**Mobility and Traveler Information**

- **Considerations for Alternate Route Travel Times:**
  - Alternate route travel times are calculated and displayed for selected alternate route(s) and the main route through the work zone to provide options to drivers.
  - Travel times on the main route and alternate route(s) vary independently; i.e. one route changes while the other does not.
  - Care should be taken to determine proximity to other projects when selecting alternative routes to display travel times.

- **Considerations to Ensure Times Displayed Are Accurate:**
  - Maximum detector spacing is 5 miles.
  - Travel Time is used when the time display is within 10 miles of the destination shown on the sign.
  - Delay Time is used when the time display is more than 10 miles from the destination shown on the sign.

**Motorist Advisory**

- **Motorist Warning:**
  - Motorist Warnings respond to individual conditions, i.e. vehicle speed, dimension, weather, etc. that require drivers to take immediate action.
  - Intrusion Warning Considerations:
    - Workers are adjacent to open lanes or barrier
  - Electronic Workers Present Speed Limit Benefits:
    - Electronic workers present speed limit reduces speed such that the majority of hazards can be tolerated without danger to workers and motorists.

- **Motorist Scoping Needs:**
  - IWZ Scoping Needs
  - Considerations for Temporary Ramp Metering
  - Considerations to Ensure Times Displayed Are Accurate
  - Use this Decision Tree to Identify Potential ITS/IWZ Scoping Needs – Draft April 1, 2019 Version 1 Revised

**Route Management Systems**

- **Benefits of Route Management Systems:**
  - Improves capacity of freeway by reducing turbulence and shockwaves caused by entering traffic.
  - Improves safety by providing uniform traffic speeds.

- **Considerations for Temporary Ramp Metering:**
  - Downsteam capacity is exceeded reducing the maximum volume on the freeway.
  - Nearby signals on the cross street or ramp terminals create platoons of vehicles entering the freeway creating turbulence and shock waves.
Contact the RTMC Freeway Operations Engineer @ (651)234-7022 to determine feasibility and cost for these systems.

A more accurate estimate can be made if the project duration and the availability of an alternate route are known.

**High Level Cost Estimate for Mobility and Traveler Information Systems**

High level cost estimates may be used if the duration of the ITS/IWZ need is unknown.

<table>
<thead>
<tr>
<th></th>
<th>1 week</th>
<th>4 weeks</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel/Delay Time (NO alternate route)</td>
<td>$16,000</td>
<td>$35,000</td>
<td>$145,000</td>
</tr>
<tr>
<td>Travel/Delay Time (one alternate route)</td>
<td>$31,000</td>
<td>$70,000</td>
<td>$290,000</td>
</tr>
<tr>
<td>Cost per additional mile per direction</td>
<td>$1,300</td>
<td>$3,500</td>
<td>$13,000</td>
</tr>
</tbody>
</table>

Note: Additional mile cost is for one direction only.

**Detailed Estimate for Mobility and Traveler Information Systems**

Assumptions for these system estimates:

- Project and alternate routes are 10 miles long.
- Detectors are placed every ½ mile.
- Travel/delay time will be provided for both directions in the work zone.
- One PCMS is used for each direction.
- Additional mile cost is for one direction only.

<table>
<thead>
<tr>
<th>System Control and Management</th>
<th>Contractor Provided*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>1 week</td>
</tr>
<tr>
<td>One Direction</td>
<td>$7,000</td>
</tr>
<tr>
<td>Two Directions</td>
<td>$13,000</td>
</tr>
<tr>
<td>Cost for each mile of additional queue length</td>
<td>$1,700</td>
</tr>
</tbody>
</table>

*Contact the RTMC Freeway Operations Engineer @ (651)234-7022 to determine feasibility of using the RTMC and IRIS for ITS/IWZ system.

**High Level Cost Estimate for Motorist Advisory Systems**

High level cost estimates may be used if the duration and number of directions for the ITS/IWZ need is unknown.

$75,000 for each system

Each of the suggested motorist advisory systems have similar costs:

- Active Zipper Merge
- Congestion Advisory
- Stopped Traffic Advisory (End of Queue Warning)
- Variable Speed Limit or Downstream Speed Notification

A more accurate estimate can be made if the number of directions and duration of the deployment are known.

**Detailed Estimate for Motorist Advisory Systems**

Assumptions for these systems:

- Anticipated queue is three (3) miles.
- Detectors are placed every ½ mile.
- PCMS are placed every 2 miles (mile 1 and 3 in advance of lane closure taper).
- Additional mile cost is for one direction only.

<table>
<thead>
<tr>
<th>System Control and Management</th>
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<tbody>
<tr>
<td>Duration</td>
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</tr>
<tr>
<td>One Direction</td>
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<tr>
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</tbody>
</table>

*Contact the RTMC Freeway Operations Engineer @ (651)234-7022 to determine feasibility of using the RTMC and IRIS for ITS/IWZ system.

**High Level Cost Estimate for Motorist Warning Systems**

High level cost estimates may be used if the duration for the ITS/IWZ need is unknown.

$13,000 for each system

Each of the suggested motorist warning systems have similar costs:

- Excessive Speed Display
- Trucks Warning
- Vehicle Restriction Warning
- Hazardous Roadway Warning

Note: MnDOT is currently evaluating various systems and has not selected a final technology or design for Intrusion Warning and Electronic Workers Present Speed Limit systems.

A more accurate estimate can be reached if the duration of the ITS/IWZ need is known.

**Detailed Estimate for Motorist Warning Systems**

Assumptions for these systems:

- There is a single system at a single site within the project.
- RTMC and IRIS cannot be used for control, therefore all control and system management is Contractor provided.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Duration</td>
<td>1 week</td>
</tr>
<tr>
<td>Single Site – Excessive Speed Display</td>
<td>$1,000</td>
</tr>
<tr>
<td>Single Site – All Others</td>
<td>$2,000</td>
</tr>
</tbody>
</table>

**Route Management Systems**

All Route Management Systems are controlled by the RTMC and IRIS.

*Contact the RTMC Freeway Operations Engineer @ (651)234-7022 to determine feasibility and cost for these systems.

**ASSUMPTIONS AND BASIS FOR COST ESTIMATES FOR ITS/IWZ SCOPING**

- These ITS/IWZ cost estimates are based on current MnDOT rental prices.
- All assumptions included below should be used while developing estimates for planning purposes.

**High Level Cost Estimate for ITS/IWZ Scoping**

High level cost estimates may be used if the duration of the ITS/IWZ need is unknown.

<table>
<thead>
<tr>
<th></th>
<th>1 week</th>
<th>4 weeks</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Route Management Systems</td>
<td>$140,000</td>
<td>$280,000</td>
<td>$460,000</td>
</tr>
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</table>

A more accurate estimate can be made if the duration and number of directions for the ITS/IWZ need is unknown.

**Detailed Estimate for ITS/IWZ Scoping**

Assumptions for these systems:

- Each of the suggested motorist advisory systems have similar costs
- Travel/delay time will be provided for both directions in the work zone.
- One PCMS is used for each direction.
- Additional mile cost is for one direction only.

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*Contact the RTMC Freeway Operations Engineer @ (651)234-7022 to determine feasibility for ITS/IWZ system.