 2014; left copies with project team (letter is attached). Commissioner Mauck apologized for departure of CCC staff, as they had another engagement. (Letter Attached to Minutes) Letters were passed out to all members of the technical team that were in attendance.

Agenda Item 3 – Small Group Sessions – TT agreed to just stay in one group:

Ben Acimovic led discussion on questions. Ben reminded everyone that everything is still on the table and that ideas, comments, questions, and input are all welcome for consideration.

Group Discussion regarding two questions:

1. Can we create a better alternative by mixing and matching elements of different alternatives?
 - Scott Thomas (APEX) – We should look at what deal breakers are for CCC/Idaho Springs and from engineering perspective look at traffic volumes, and see if that can converge on alternative. Potential Max PEIS – keep same footprint and

operate inside shoulder as managed lanes, so there would be two managed lanes for each direction of travel.

- Art Ballah (Colorado Motor Carriers Association, CMCA) – What extent are alternatives 1 and 2 outside ROD? Ben Acimovic answered that they are not part of preferred alternative (3 lanes each direction and AGS). Alts 1 and 2 include BRT (not AGS) and expands the footprint. If these Alternatives 1 and 2 are pursued, CDOT/FHWA may need to go back and start new EIS process, or revise ROD; this would be an additional risk. Art Ballah (CMCA) stated the CMCA desires a 65mph speed limit for trucks; not 55mph. Can we do a 65mph option and still be within the bounds of the ROD? If stay with 55mph, might need to increase costs with more signage.
- Sara Richardson (Parsons) – Higher level of design will be done to make costs lower (i.e. more rock cuts, less tunnels).
- Ralph Trapani (Parsons) – By incorporating the AGS component with alternatives, costs are higher for those alternatives.
- Elena Wilkens (CASTA) – Would like to see a comparison chart of alternatives' costs, as a menu. Would also like to see a breakdown of "part"s to build a better alternative with the costs. Ralph referred her to the base cost breakdown.

Action Items:

- Project team will put together a chart that develops a cost "menu" of sorts.
- Project team will put together a width/footprint alternative comparison chart for distribution.
- Hans Hoppe (Parsons) – Stated sensitivity analysis was also conducted with cost estimating modeling, and those can be adjusted based on bigger ticket items. (i.e. rock cuts, mobilization, wildlife crossing structures) Hans Hoppe stated he is happy to answer any specific questions about the model.
- Scott Thomas (APEX) – Need to look at the attributes/effects of each improvement, such as travel times, number of people served, and expectancy for traffic operations to remain at desirable levels, and include these forecasts in the level 1 comparison.

2. What constitutes a good cost estimate?

- No general comments about the cost estimating process or cost estimates were made.

Joe Mahoney (CDOT) – Stated everyone should review CCC comments and respond back to CDOT with pros/cons/comments.

Eva Wilson (Eagle County) – Understands the cost estimates and process; no questions at this time. Review times are adequate.

Art Ballah (Colorado Motor Carriers) – No questions at this time. Feels that the alternatives we are studying are ok, even though they are outside the ROD. Eva Wilson (Eagle County) agrees with this, that the PLT will be the place to vet solutions.

David Krutsinger (CDOT) – Feels that it is important to look at revenues from alternatives that would help pay for an AGS system at later time.

Rich Doak (White River US Forest Service) – Clarification on amortization time frame of AGS. David Krutsinger (CDOT) answered AGS did 30 year amortization from 2020 to 2050.

Elena Wilkens (CASTA) – After reading through CCC letter, agreed with the point about finding it difficult to follow calendar and access to documents (dissemination of information). Speaking for transit agencies along corridor, welcome cost numbers that we are receiving, and look forward to receiving traffic numbers as well. Ralph Trapani (Parsons) – Responded that we did hear Sharepoint was too clunky for stakeholders to use, and that is why CDOT project website was created. We are at a point where cost data is all coming together – alternatives, AGS, and soon revenue forecasts. The website is updated regularly.

Agenda Item 4 – Schedule Review & Next Meetings

Discussion on potential schedule. Scott Thomas (APEX) stated we might want a week in between the Modeling and Tolling ITF meeting (currently scheduled on March 25) and the PLT meeting (currently scheduled on March 26) so that project team can have adequate time to respond to comments heard at ITF meeting, before PLT meeting.

Action item: Change dates to allow for more review time. Look back to meeting minutes to see overall conflicts stakeholders have in calendar, to consider possibility of moving tentative March 26 PLT towards early April. Potential to move March 25 ITF meeting up too. CDOT will also let the team know what information will be distributed on March 19.

Tentative Tolling and Modeling ITF Meeting March 25 – will review traffic and revenue

Tentative PLT Meeting March 26 – will review costs, traffic and revenue

Tentative PLT/TT April 23 – will review Level 1 Results

The presentation will be posted on the CDOT project website within 2 business days.

Meeting adjourned.

ATTACHMENTS: Clear Creek County letter to CDOT and HPTE, dated 2/20/14
Meeting attendees

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February 20, 2014

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Re: Record of Clear Creek County concerns with Traffic and Revenue Study

Clear Creek County (County) has serious concerns regarding the process by which the I-70 Mountain Corridor Traffic and Revenue Study (T&R Study) is being conducted. Specifically, the County's primary concern is that the Context Sensitive Solutions (CSS) process has not been implemented properly, as the Project Leadership Team (PLT) has not led the process from the beginning. Instead, the PLT has been used in a largely ceremonial fashion to approve assorted components needed to reach what increasingly appears to be a predetermined result.

Representatives for the County expressed these concerns at the T&R PLT meetings in April 2013, May 2013, June 2013, August 2013, September 2013, and December 2013 (in addition to the Tech Team (TT) meetings and the other Issue Task Force (ITF) meetings that representatives from the County attend). The County also expressed similar concerns, near the beginning of the T&R process, in a January 22, 2103 letter to Tony DeVito and Doug Bennett. Despite the County's repeated protestations, CDOT has moved forward without addressing these foundational problems.

Therefore, the County requests that the following comments be entered into the official record of the T&R Study.

The Colorado Department of Transportation (CDOT) must adhere to the CSS process. Under the National Environmental Policy Act (NEPA), all transportation projects and decisions within the Interstate 70 mountain transportation corridor (I-70 Mountain Corridor) must comply with the I-70 Mountain Corridor Final Programmatic Environmental Impact Statement (PEIS) and the June 2011 PEIS Record of Decision (ROD). Within the PEIS, CDOT explicitly committed to adhere to the

principles of the U.S. Department of Transportation’s CSS process on all projects in and along the I-70 Mountain Corridor.¹ CDOT also agreed that, consistent with CSS, it would convene a PLT for every project on the I-70 Mountain Corridor and that the formation of each PLT would be in collaboration with the county local to the project.²

CSS principles commit all projects to a “*collaborative, interdisciplinary, holistic approach to the development of transportation projects. It is both process and product, characterized by a number of attributes. It involves all stakeholders, including community members, elected officials, interest groups, and affected local, state, and federal agencies. It puts project needs and both agency and community values on a level playing field and considers all trade-offs in decision making. Often associated with design in transportation projects, Context Sensitive Solutions should be a part of all phases of program delivery including long range planning, programming, environmental studies, design, construction, operations, and maintenance.*”³

With respect to other I-70 Mountain Corridor projects, the County has partnered in many effective CSS initiatives, including the PLT for the creation of the corridor’s CSS process, development of the corridor-wide CSS principles, completion of the Final PEIS, adoption of the I-70 Corridor Interpretive Plan as incorporated in the Programmatic Section 106 Agreement, design of the Twin Tunnels Eastbound (EB) Expansion, the PLT for the Advanced Guideway System (AGS) Feasibility Study,⁴ development of the Chain Station Plan,⁵ and the ongoing design of the EB Auxiliary Lane, EB Peak Period Shoulder Lanes,⁶ and westbound expansion of the Twin Tunnels. In each of these projects, the CSS process has been adhered to by convening a PLT that meaningfully led each project from the very start and gave appropriate consideration to local context through every step of the CSS process.

In stark contrast, the T&R PLT has not led this process and has further been marred by a number of substantive and procedural shortcomings. Ultimately, the T&R PLT has not placed “*agency and community values on a level playing field.*”⁷

1. The T&R PLT has not led the project.

The T&R Study’s CSS shortcomings are most apparent and most troubling in the composition and operation of the T&R PLT, which has failed to “lead the project,” “champion Context Sensitive Solutions,” and “enable decision making,” as mandated by the corridor-wide CSS process adopted pursuant to the Final PEIS.⁸ The PLT has not led the T&R Study through a collaborative and

¹ PEIS, appdx. A § A.1.3.

² *Id.*; see also PEIS, appdx. A §§ A.1.5, A.7.3.

³ FHWA, “What is CSS?,” http://contextsensitivesolutions.org/content/topics/what_is_css/ (last visited Jan. 24, 2014).

⁴ CDOT, “Advanced Guideway System (AGS) Feasibility Study,” <http://www.coloradodot.info/projects/AGSstudy> (last visited Feb. 13, 2014).

⁵ CDOT, I-70 Mountain Corridor Chain Station Plan (2009), available at http://www.coloradodot.info/projects/contextsensitivesolutions/docs/plans/20090410_170ChainStationPlanFinal.pdf/view.

⁶ CDOT, “I-70 Peak Period Shoulder Lane Project,” <http://www.coloradodot.info/projects/I70mtnppsl> (last visited Jan. 27, 2014).

⁷ *Cf.* FHWA, *supra* note 3, “What is CSS?”

⁸ CDOT, “Project Leadership Team,” <http://www.coloradodot.info/projects/contextsensitivesolutions/docs/decision-making/collaboration-and-communication/project-leadership-team> (last visited Feb. 13, 2014).

publicly transparent process; it has merely rubberstamped the predetermined alternatives that have been placed before it. Rather than develop Alternative 1 and Alternative 2 from the beginning with an eye towards local context and aesthetic values, Parsons Engineering has convened a number of ITFs to provide it with acceptable answers to the many challenges that these alternatives pose, so that it may have the PLT ceremonially approve them as is. Under the CSS process, however, no post hoc rationalizations can remediate the PLT's failure to lead the process.

A common format exists for implementing CSS from the formation of a PLT to assure the development of collaborative Context Sensitive Solution. All studies begin with the development by the PLT of a Context Statement and a Core Values, Critical Issues, and Performance Measures Matrix. As a member of the T&R PLT, the County collaborated with CDOT and other stakeholders to adopt these guiding documents.⁹ Subsequently, however, the T&R PLT has ignored or otherwise failed to comply with these guidelines in contravention of the corridor-wide CSS process.¹⁰ Rather, the unofficial "internal project team," comprised largely of Parsons Engineering employees, has presented finalized alternatives and assumptions to the PLT for its presumptive approval. The PLT has repeatedly approved of this work without any meaningful stakeholder review and without using the adopted Core Values, Critical Issues and Performance Measures Matrix.¹¹

For example, at the last T&R PLT/TT meeting on December 5, 2013, the Core Values, Critical Issues, and Performance Measures Matrix was displayed but was not applied to the range of alternatives presented and considered. CDOT has indicated that the Matrix may be applied to the T&R Study after Level I financial screening. In contrast and consistent with CSS principles, model decision-making matrices have been completed and used for many other I-70 Mountain Corridor projects from the very beginning.¹²

Because the PLT has neither led the process nor championed CSS, it cannot possibly enable decision-making that is consistent with the CSS process. The T&R Study will not be in accordance with CSS principles regardless of the outcome.

⁹ I-70 Traffic & Revenue Study, Joint Project Leadership Team & Technical Team Meeting, "Preliminary Information Package," at pp. 2-6 (Sept. 25, 2013).

¹⁰ CDOT, "Step 4: Develop Alternatives or Option," <http://www.coloradodot.info/projects/contextsensitivesolutions/decision/6-step-process/step-4.html> (last visited Jan. 27, 2014).

¹¹ Cf. CDOT, "Step 3: Establish Criteria," <http://www.coloradodot.info/projects/contextsensitivesolutions/decision/6-step-process/step-3.html> (last visited Feb. 13, 2014) ("Step 3 tracks how concerns and issues are used in the formation of criteria, allowing stakeholders and affected parties to see how their interests will be considered and permitting them to monitor the outcome in a meaningful way.").

¹² See FHWA, "Decision Points," <http://contextsensitivesolutions.org/content/reading/decision-poi/> (last visited Jan. 24, 2014) ("The focus of a decision process is often mistakenly placed on only the final decision, overlooking the many intermediate decisions along the way. For example, in an alternative selection process, the alternative development and screening occurs prior to detailed alternative evaluation. Whether it is explicitly stated or not, the early steps involve decisions on compiling the list of potential alternatives, the manner and level of detail to which they will be outlined or described, the feasibility criteria to be used, and the list of feasible alternatives to be considered further. Specification of each decision step in this way highlights the importance of individual decisions.").

2. The T&R Study Issue Task Forces violate CSS principles.

In support of the T&R Study, CDOT, in conjunction with an outside consultant from Parsons Engineering, has convened 14 ITFs.¹³ This substantial number of ITFs has only added to the confusion and lack of public accountability surrounding the T&R Study.

There are also significant issues with the composition of the ITFs. Many of the ITFs are not multidisciplinary—a requirement of CSS—and are instead comprised primarily of Parsons engineering employees.¹⁴ Consequently, the ITFs have been guided by individuals that are unfamiliar with CSS and the preexisting agreements within the I-70 Mountain Corridor.

Many of the ITF meetings have not been properly noticed and, as a result, were poorly attended. The sheer number of ITF meetings has made it unreasonable to expect meaningful stakeholder participation. This has also made the accountability of the ITFs to the PLT difficult to track and understand. As a result, the PLT has not had sufficient information to fully and fairly consider the work of the ITFs.

3. In violation of CSS principles, the T&R Study has not been transparent.

The CSS process has not been transparent with respect to stakeholders or the general public. Throughout much of the T&R Study process to date, most of the T&R Study documents were held on an electronic “sharepoint” database and access was controlled by Parsons Engineering. After many requests for information on the T&R process by the County, CDOT recently moved many of these documents to the open access portion of its website. However, numerous T&R Study documents, including the minutes for many of the ITFs, remain unapproved, incomplete, and/or unavailable to the public. This is not a transparent and accessible process.

Furthermore, the County’s repeated requests for a calendar of meetings and a single contact person for meeting notification has been ignored. The calendar of scheduled meetings on the sharepoint is inaccurate and updated on an inconsistent basis. Minutes of many of the meetings that have occurred are not posted on the sharepoint. The minutes that have been prepared are incomplete and do not fully reflect stakeholder positions and concerns.

Pursuant to FHWA guidance, the CSS process must be “*open, honest, early and continuous.*”¹⁵ Without transparency, it is impossible to create “*consensus among stakeholders and the transportation agency.*”¹⁶ This sentiment is echoed in CDOT’s own CSS principles for the I-70 Mountain Corridor, which expressly provide that the decision-making process must be “*clear, transparent, and accessible to the public and stakeholders.*”¹⁷ The failure of CDOT to maintain an

¹³ The 14 ITFs cover the following issues: (1) Alternatives; (2) Roadway Cost Estimating; (3) Structures Cost Estimating; (4) Transit Cost Estimating; (5) Tunnel Cost Estimating; (6) Mitigation; (7) ALIVE; (8) SWEEP; (9) Historic; (10) Finance; (11) Permitting; (12) Tolling; (13) Traffic Modeling; and (14) Traffic Operations & Maintenance. See I-70 Traffic & Revenue Study, *supra* note 9, at p. 1.

¹⁴ FHWA, “The CSS Process,” <http://contextsensitivesolutions.org/content/topics/process/> (last visited Jan. 24, 2014) (“To oversee a CSS process, project managers need to draw upon diverse skills and professions to analyze problems and develop solutions.”).

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ CDOT, “Is it CSS Yet?,” available at <http://www.coloradodot.info/projects/contextsensitivesolutions/docs/decision-making/collaboration-and-communication/isitcssyet.pdf>.

open and public database with respect to the T&R Study has rendered this project wholly inconsistent with CSS principles.

4. The T&R PLT has considered alternatives that were not developed in accordance with CSS.

Alternative 1 and Alternative 2 in the T&R Study were not developed pursuant to the CSS process. As discussed above, CSS is intended to provide an opportunity for collaboration between CDOT and affected stakeholders in the design of a project so that the design will reflect the physical context and geography of the project location. To achieve this goal, CDOT, in collaboration with stakeholders, has adopted specific Design Criteria for Engineering within the I-70 Mountain Corridor.¹⁸ CDOT has also established Aesthetic Guidelines and a Regional Functional Context, which are intended to provide an aesthetic vision for the entire corridor given the distinct natural and human landscapes in which the corridor sits.¹⁹

Alternative 1 and Alternative 2 do not adhere to the adopted Design Criteria for Engineering. These Alternatives also were not designed in keeping with the Aesthetic Guidelines. Instead, it appears that CDOT is applying the aesthetic criteria after design, by merely “laying out” the chosen design on the corridor. This is a violation of CDOT’s own CSS principles.²⁰ CSS is not mitigation after the fact; it is a foundational element of project design. A valid CSS design is one that has been developed from its inception within the context of the corridor and in conjunction with all stakeholders through the PLT’s leadership.²¹

Alternatives 3, 4, and 5 of the T&R Study are part of the ROD and were initially designed in accordance with what would later become the corridor-wide Aesthetic Guidelines and CSS Engineering Criteria and through a multidisciplinary collaborative process involving all corridor stakeholders. In contrast, no stakeholder involvement was sought in the design of Alternatives 1 and 2, and they are without consideration of or respect for the local landscape and environment. If either alternative had included these critical elements, it would have quickly become apparent that the expansion of the highway footprint by 60 feet is untenable. This expansion would have irreversible consequences to the livability and economic vitality of Clear Creek County communities and detrimental impacts to the County’s unique natural environment.

¹⁸ CDOT, “Design Criteria for Engineering,” <http://www.coloradodot.info/projects/contextsensitivesolutions/design/design-criteria.html> (last visited Feb. 14, 2014).

¹⁹ CDOT, “I-70 Mountain Corridor Aesthetics Guidance,” <http://www.coloradodot.info/projects/contextsensitivesolutions/design/i-70-mountain-corridor-aesthetics-guidance> (last visited Jan. 27, 2014).

²⁰ *Id.* (“The I-70 Mountain Corridor Aesthetic Guidance provides an aesthetic vision for the entire corridor that will guide the design of future projects and improvements.”).

²¹ Unfortunately, the citizens of Clear Creek County know firsthand the immense importance of considering the local geography during the initial design of a transportation project. In the 1960’s the I-70 right-of-way (ROW) was planned in an office far from the corridor. When it was “laid out,” it was found to include major portions of Clear Creek’s communities including streets, parts of Clear Creek itself, and local pedestrian pathways. When it was built, the actual footprint was narrowed as much as possible and medians abandoned in many areas. However, it still bisected communities (taking as much as 20 percent of some), destroyed the sinuosity of Clear Creek in many areas, and required the destruction of 80 historic structures. The ROW was not selected with any consideration of the local geography and as a result, the negative impacts of this failure are still felt within the County today. In fact, it is the legacy of this and similar failures that precipitated FHWA’s development of the CSS principles.

5. Without adherence to CSS principles, the T&R Study violates the Final PEIS and ROD.

As currently carried out, the T&R Study will not produce a valid result. It is increasingly clear that the Parsons consultant in charge of the CSS process for the T&R Study views the T&R Study as a “rubber stamp” validation of Alternative 1 and Alternative 2, which it proposed to CDOT in its unsolicited proposal.²² This self-interest undermines the entire T&R Study and will render any results invalid. Clear Creek County supports a T&R Study that will consider the revenue potential of the I-70 Mountain Corridor in an unbiased and transparent fashion.

In light of the many CSS failings discussed above, the present course of the T&R Study violates both the spirit of the Final PEIS and the requirements of the ROD. For example, the ROD establishes that no highway solution will adequately resolve the congestion without an open and honest consideration of all transit options. Non-highway transit is the preferred solution. Clear Creek County supports the Advanced Guideway System (AGS) as the most responsible and effective solution to congestion within the I-70 Mountain Corridor. Any alternative that would defer the potential development of the AGS through unsolicited proposals and/or non-compete contracts that result in an incompatible use of potential alignments should not be considered prior to the full and fair consideration of AGS alternatives. Alternative 1 and Alternative 2 would preemptively foreclose the consideration of the alignment needed to implement AGS.

Clear Creek County remains committed to ensuring that every project within the I-70 Mountain Corridor adheres to a meaningful CSS process in order to achieve publicly acceptable solutions for congestion in and along I-70. The County’s goals, as always, are to sustain and improve the economic viability and livability of its communities and to protect the natural environment of Clear Creek County. In light of its many CSS failings, this T&R Study as managed is not consistent with these objectives.

If any project flows from this study we expect that it will fully follow the CSS process, as mutually understood.

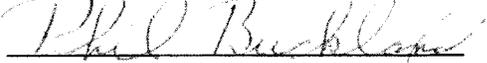
CLEAR CREEK BOARD OF COUNTY COMMISSIONERS



Tom Hayden, Chairman



Timothy J. Mauck, Commissioner



Phil Buckland, Commissioner

²² Parsons, Co-Development Multi-Modal I-70 Mountain Corridor Project, “Part I—Technical Proposal” (Aug. 15, 2012).

CC: Don Hunt, Executive Director
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I-70 Traffic & Revenue Study

Technical Team Meeting #4
February 26, 2014



I-70 Traffic & Revenue Study Agenda

- Welcome & Introductions
- Overview of Level 1 Process
- Alternatives under Consideration
- Overview of Cost Estimating Process
- Review Alternative costs
- Small Group Sessions
- Review small group session comments & questions
- Schedule of Reviews & Future Level 1 Meetings
- Wrap Up & Adjourn

I-70 Traffic & Revenue Study Progress

- Dec 5 PLT & TT Meeting
- Detailed Alternatives
- Engineering
- Cost Estimating
- Modeling
- Issue Task Force Meetings
- CDOT Website
- Newsletter

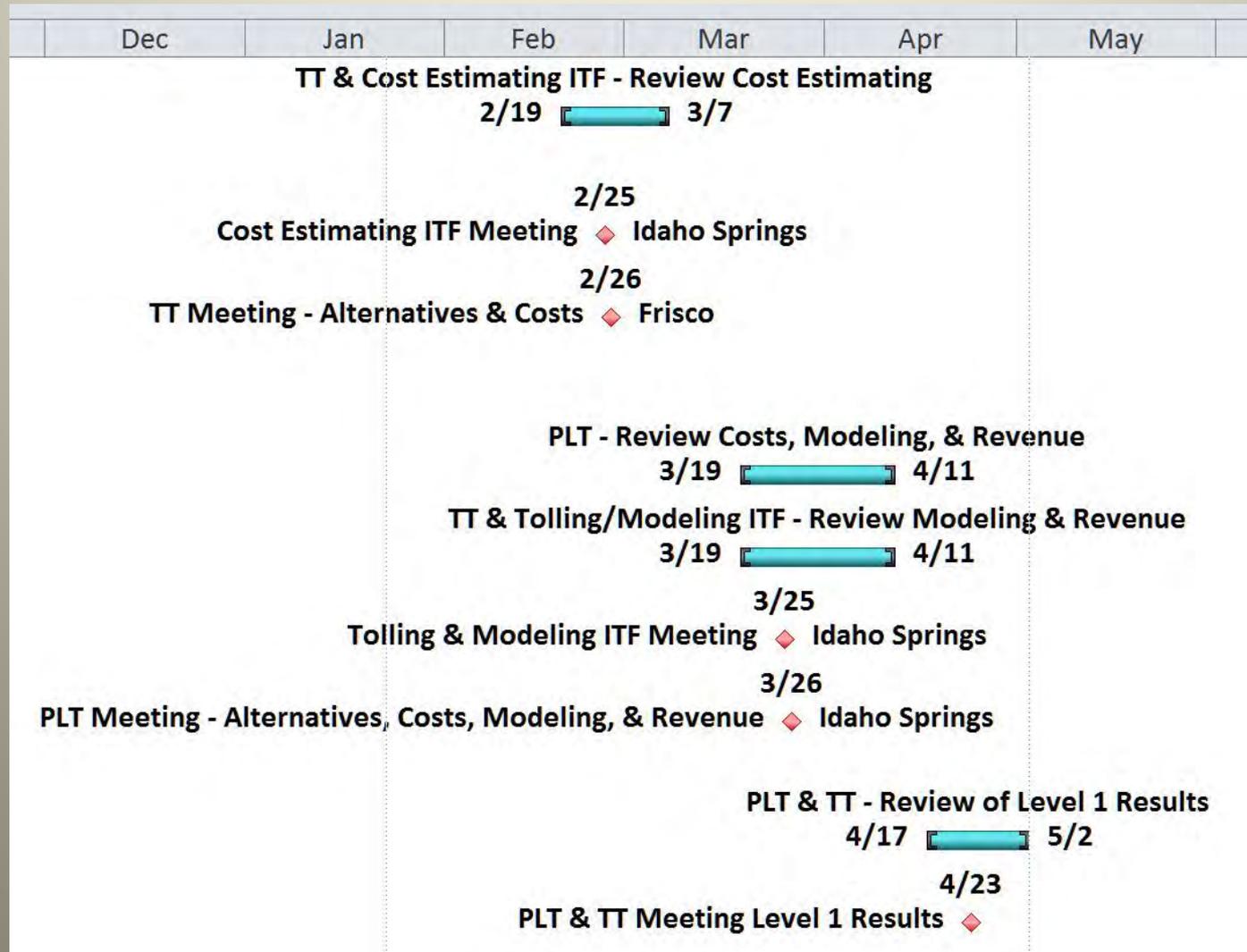
I-70 Mountain Corridor Context Sensitive Solutions Process

I-70 Mountain Corridor Level 1 Traffic
and Revenue Study Schedule



I-70 Mountain Corridor

Traffic & Revenue Study 3 – Month Look Ahead



I-70 Traffic & Revenue

13 Alternatives Under Consideration

- 2 Managed Lanes – 2 options
- 3 Managed Lanes – 3 options
- PEIS Minimum Improvements – 4 options
- PEIS Maximum Improvements – 2 options
- Permanent Peak Period Shoulder Lane
- Temporary Peak Period Shoulder Lane

Base Condition

Existing I-70 with EB Peak Period Shoulder Lane

Base Condition includes the existing highway infrastructure including the planned improvement of the EB peak period shoulder lane from Empire to Floyd Hill. The recently completed widening of the EB Twin Tunnel is part of the peak period shoulder lane project.

Roadway Information

Extent of Roadway Improvements	Empire to Floyd Hill
General Purpose (GP) Lane Information	Additional capacity by restriping existing pavement
Direction of Improvements	EB Only Direction
Design Speed	Match Existing
Trucks, Private Buses, BRT	Allowed in Peak Period Shoulder Lane (Always in GP Lanes)

Tolling

Capacity Improvements	Dynamic priced toll for EB Peak Period Shoulder Lane
Tunnels	Dynamic priced toll as part of the EB Peak Period Shoulder Lane
Technology	Transponder and license plate recognition

Schedule

Construction Start	2014 (Assumes NEPA Cal-Ex)
Construction Duration	1 year
First Year Operation	2014 - WB Tunnel / 2015 - EB PPSL
Financial Period	50 years

Transit Information

Termini	Glenwood Springs to Denver (CDOT Bus)
Special Infrastructure	N/A
Schedule	Fall 2014
Stations	6 CDOT Bus Stations - Glenwood Springs, Eagle, Vail, Frisco, Denver (2)

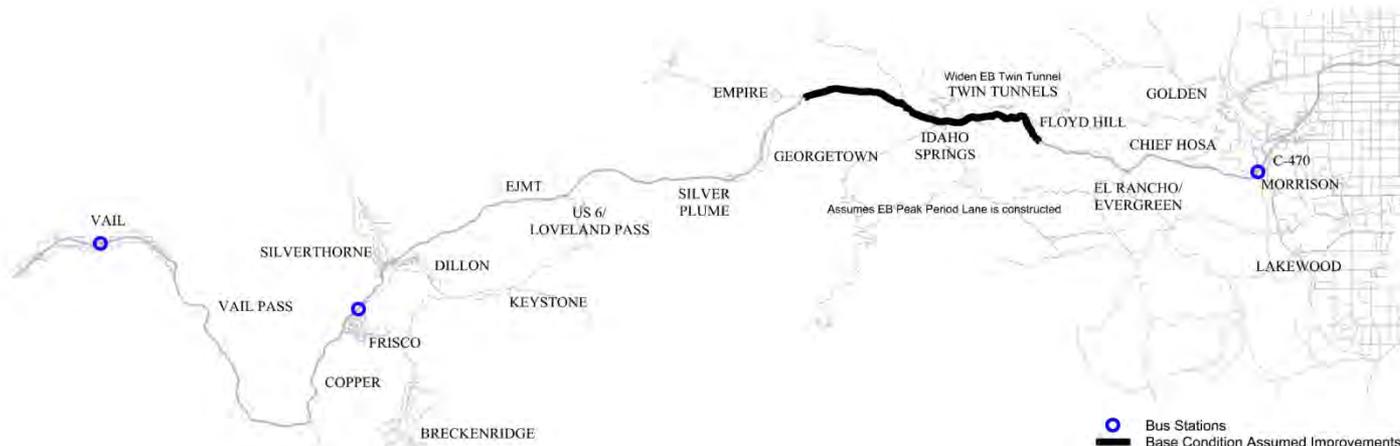
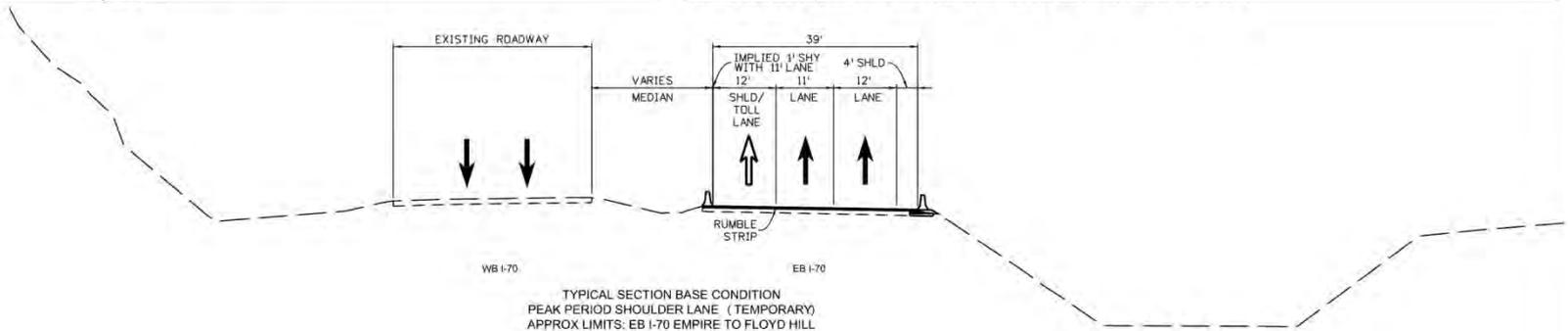
Type

CDOT Bus	TBD by CDOT
BRT	N/A
AGS	N/A

Special Structures

Special Structures	Existing EB Twin Tunnel Widening
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels



Alt01_Opt01

2 Tolled Reversible Managed Lanes

Reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General purpose (GP) lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds & lanes will remain.

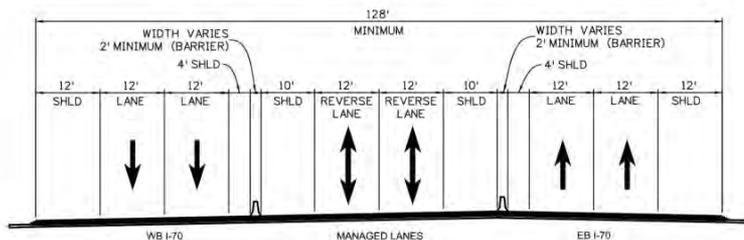
Roadway Information

Extent of Roadway Improvements	Silverthorne to C-470
General Purpose (GP) Lane Information	Align managed lanes with GP lanes except from E Idaho Springs to Floyd Hill
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph Managed Lanes, 55 mph GP lanes
Trucks, Private Buses, BRT	Allowed in Managed Lanes (Always in GP Lanes)
Tolling	
Capacity Improvements	Dynamic priced toll for Reversible Managed Lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd bore
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2019 (Assumes 4 years NEPA & Procurement)
Construction Duration	4 years
First Year Operation	2023
Financial Period	50 years

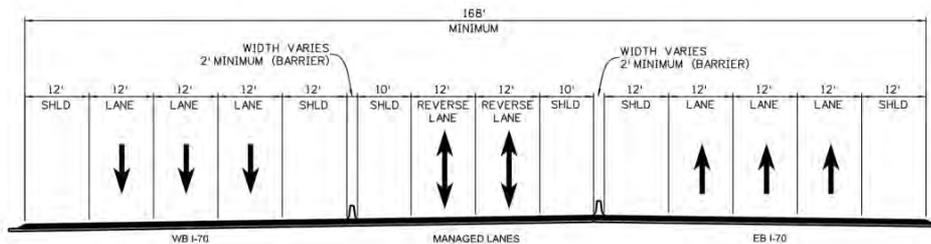
Transit Information

Termini	Vail to Denver
Special Infrastructure	Stations
Schedule	2019 - Limited Startup / 2023 - Full BRT Service
Stations	12 Total
Type	
CDOT Bus	N/A
BRT	Transit option for full 50 year concession
AGS	N/A
Special Structures	
Special Structures	EJMT and Twin Tunnel 3rd Bores
	Managed Lanes on Viaduct from East Idaho Springs to Floyd Hill

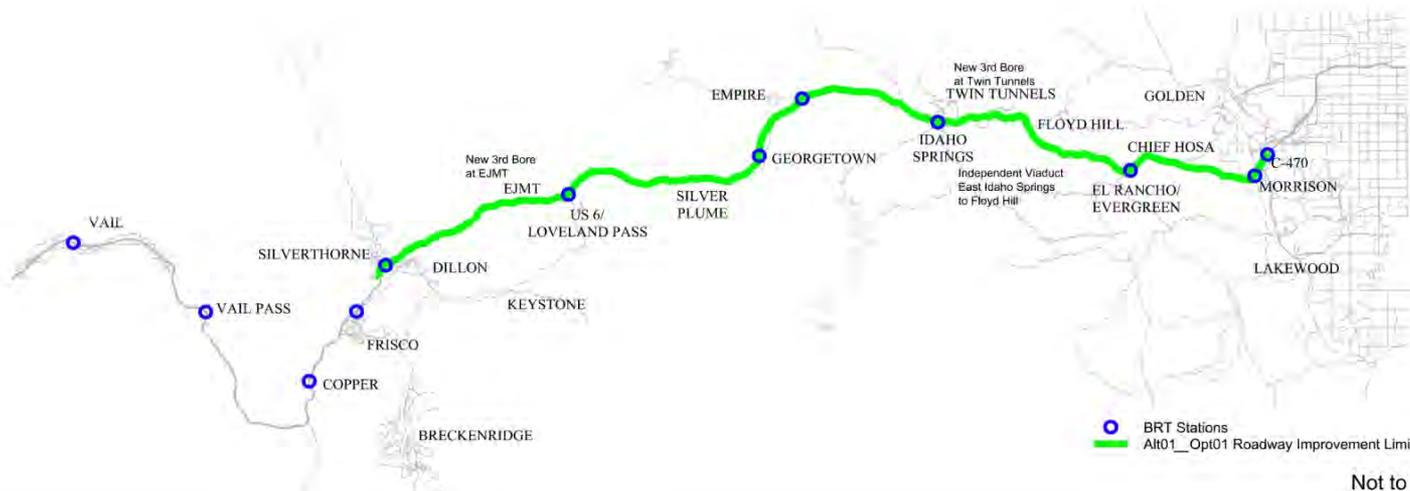
GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels



TYPICAL SECTION ALT01
2 TOLLED REVERSIBLE MANAGED LANES
EXISTING 2 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: EJMT TO FLOYD HILL



TYPICAL SECTION ALT01
2 TOLLED REVERSIBLE MANAGED LANES
EXISTING 3 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: SILVERTHORNE TO EJMT, FLOYD HILL TO C-470



Alt01_Opt02

2 Tolled Reversible Managed Lanes

Reversible managed lanes and I-70 designed at 65 mph. This option matches Alt01_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 will be reconstructed to meet a 65 mph design speed.

Roadway Information

Extent of Roadway Improvements	Silverthorne to C-470
General Purpose (GP) Lane Information	Align managed lanes with GP lanes
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph - Managed Lanes & GP Lanes
Trucks, Private Buses, BRT	Allowed in Managed Lanes (Always in GP Lanes)

Tolling

Capacity Improvements	Dynamic priced toll for Reversible Managed Lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd bore
Technology	Transponder and license plate recognition

Schedule

Construction Start	2019 (Assumes 4 years NEPA & Procurement)
Construction Duration	4 years
First Year Operation	2023
Financial Period	50 years

Transit Information

Termini	Vail to Denver
Special Infrastructure	Stations
Schedule	2019 - Limited Startup / 2023 - Full BRT Service
Stations	12 Total

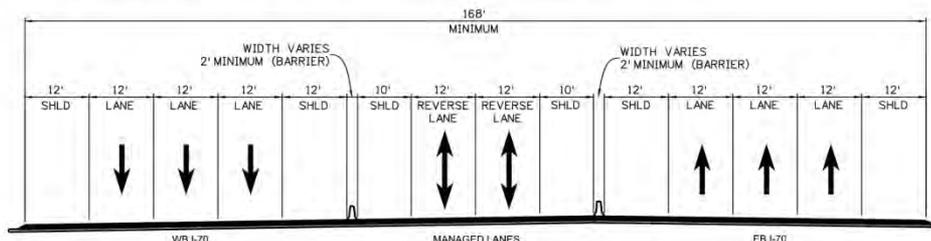
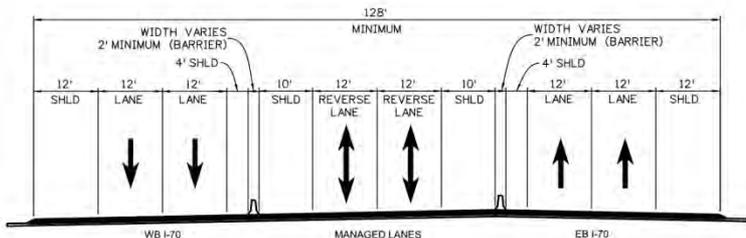
Type

CDOT Bus	N/A
BRT	Transit option for full 50 year concession
AGS	N/A

Special Structures

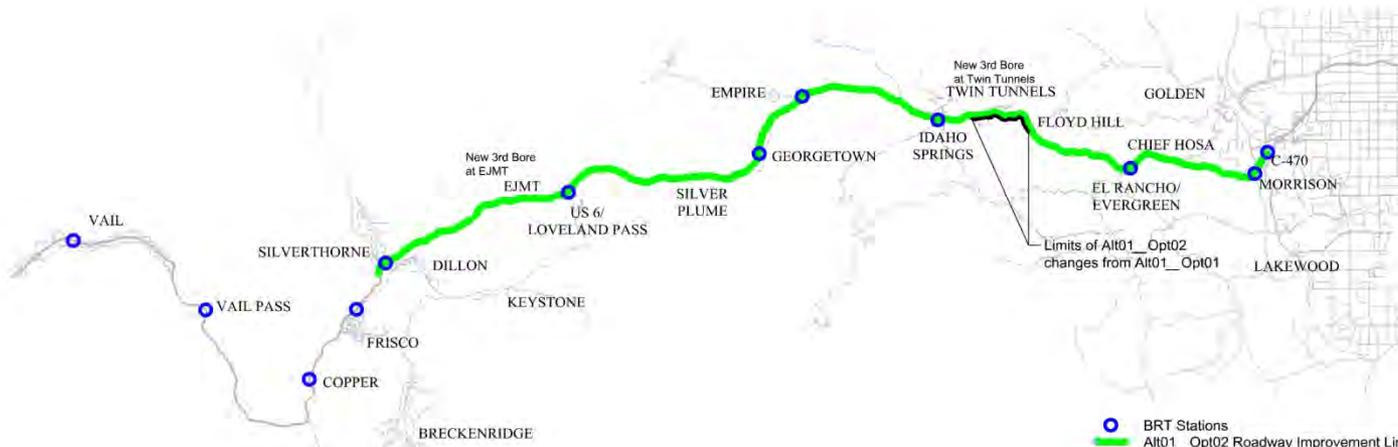
Special Structures	EJMT and Twin Tunnel 3rd Bores
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels



TYPICAL SECTION ALT01
2 TOLLED REVERSIBLE MANAGED LANES
EXISTING 2 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: EJMT TO FLOYD HILL

TYPICAL SECTION ALT01
2 TOLLED REVERSIBLE MANAGED LANES
EXISTING 3 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: SILVERTHORNE TO EJMT, FLOYD HILL TO C-470



● BRT Stations
— Alt01_Opt02 Roadway Improvement Limits

Alt02_Opt01

3 Tolled Reversible Managed Lanes

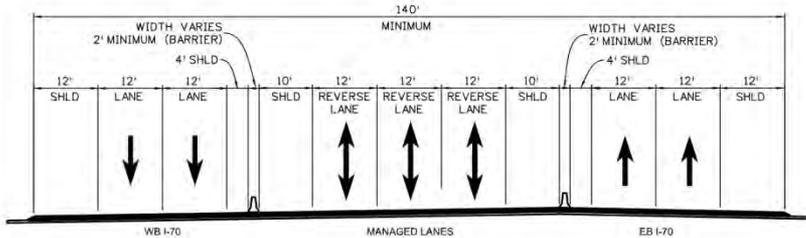
Reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General purpose (GP) lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds & lanes will remain.

Roadway Information

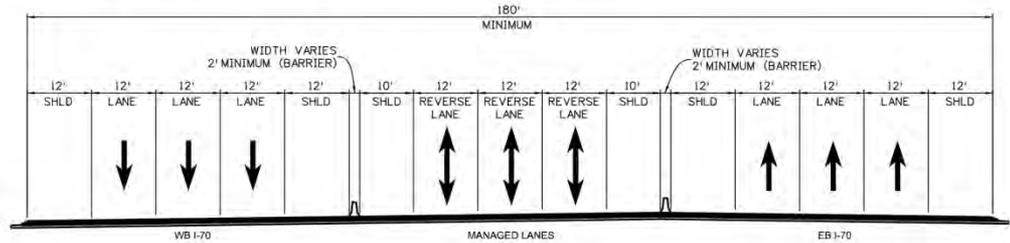
Extent of Roadway Improvements	Silverthorne to C-470
General Purpose (GP) Lane Information	Align managed lanes with GP lanes except from E Idaho Springs to Floyd Hill
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph Managed Lanes, 55 mph GP lanes
Trucks, Private Buses, BRT	Allowed in Managed Lanes (Always in GP Lanes)
Tolling	
Capacity Improvements	Dynamic priced toll for Reversible Managed Lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd bore
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2019 (Assumes 4 years NEPA & Procurement)
Construction Duration	4 years
First Year Operation	2023
Financial Period	50 years

Transit Information

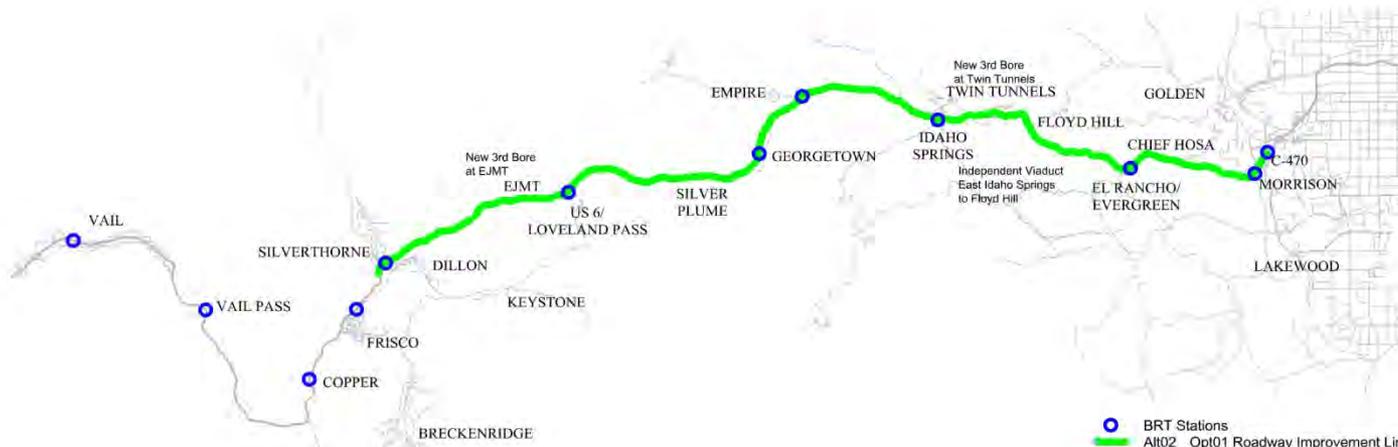
Termini	Vail to Denver
Special Infrastructure	Stations
Schedule	2019 - Limited Startup / 2023 - Full BRT Service
Stations	12 Total
Type	
CDOT Bus	N/A
BRT	Transit option for full 50 year concession
AGS	N/A
Special Structures	
Special Structures	EJMT and Twin Tunnel 3rd Bores Managed Lanes on Viaduct from East Idaho Springs to Floyd Hill
GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels	



TYPICAL SECTION ALT02
3 TOLLED REVERSIBLE MANAGED LANES
EXISTING 2 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: EJMT TO FLOYD HILL



TYPICAL SECTION ALT02
3 TOLLED REVERSIBLE MANAGED LANES
EXISTING 3 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: SILVERTHORNE TO EJMT, FLOYD HILL TO C-470



Alt02_Opt02

3 Tolled Reversible Managed Lanes

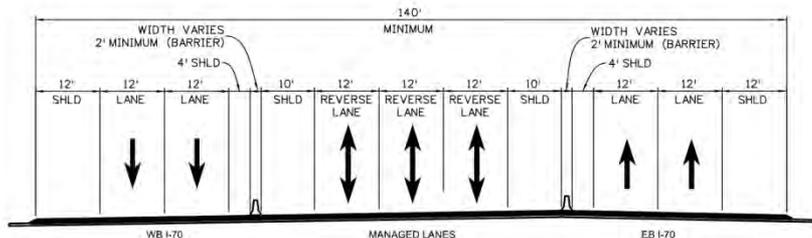
Reversible managed lanes and I-70 designed at 65 mph. This option matches Alt02_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 GP lanes will be reconstructed to meet a 65 mph design speed.

Roadway Information

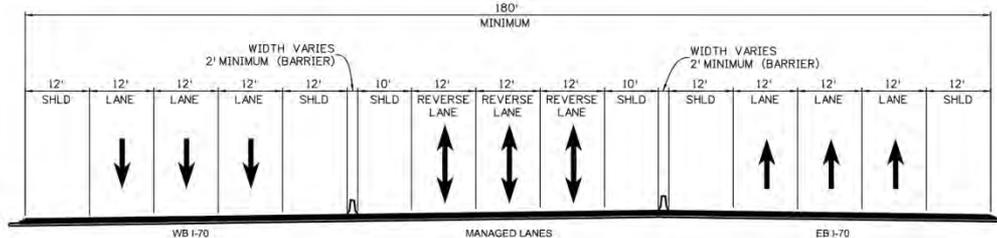
Extent of Roadway Improvements	Silverthorne to C-470
General Purpose (GP) Lane Information	Align managed lanes with GP lanes
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph - Managed Lanes & GP Lanes
Trucks, Private Buses, BRT	Allowed in Managed Lanes (Always in GP Lanes)
Tolling	
Capacity Improvements	Dynamic priced toll for Reversible Managed Lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd bore
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2019 (Assumes 4 years NEPA & Procurement)
Construction Duration	4 years
First Year Operation	2023
Financial Period	50 years

Transit Information

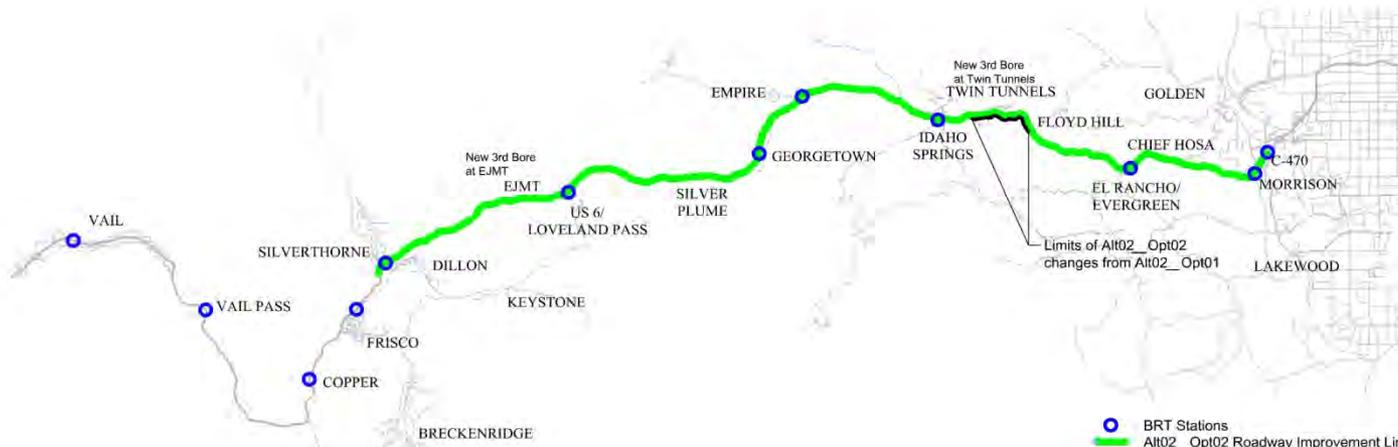
Termini	Vail to Denver
Special Infrastructure	Stations
Schedule	2019 - Limited Startup / 2023 - Full BRT Service
Stations	12 Total
Type	
CDOT Bus	N/A
BRT	Transit option for full 50 year concession
AGS	N/A
Special Structures	
Special Structures	EJMT and Twin Tunnel 3rd Bores
GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels	



TYPICAL SECTION ALT02
3 TOLLED REVERSIBLE MANAGED LANES
EXISTING 2 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: EJMT TO FLOYD HILL



TYPICAL SECTION ALT02
3 TOLLED REVERSIBLE MANAGED LANES
EXISTING 3 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: SILVERTHORNE TO EJMT, FLOYD HILL TO C-470



● BRT Stations
— Alt02_Opt02 Roadway Improvement Limits

Alt02_Opt03

3 Tolled Reversible Managed Lanes

Reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from West Idaho Springs to Floyd Hill to minimize impacts. General purpose (GP) lanes designed at 65 mph except from West Idaho Springs to Floyd Hill, where existing design speeds & lanes will remain. This option is similar to Alt02_Opt01, except viaduct extends to West Idaho Springs.

Roadway Information

Extent of Roadway Improvements	Silverthorne to C-470
General Purpose (GP) Lane Information	Align managed lanes with GP lanes except from W Idaho Springs to Floyd Hill
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph Managed Lanes, 55 mph GP lanes
Trucks, Private Buses, BRT	Allowed in Managed Lanes (Always in GP Lanes)

Tolling

Capacity Improvements	Dynamic priced toll for Reversible Managed Lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd bore
Technology	Transponder and license plate recognition

Schedule

Construction Start	2019 (Assumes 4 years NEPA & Procurement)
Construction Duration	4 years
First Year Operation	2023
Financial Period	50 years

Transit Information

Termini	Vail to Denver
Special Infrastructure	Stations
Schedule	2019 - Limited Startup / 2023 - Full BRT Service
Stations	12 Total

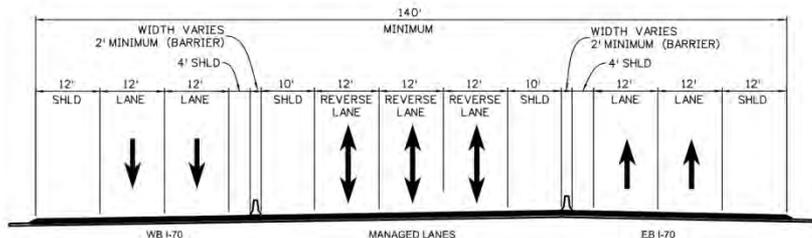
Type

CDOT Bus	N/A
BRT	Transit option for full 50 year concession
AGS	N/A

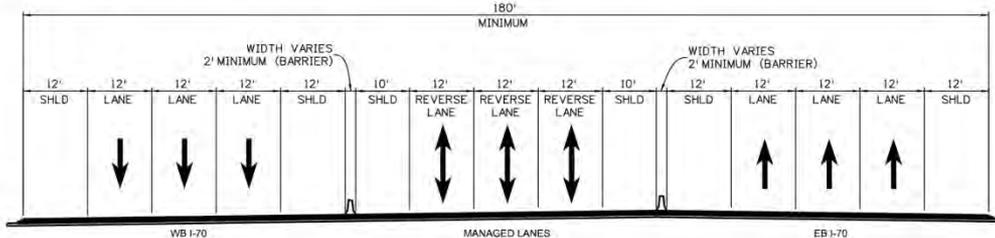
Special Structures

Special Structures	EJMT and Twin Tunnel 3rd Bores
	Managed Lanes on Viaduct from West Idaho Springs to Floyd Hill

GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels



TYPICAL SECTION ALT02
3 TOLLED REVERSIBLE MANAGED LANES
EXISTING 2 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: EJMT TO FLOYD HILL



TYPICAL SECTION ALT02
3 TOLLED REVERSIBLE MANAGED LANES
EXISTING 3 GENERAL PURPOSE LANES EB & WB I-70
APPROX LIMITS: SILVERTHORNE TO EJMT, FLOYD HILL TO C-470



Alt03_Opt01

Minimum Program per PEIS

Minimum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements.

Roadway Information

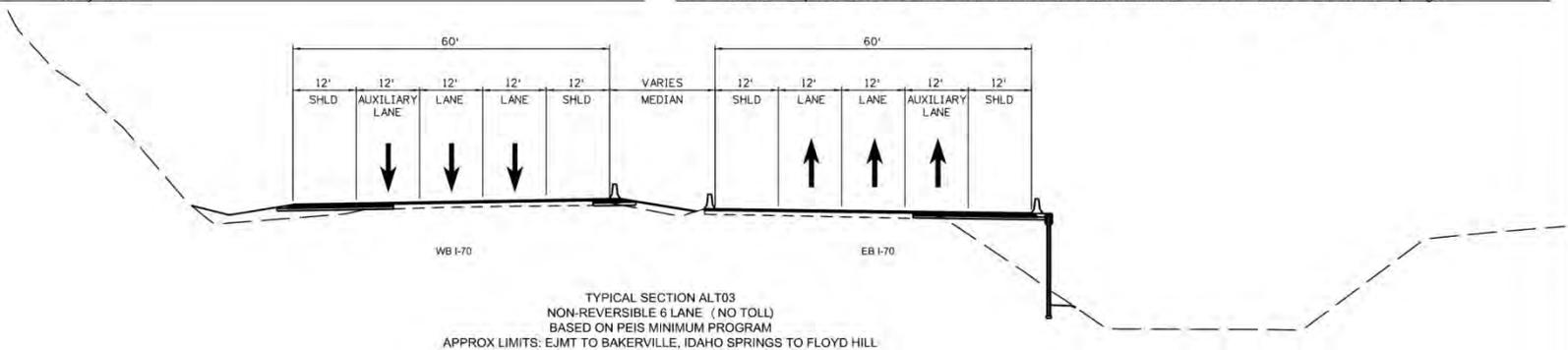
Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Auxiliary lanes added at localized areas between interchanges
Direction of Improvements	Both directions (EB and WB)
Design Speed	55 mph
Trucks, Private Buses, BRT	Allowed in GP Lanes and auxiliary lanes
Tolling	
Capacity Improvements	No toll for auxiliary lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2018 (Assumes 3 years NEPA)
Construction Duration	3 years
First Year Operation	2021
Financial Period	50 years

Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations
Type	
CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	EJMT 3rd Bore
GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs	



Alt03_Opt02

Minimum Program per PEIS

Minimum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements.

Roadway Information

Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Auxiliary lanes added at localized areas between interchanges
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph
Trucks, Private Buses, BRT	Allowed in GP Lanes and auxiliary lanes
Tolling	
Capacity Improvements	No toll for auxiliary lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore, New & Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2018 (Assumes 3 years NEPA)
Construction Duration	3 years
First Year Operation	2021
Financial Period	50 years

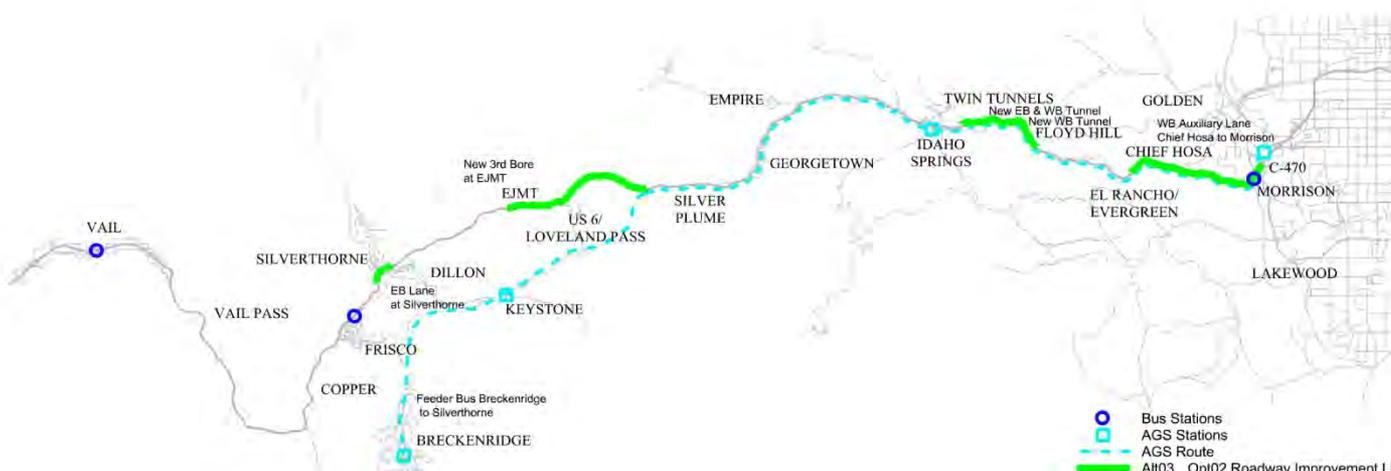
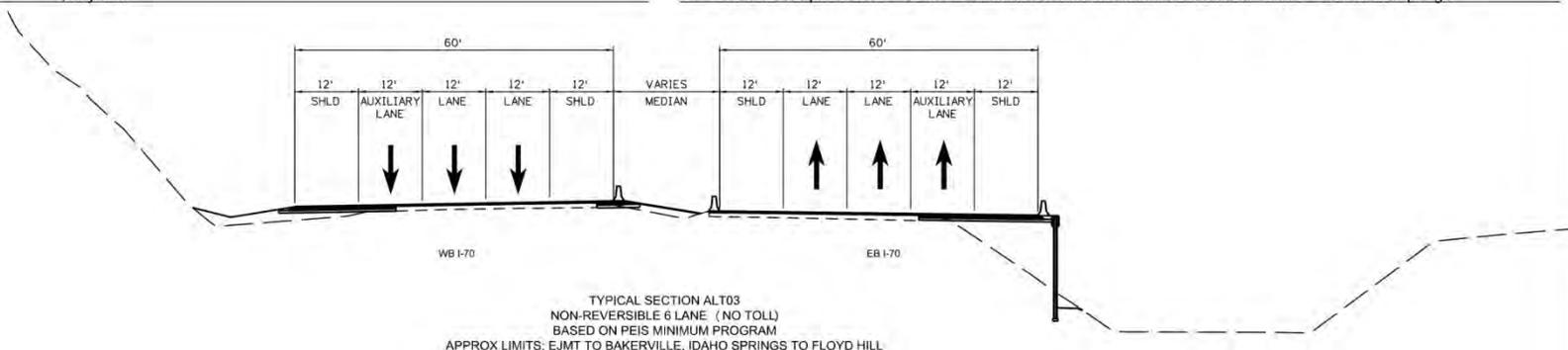
Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations
Type	
CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	EJMT 3rd Bore New EB & WB Tunnel at Hidden Valley, New WB Tunnel near SH 6
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs



○ Bus Stations
□ AGS Stations
--- AGS Route
--- Alt03_Opt02 Roadway Improvement Limits

Alt03_Opt03

Minimum Program per PEIS

Minimum program per PEIS with 55 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt01 without 3rd Bore EJMT.

Roadway Information

Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Auxiliary lanes added at localized areas between interchanges
Direction of Improvements	Both directions (EB and WB)
Design Speed	55 mph
Trucks, Private Buses, BRT	Allowed in GP Lanes and auxiliary lanes
Tolling	
Capacity Improvements	No toll for auxiliary lanes
Tunnels	Dynamic priced toll for Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2018 (Assumes 3 years NEPA)
Construction Duration	3 years
First Year Operation	2021
Financial Period	50 years

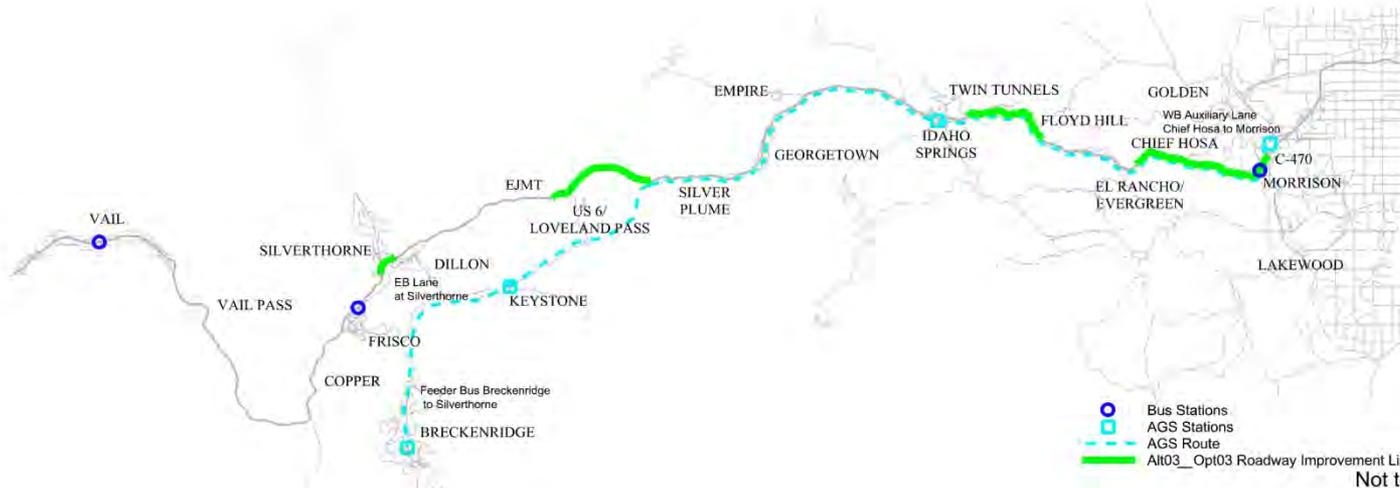
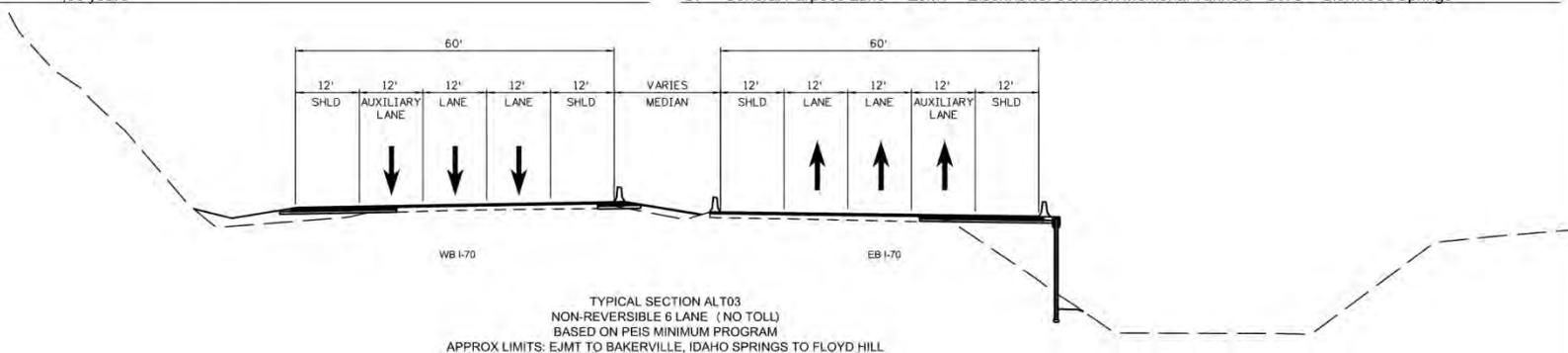
Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System: None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations
Type	
CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	

GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs



Alt03_Opt04

Minimum Program per PEIS

Minimum program per PEIS with 65 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt02 without 3rd Bore EJMT.

Roadway Information

Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Auxiliary lanes added at localized areas between interchanges
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph
Trucks, Private Buses, BRT	Allowed in GP Lanes and auxiliary lanes
Tolling	
Capacity Improvements	No toll for auxiliary lanes
Tunnels	Dynamic priced toll for New & Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2018 (Assumes 3 years NEPA)
Construction Duration	3 years
First Year Operation	2021
Financial Period	50 years

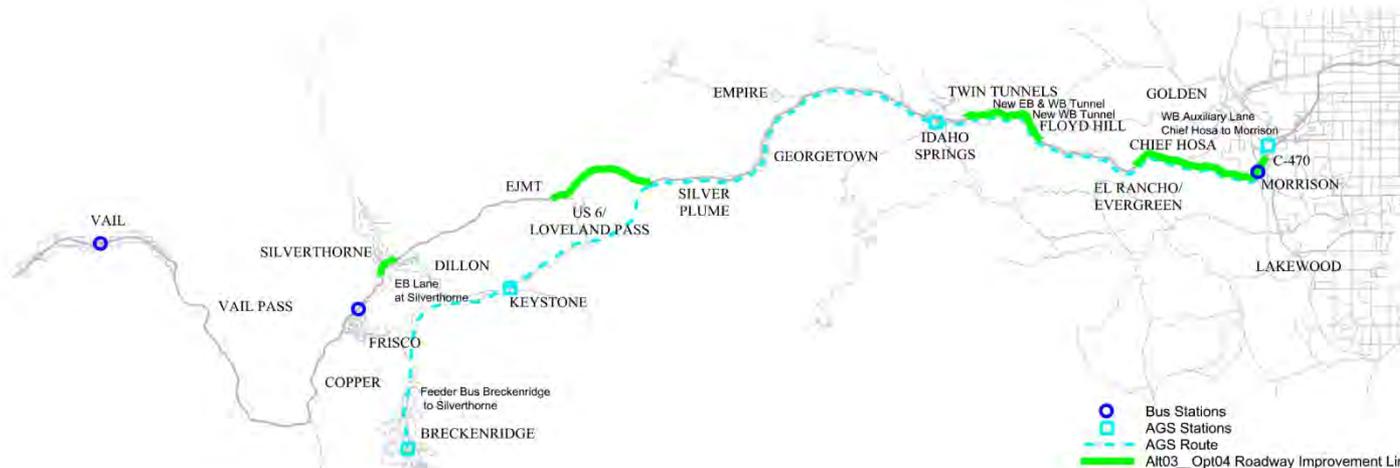
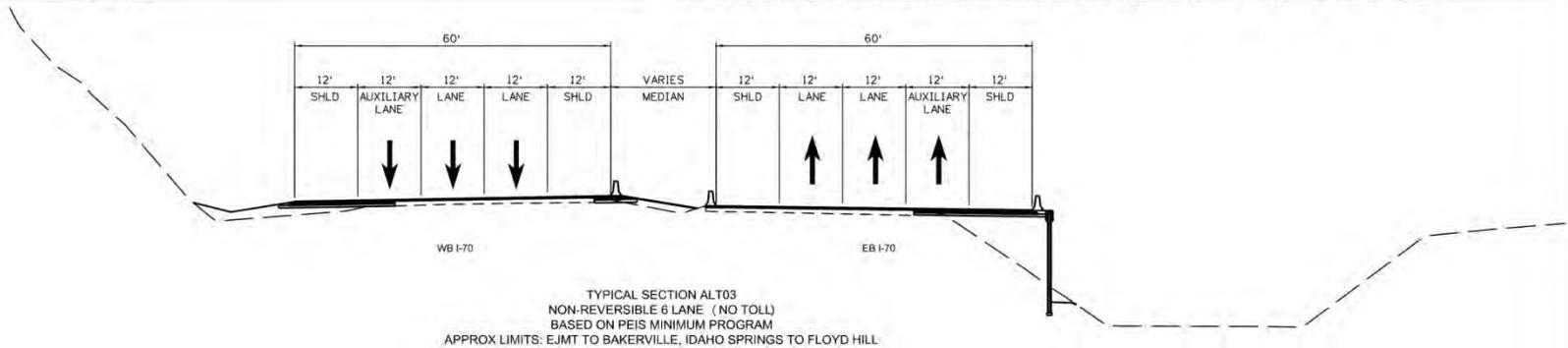
Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations
Type	
CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	New EB & WB Tunnel at Hidden Valley, New WB Tunnel near SH 6
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs



Alt04_Opt01

Maximum Program per PEIS

Maximum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill.

Roadway Information

Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Additional capacity by widening existing (Non-reversible)
Direction of Improvements	Both directions (EB and WB)
Design Speed	55 mph
Trucks, Private Buses, BRT	Allowed in Toll Lane (Always in GP Lanes)
Tolling	
Capacity Improvements	Dynamic priced toll for 3rd toll lane
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2018 (Assumes 3 years NEPA)
Construction Duration	4 years
First Year Operation	2022
Financial Period	50 years

Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations

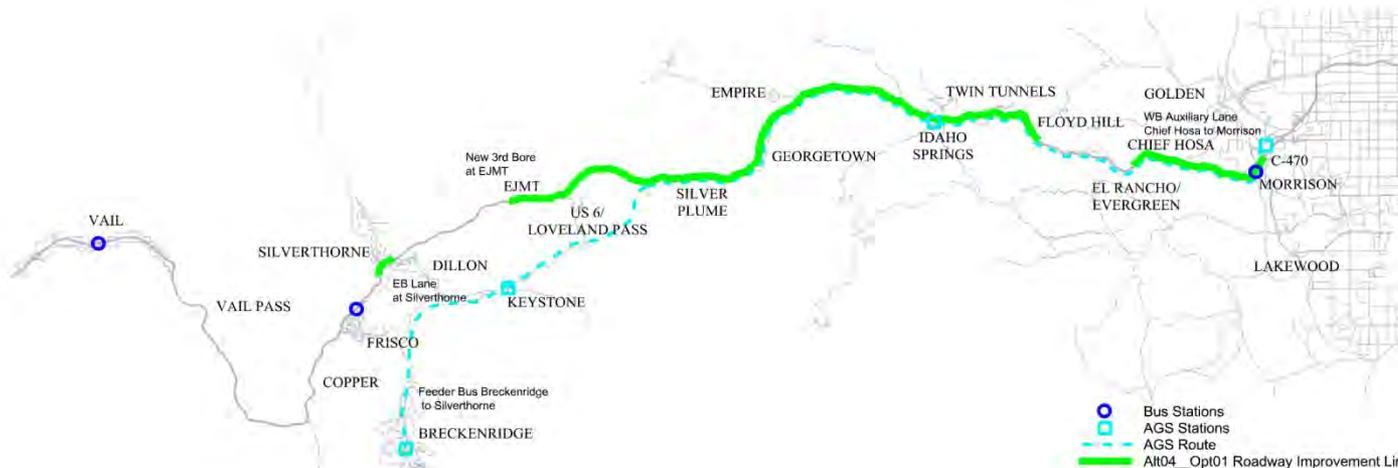
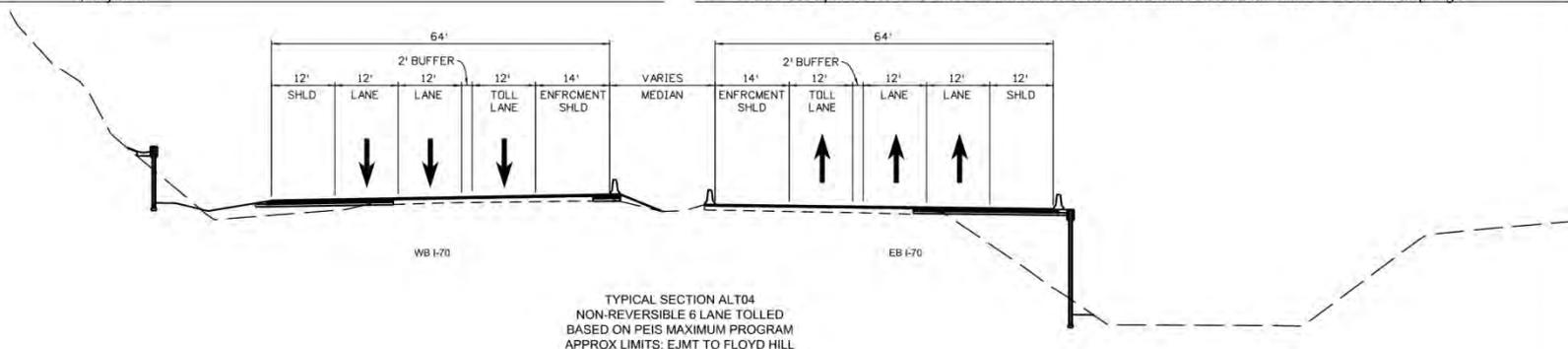
Type

CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	EJMT 3rd Bore
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs



Alt04_Opt02

Maximum Program per PEIS

Maximum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill.

Roadway Information

Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Additional capacity by widening existing
Direction of Improvements	Both directions (EB and WB)
Design Speed	65 mph
Trucks, Private Buses, BRT	Allowed in Toll Lane (Always in GP Lanes)
Tolling	
Capacity Improvements	Dynamic priced toll for 3rd toll lane
Tunnels	Dynamic priced toll for EJMT 3rd Bore and New & Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition
Schedule	
Construction Start	2018 (Assumes 3 years NEPA)
Construction Duration	4 years
First Year Operation	2022
Financial Period	50 years

Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations

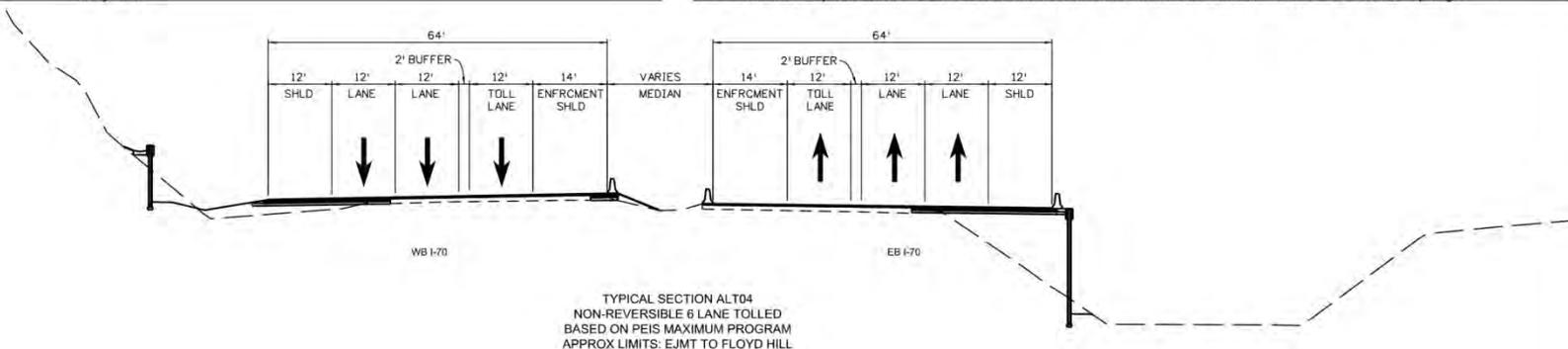
Type

CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	EJMT 3rd Bore New EB & WB Tunnel at Hidden Valley, New WB Tunnel near SH 6
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs



- Bus Stations
- AGS Stations
- AGS Route
- Alt04_Opt02 Roadway Improvement Limits

Alt05_Opt01

Permanent Peak Period Shoulder Lane

Widen the existing roadway to accommodate one additional left side managed lane (EB & WB) for use during peak times, during non-peak times operates as a standard shoulder. Provide full width shoulder on right side.

Roadway Information

Extent of Roadway Improvements	EJMT to Floyd Hill
General Purpose (GP) Lane Information	Additional capacity by widening existing
Direction of Improvements	Both directions (EB and WB)
Design Speed	Match Existing
Trucks, Private Buses, BRT	Allowed in Peak Period Lane (Always in GP Lanes)

Tolling

Capacity Improvements	Dynamic priced toll for EB & WB Peak Period Shoulder Lanes
Tunnels	Dynamic priced toll for EJMT 3rd Bore and Twin Tunnels 3rd Lane
Technology	Transponder and license plate recognition

Schedule

Construction Start	2019 (Assumes 4 years NEPA)
Construction Duration	4 years
First Year Operation	2023
Financial Period	50 years

Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations

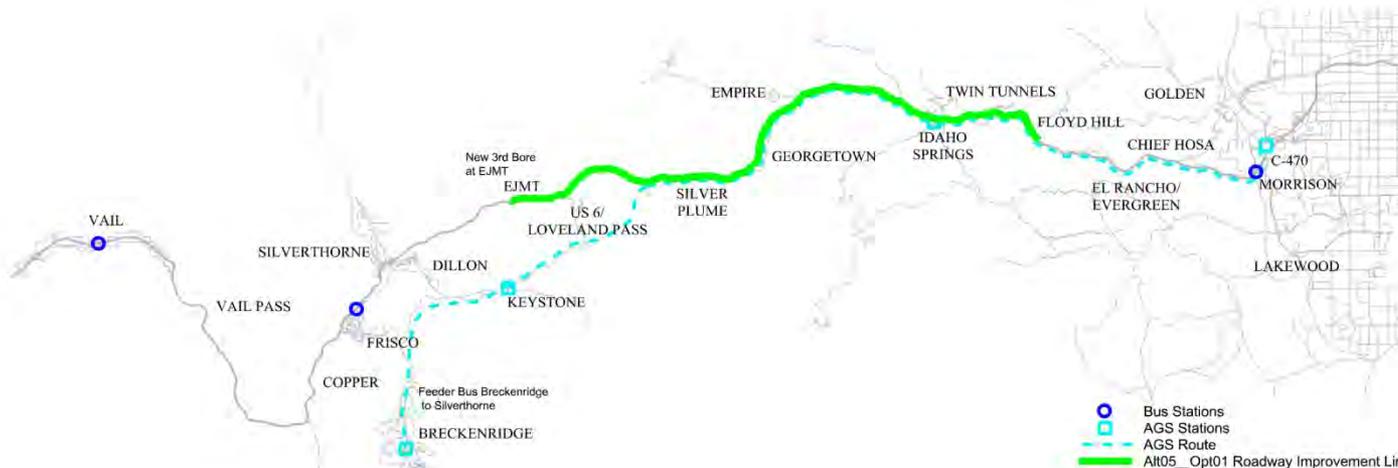
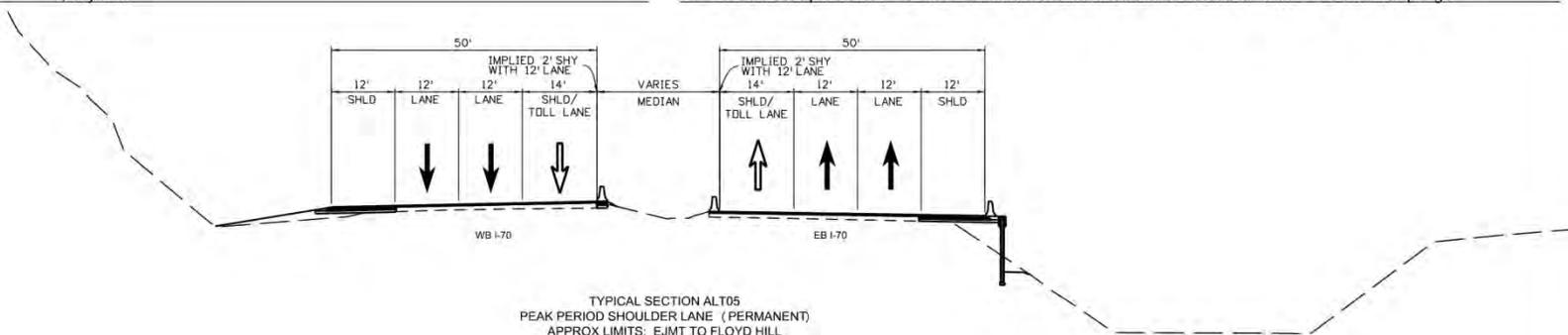
Type

CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	EJMT 3rd Bore
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs



- Bus Stations
- AGS Stations
- AGS Route
- Alt05_Opt01 Roadway Improvement Limits

Alt06_Opt01

Temporary Peak Period Shoulder Lane

Using the existing roadway, accommodate one additional WB left side managed lane for use during peak times; during non-peak times operates as a standard shoulder. No twelve foot wide shoulders are available during peak periods. During non-peak periods, twelve foot breakdown shoulder is on left side instead of right. Construction of WB peak period lane from Empire to Floyd Hill only. (This alternative assumes EB direction peak period lane from Empire to Floyd Hill is constructed.)

Roadway Information

Extent of Roadway Improvements	Empire to Floyd Hill
General Purpose (GP) Lane Information	Additional capacity by restriping existing
Direction of Improvements	WB Only Direction
Design Speed	Match Existing
Trucks, Private Buses, BRT	Allowed in Peak Period Lane (Always in GP Lanes)

Tolling

Capacity Improvements	Dynamic priced toll for EB & WB Peak Period Shoulder Lanes
Tunnels	Dynamic priced toll for Twin Tunnels 3rd Lanes
Technology	Transponder and license plate recognition

Schedule

Construction Start	2016 (Assumes 1.5 years NEPA)
Construction Duration	3 years
First Year Operation	2019
Financial Period	50 years

Transit Information

Termini	Silverthorne-Denver, Service to GWS (CDOT Bus), Breckenridge-Denver (AGS)
Special Infrastructure	AGS System; None for CDOT Bus
Schedule	Fall 2014 - CDOT Bus / After 2035 - AGS
Stations	6 CDOT Bus Stations - GWS, Eagle, Vail, Frisco, Denver (2); 5 AGS Stations

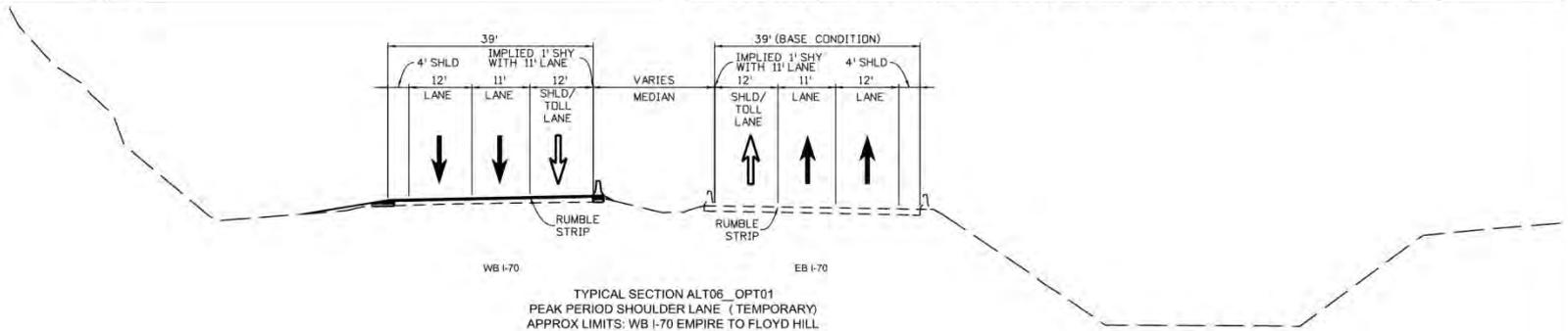
Type

CDOT Bus	TBD by CDOT
BRT	N/A
AGS	In operation after 2035

Special Structures

Special Structures	
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GP = General Purpose Lane EJMT = Eisenhower Johnson Memorial Tunnels GWS = Glenwood Springs

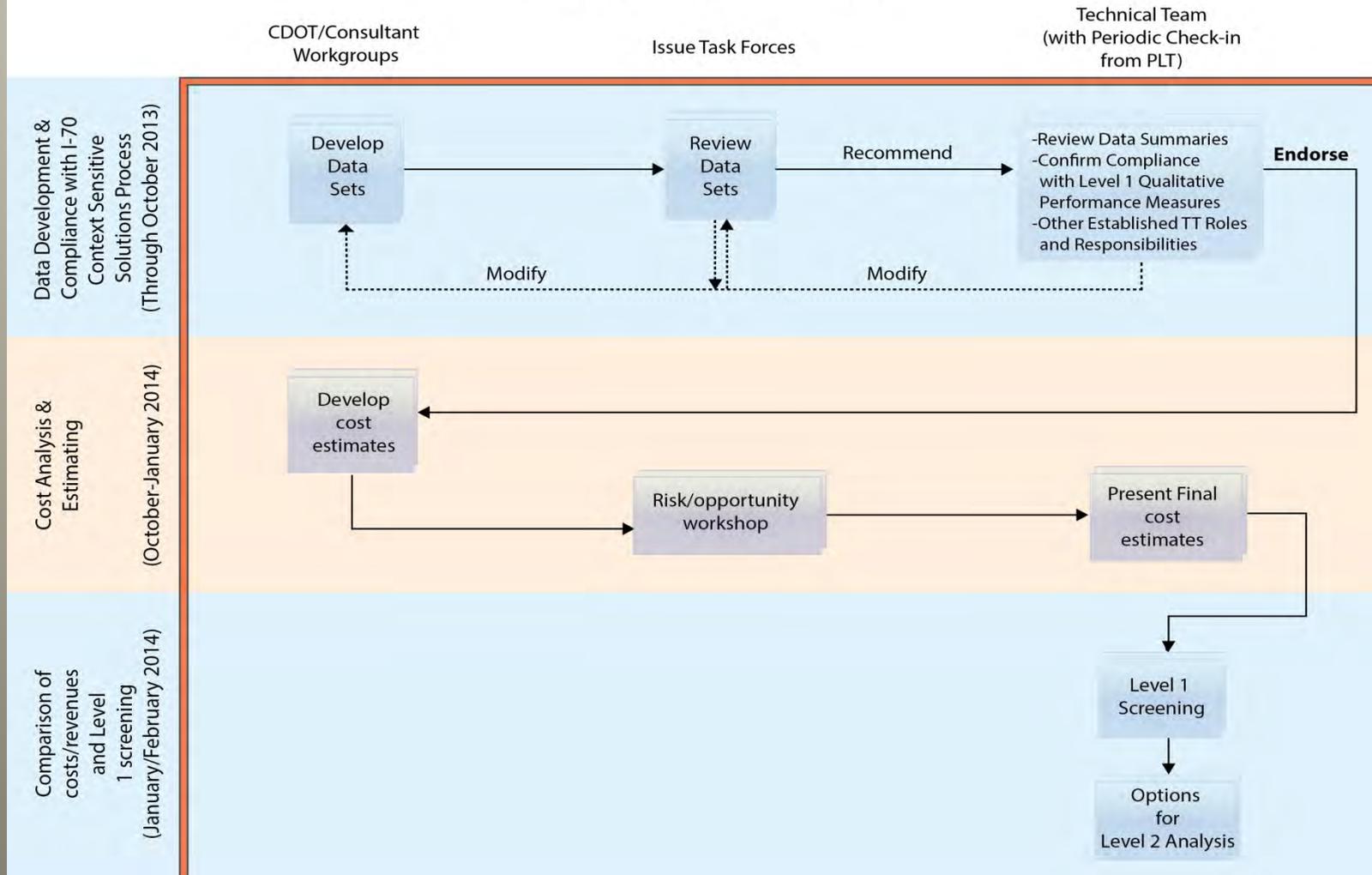


I-70 Traffic & Revenue Study

Process for Cost Estimating of Alternatives

Level 1 Workflow Process

Level 1 Workflow Process



I-70 Traffic & Revenue Study

Process for Base Cost Estimate of Alternatives

Base Cost Estimating

- **General Concepts for Capital Costs**
 - Roadway & Structures, Tunnels, & Transit
 - Schematic Engineering to produce quantities for known items
 - Varied resources for deriving unit costs for known items (CDOT)
 - Allowance for Unallocated Items (known items but not quantifiable)
 - Allowance for CSS factor on capital costs 15%
 - Advanced Guideway System costs directly from DRAFT 2014 AGS Study

Base Cost Estimating

- **General Concepts for Preconstruction & Administration**
 - NEPA costs derived through similar projects
 - Design percentages applied to capital costs
 - Design percentages include both Design Engineer & CDOT costs
 - Allowance for CSS factor on design costs 19%
 - Construction Engineering percentages applied to capital costs
 - Advanced Guideway System costs directly from DRAFT 2014 AGS Study

Base Cost Estimating

- **General Concepts for Operations & Maintenance**
 - Varied resources for deriving unit costs for known items (CDOT)
 - CDOT Maintenance Staff provided unit costs for maintenance items
 - O&M costs were included to carry out the CDOT I-70 Clear Creek Corridor Sediment Control Action Plan (September 2013)
 - Advanced Guideway System costs directly from DRAFT 2014 AGS Study

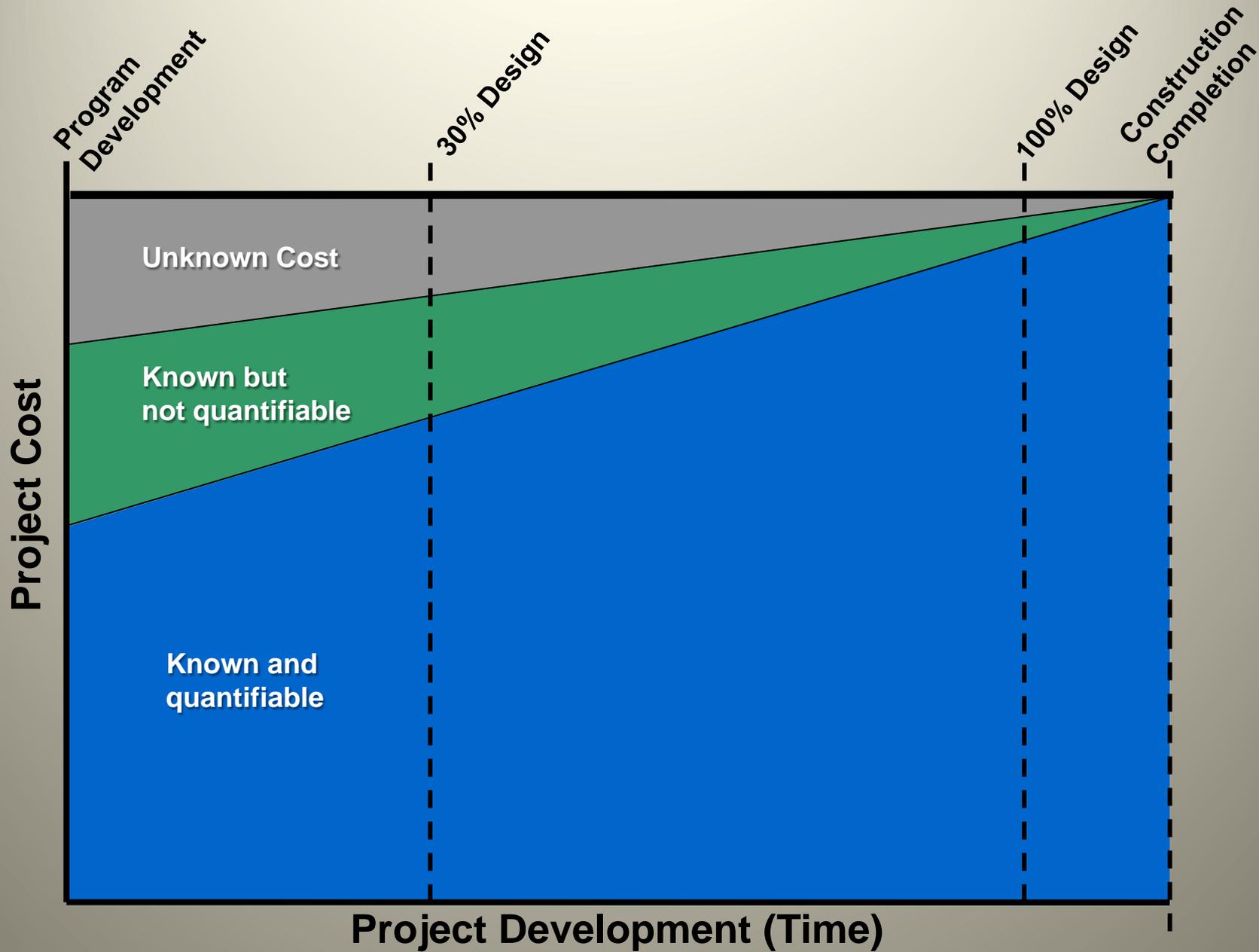
I-70 Traffic & Revenue Study

Process for Validating Base Cost Estimate of Alternatives

Project Cost and Schedule Uncertainty

The ultimate cost and schedule of a project cannot be predicted with 100% certainty, because:

- Plans can be affected by a number of variables:
 - o Technical
 - o Policy (regulatory and political)
 - o Stakeholders
- During project development, information on these variables is typically limited



Transportation Risk and Uncertainty Estimating (TRUE)

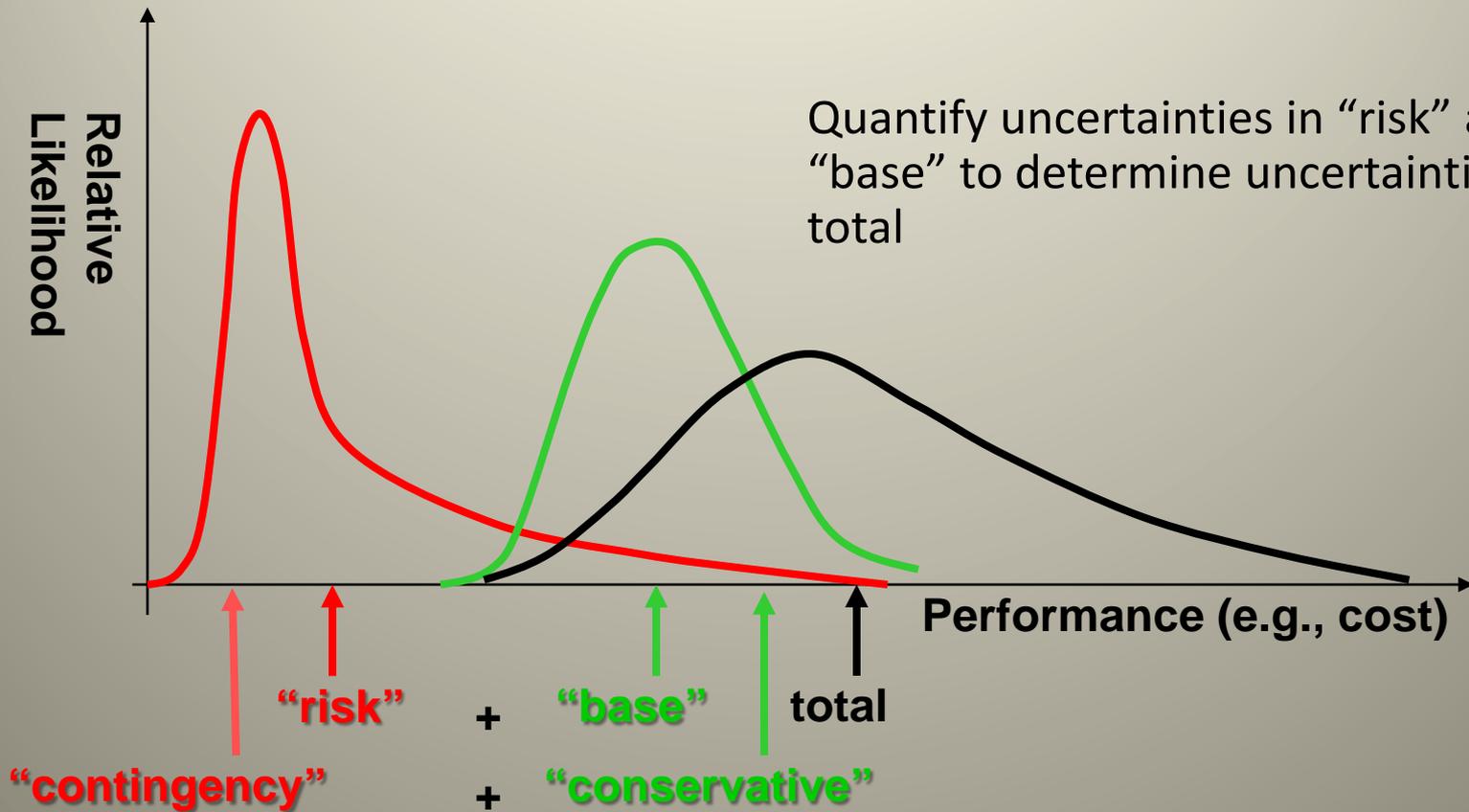
- Quantify uncertainty in cost:
 - o Sequence project activities
(at Level 2 update)
 - o “Base” activity costs
 - o Risks, Opportunities, and other uncertainties
- Prioritize critical risks



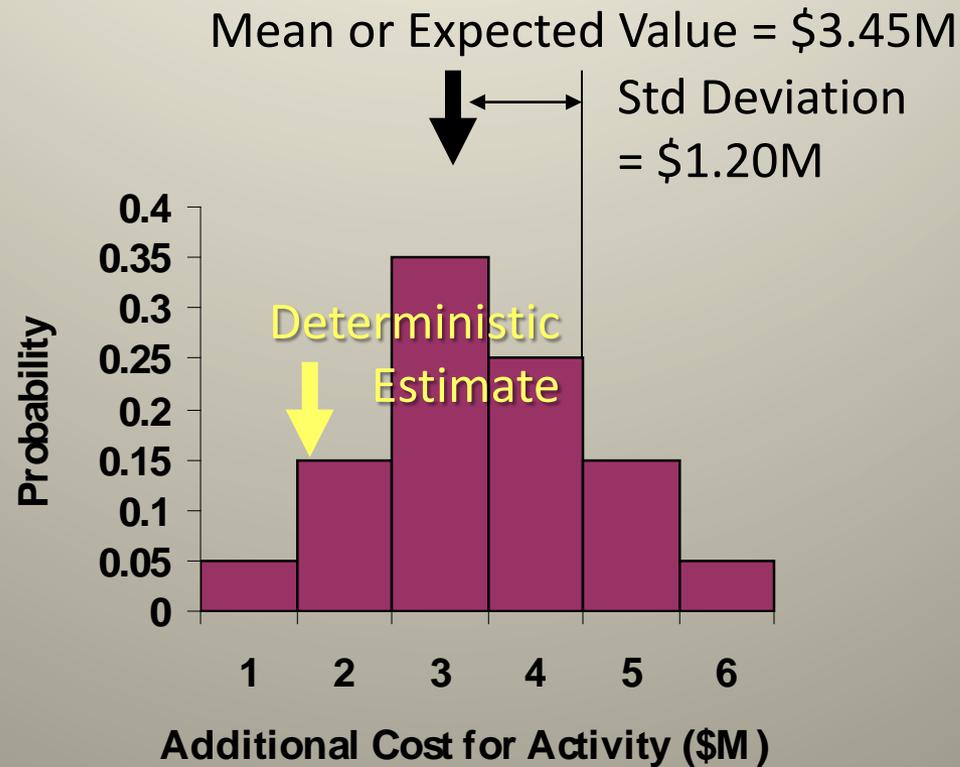
$$\text{Total} = \text{Base} + \text{Risk}$$

Replace “contingency” (top-down)
with calculated “risk” and
“opportunity” (bottom-up)

Quantify uncertainties in “risk” and
“base” to determine uncertainties in
total



Describing Uncertainty



TRUE Approach

Comprehensive look at the project



Employ a collaborative, team approach



Focus on key issues



Quantify uncertainty



Apply risk-mgt. Strategies (level2)

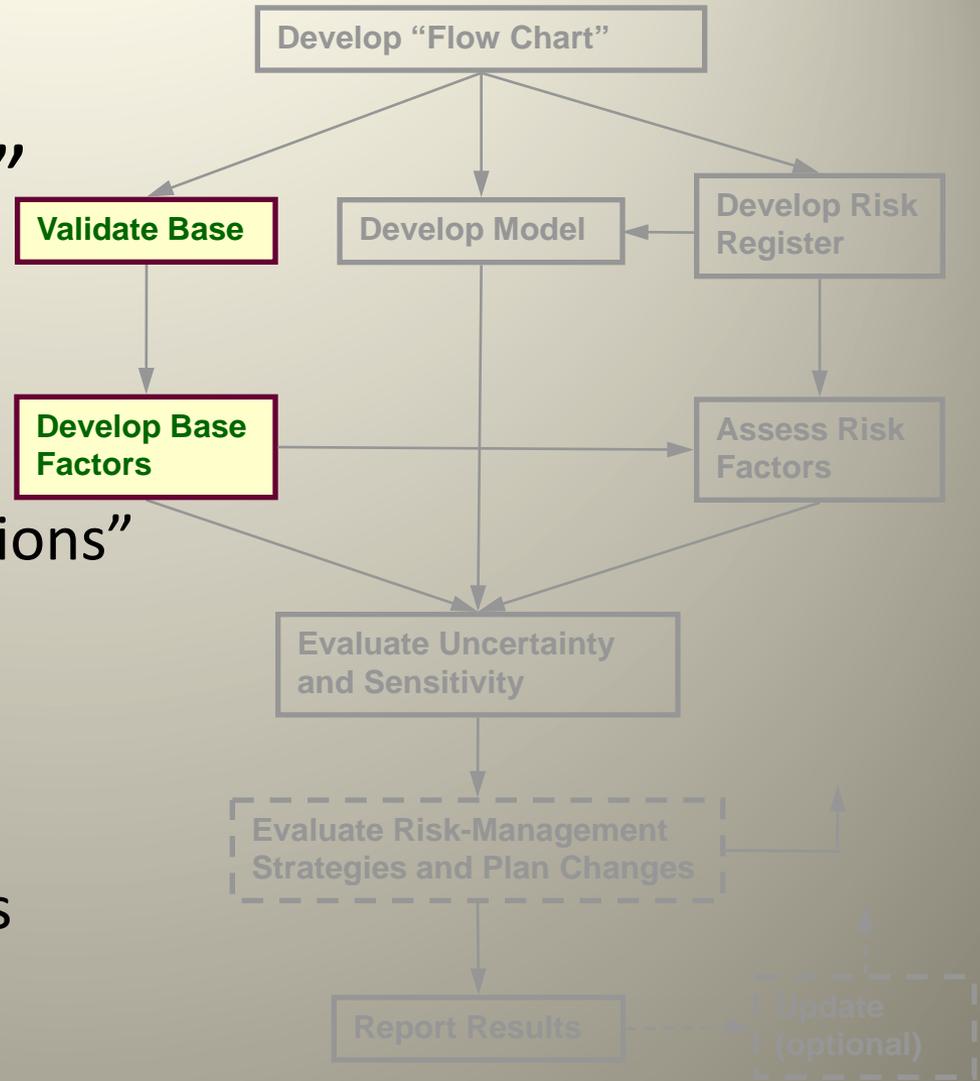


Document and Update

TRUE (Risk-Based) vs. Traditional

Traditional	Risk-Based
Estimate is a Single Value with unknown confidence	Estimate is a Distribution that expresses confidence
Based on arbitrary set of assumptions	Considers uncertainty in key assumptions
Risk and Uncertainty are modeled as lumped “contingency”	Risk and Uncertainty are evaluated explicitly by source / type
Risk Management is ad-hoc	Risk Management is formal and explicit, because significant risks (and opportunities) are quantified
Relies on judgment from experience plus data – consensus hard to achieve	Relies on judgment from experience plus data – consensus easier to achieve

Develop “Base Cost”



- Project “within assumptions”
- Estimate = Scope
- Validate Costs
- Develop *unbiased* values

PROJECT TEAM OWNS THE ESTIMATE

Actions...

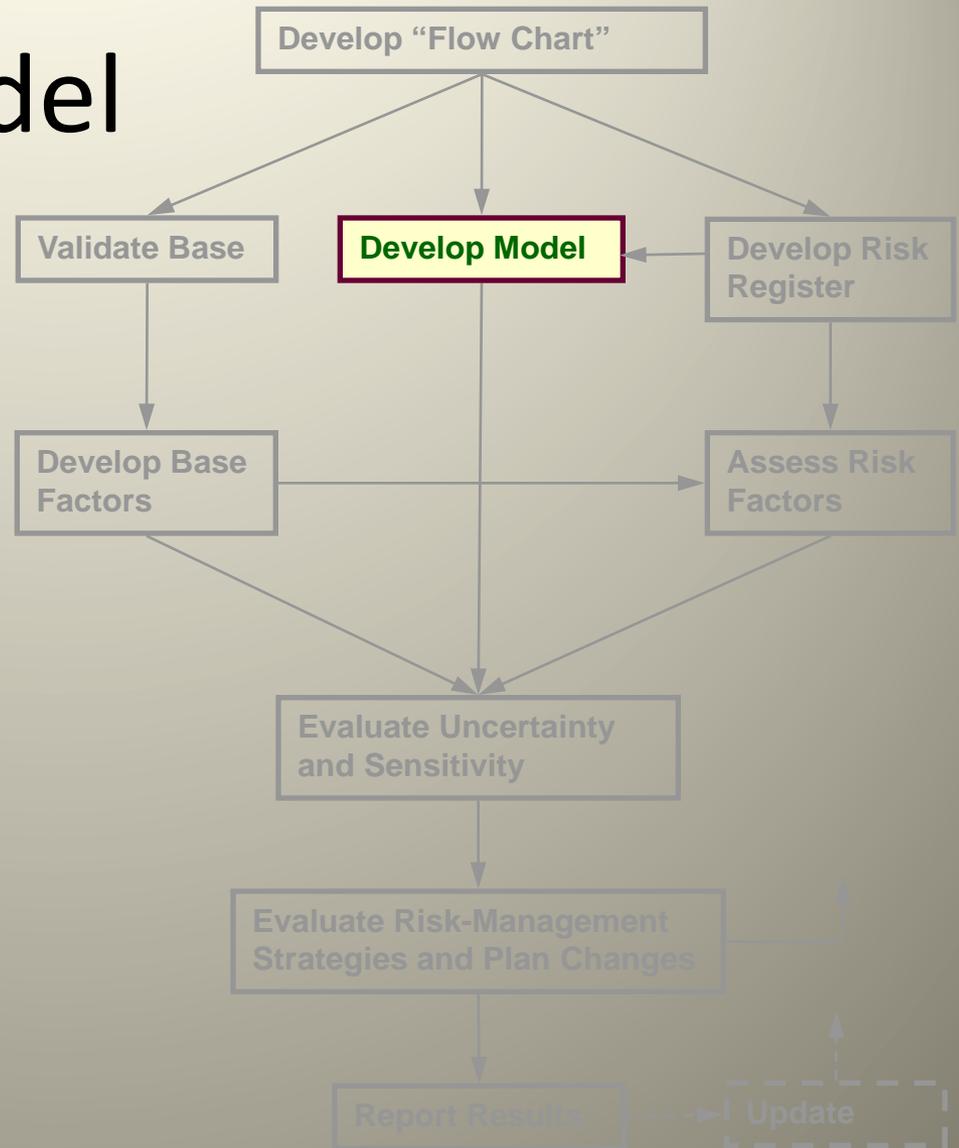
- Remove contingency (explicit and ‘buried’)
 - Exception for CSS Factor
- Replace with “risk” and “opportunity” events
- Identify conservatism (e.g. unit prices)
- Document assumptions

Risk-factor assessments...

- Are based on data, if available (objective analysis)
- Are based on assessments from experienced Subject Matter Experts
- Can combine data and judgment

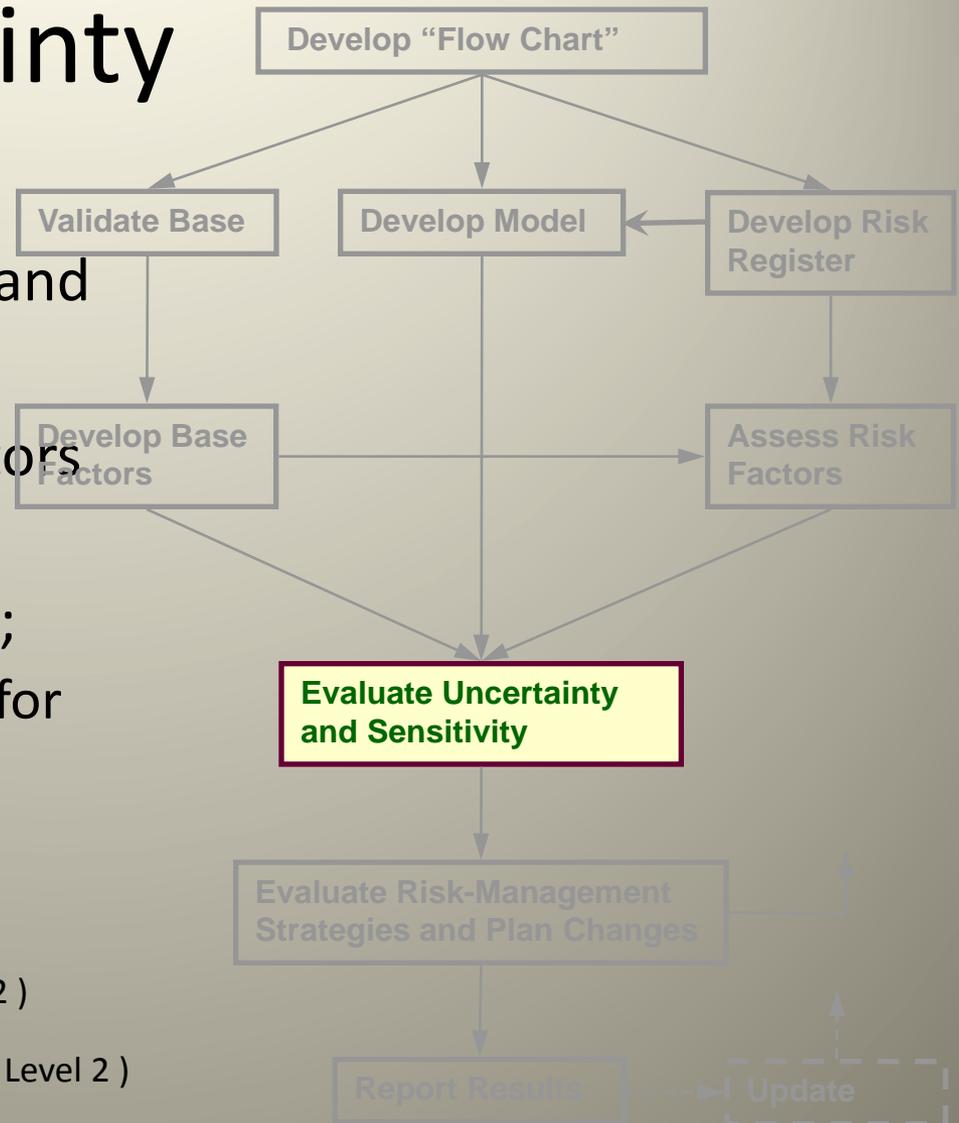
Uncertainty Model

- Inputs: base cost, and risk register (flow chart in Level 2)
- Statistical Model
- Software used is Crystal Ball™
- Predictive analysis tool
- Monte Carlo simulation calculates thousands of scenarios



Evaluate Uncertainty

- Identify, quantify, and prioritize critical activities and risks
- Combine base and risk factors
- Simulate results of interest;
 - Probability distributions for total project cost
 - Probability of meeting milestones (for Level 2)
 - Component costs (for Level 2)
 - Cash flow uncertainty (for Level 2)

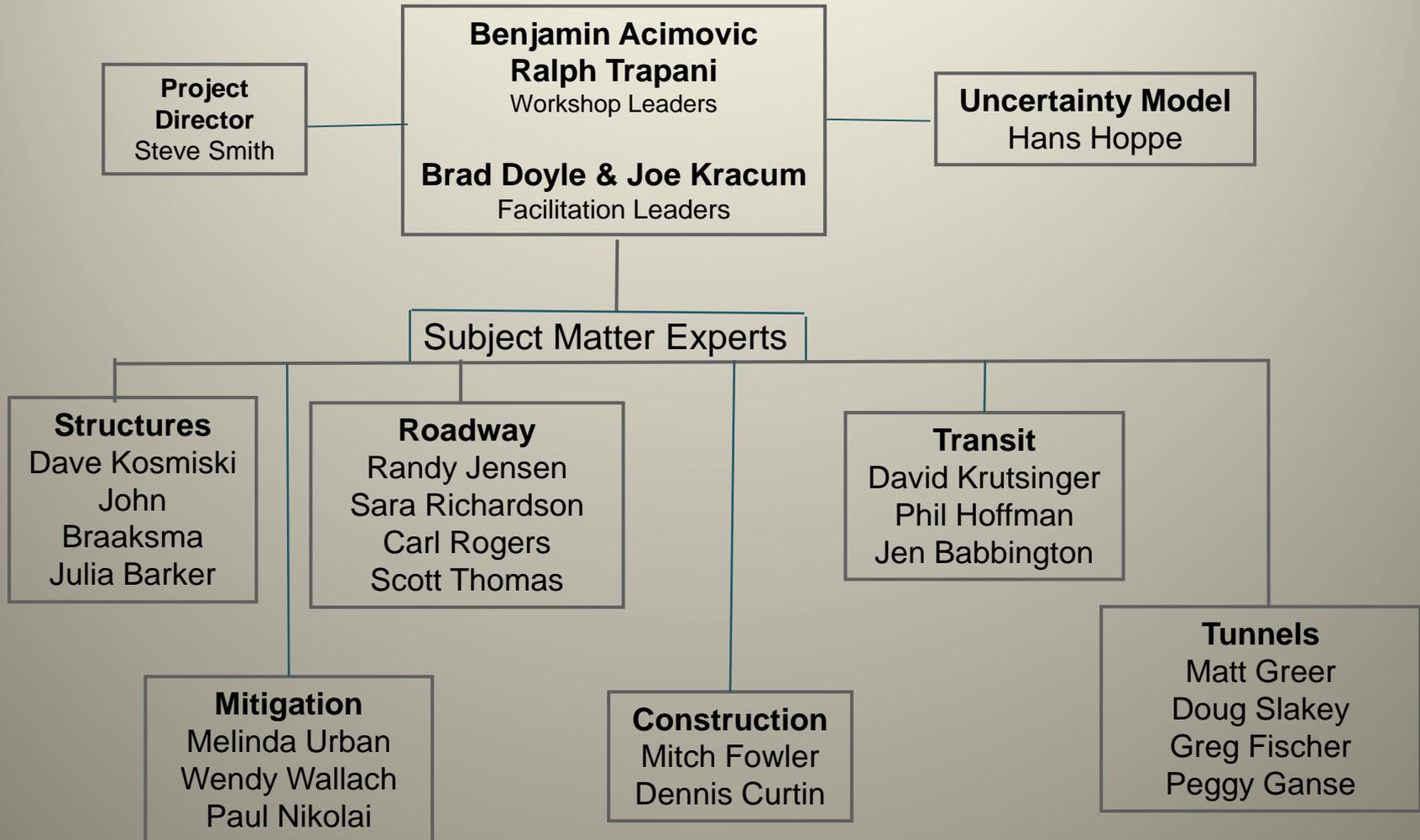


SAMPLE ESTIMATING SPREADSHEET

Resource	Description	Project Totals
Contractor	Mobilization	\$ 367,500
Contractor	Excavation & Backfill	\$ 592,800
Contractor	Intersections	\$ 210,000
Contractor	Structures	\$ 14,624,584
Contractor	Retaining Walls	\$ 4,875,000
Contractor	Pavements	\$ 1,474,697
Contractor	Signing & Striping	\$ 40,000
Contractor	Erosion Control	\$ 68,321
Contractor	Surveying	\$ 20,000
Contractor	Rock Staining	\$ 42,000

At Risk Cost Range			Risk Probability			Weighted Percentages		
\$			Percentages (%)					
L	ML	H	L	ML	H			
\$ 300,000	\$ 367,500	\$ 400,000	30%	75%	80%	16.2%	40.5%	43.2%
\$ 450,000	\$ 592,800	\$ 592,880	85%	50%	20%	54.8%	32.3%	12.9%
\$ 180,000	\$ 210,000	\$ 240,000	30%	75%	60%	18.2%	45.5%	36.4%
\$ 12,000,000	\$ 14,624,584	\$ 19,000,000	20%	60%	75%	12.9%	38.7%	48.4%
\$ 4,000,000	\$ 4,875,000	\$ 5,000,000	70%	80%	70%	31.8%	36.4%	31.8%
\$ 800,000	\$ 1,474,697	\$ 1,800,000	15%	50%	20%	17.6%	58.8%	23.5%
\$ 30,000	\$ 40,000	\$ 100,000	75%	60%	80%	34.9%	27.9%	37.2%
\$ 50,000	\$ 68,321	\$ 80,000	40%	70%	50%	25.0%	43.8%	31.3%
\$ 20,000	\$ 20,000	\$ 40,000	50%	50%	50%	33.3%	33.3%	33.3%
\$ 25,000	\$ 42,000	\$ 50,000	50%	50%	70%	29.4%	29.4%	41.2%

TRUE Workshop Team



TRUE Summary

TRUE quantifies uncertainties considering

- Integration of costs for each T&R alternative
- “Base” project assumptions
- Risk and Opportunity
- Inflation

TRUE

- Provides a defensible approach to estimating
- Provides the basis for future Risk Management, Value Engineering and Project / Program Strategic Planning
- Promotes internal project communication and understanding

I-70 Traffic & Revenue Study

Level 1 Cost Estimating of Alternatives

- Capital Costs
- Design & Construction Engineering
- CSS Factors
- Distribution of Costs - 80% Certainty

Managed Lanes Alternatives w/ BRT

- **Alternative 1 – Two Managed Lanes. BRT.**
 - Option 1 \$ 4,116 - \$ 4,330
 - Option 2 \$ 4,494 - \$ 4,733

- **Alternative 2 – Three Managed Lanes. BRT.**
 - Option 1 \$ 5,084 - \$ 5,351
 - Option 2 \$ 5,339 - \$ 5,623
 - Option 3 \$ 5,156 - \$ 5,418

Costs in 2014 millions.

PEIS Alternatives

- **Alternative 3 – Minimum Program w/ AGS**

– Option 1	\$ 1,948 - \$ 2,096	Plus AGS \$6,802
– Option 2	\$ 2,300 - \$ 2,458	Plus AGS \$6,802
– Option 3	\$ 526 - \$ 563	Plus AGS \$6,802
– Option 4	\$ 886 - \$ 943	Plus AGS \$6,802

- **Alternative 4 – Maximum Program w/ AGS**

– Option 1	\$ 2,625 - \$ 2,800	Plus AGS \$6,802
– Option 2	\$ 3,028 - \$ 3,218	Plus AGS \$6,802

Costs in 2014 millions.

Peak Period Shoulder Lanes

- **Alternative 5 – Permanent Shoulder w/ AGS**
 - Option 1 \$ 1,937 - \$ 2,054 Plus AGS \$6,802

- **Alternative 6 – Temporary Shoulder w/ AGS**
 - Option 1 \$ 100 - \$ 108 Plus AGS \$6,802

Costs in 2014 millions.

I-70 Traffic & Revenue Study

Level 1 Cost Estimating of Alternatives

- Operations Maintenance Costs per year
 - Roadway & Structures
 - Tunnels
 - Bus Rapid Transit
 - Advanced Guideway System

Managed Lanes Alternatives w/ BRT Operations & Maintenance Costs

- **Alternative 1 – Two Managed Lanes. BRT.**

- Opt 1 \$ 19.8 lanes \$ 29.9 BRT \$49.7 total

- Opt 2 \$ 19.9 lanes \$ 29.9 BRT \$49.8 total

- **Alternative 2 – Three Managed Lanes. BRT.**

- Opt 1 \$ 24.0 lanes \$ 29.9 BRT \$53.9 total

- Opt 2 \$ 24.2 lanes \$ 29.9 BRT \$54.1 total

- Opt 3 \$ 24.2 lanes \$ 29.9 BRT \$54.1 total

Costs in 2014 millions per year.

PEIS Alternatives

- **Alternative 3 – Minimum Program w/ AGS**

– Opt 1	\$ 10.6 lanes	\$ 59.3 AGS	\$69.9 total
– Opt 2	\$ 10.9 lanes	\$ 59.3 AGS	\$70.2 total
– Opt 3	\$ 5.4 lanes	\$ 59.3 AGS	\$64.7 total
– Opt 4	\$ 5.6 lanes	\$ 59.3 AGS	\$64.9 total

- **Alternative 4 – Maximum Program w/ AGS**

– Opt 1	\$ 14.2 lanes	\$ 59.3 AGS	\$73.5 total
– Opt 2	\$ 14.4 lanes	\$ 59.3 AGS	\$73.7 total

Costs in 2014 millions per year.

Peak Period Shoulder Lanes

- **Alternative 5 – Permanent Shoulder w/ AGS**
 - Opt 1 \$ 13.8 lanes \$ 59.3 AGS \$73.1 total

- **Alternative 6 – Temporary Shoulder w/ AGS**
 - Opt 1 \$ 3.4 lanes \$ 59.3 AGS \$62.7 total

Costs in 2014 millions per year.

I-70 Traffic & Revenue Study Alternatives & Cost Estimating Group Sessions

- Could we create a better alternative by mixing and matching elements of different alternatives?
- What constitutes a good cost estimate?
- Any Questions or Clarifications?

Could we create a better alternative by mixing and matching elements of different alternatives?

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What constitutes a good cost estimate?

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Questions & Clarifications?



Tentative Future Meetings

- 25 Mar Tolling & Modeling ITF Meeting
- 26 Mar PLT Meeting on Costs & Modeling
- 23 Apr PLT / TT Meeting on Level 1 Results

Information Review Periods

- 7 Mar Cost Estimating review comments due
- 19 Mar Distribution of Modeling Information to TT & PLT
- 11 Apr TT & PLT Comments due on Costs & Modeling
- 23 Apr PLT / TT Meeting on Level 1 Results



Wrap up & Action Items Review



Thank You

