CORRIDOR EVALUATION

This document will provide a detailed review of the evaluation of corridors as part of the 2021 Congestion Management Process (CMP).

The first step in the process is to evaluate the following performance criteria to determine if the corridor has any deficiencies and needs improvements. Based on the deficiencies identified, performance criteria statements were created and are described below.

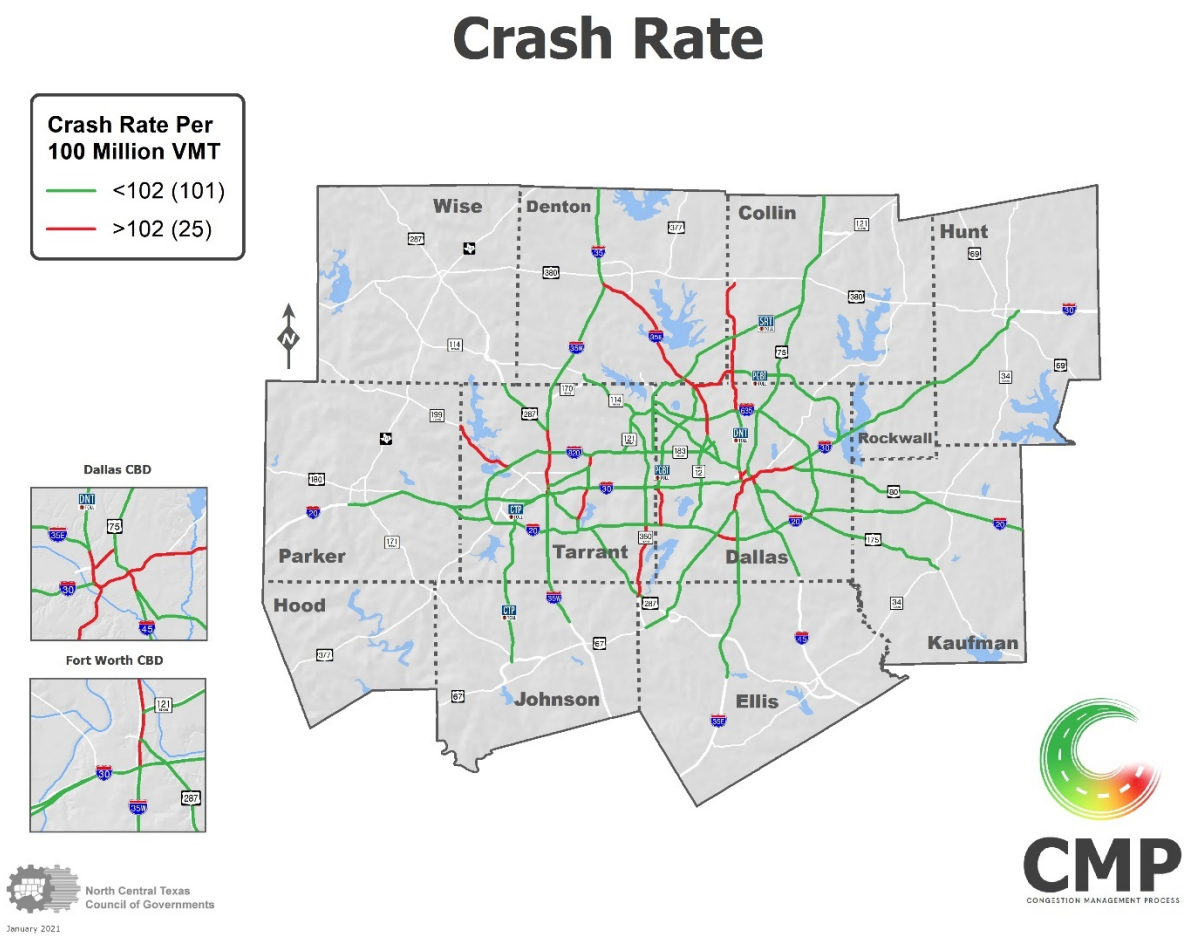
Performance Criteria

1. Crash Rate

   Procedure: Average daily volumes are joined to CMP segments from Regional Travel Model MOBLOS 2018 volumes output. The 2014-2018 crash data was combined with the MOBLOS volumes to create a crash rate for each CMP corridor. It is the rate of all reported crashes per 100 million Vehicle Miles Traveled (VMT) on each corridor.

   Rationale: Top 25 Corridors were selected as corridors in need of help.

   Cutoff Number – 102 crashes per 100 million VMT or greater
   Number of Segments
   - Sufficient – 101
   - Needs Improvement – 25



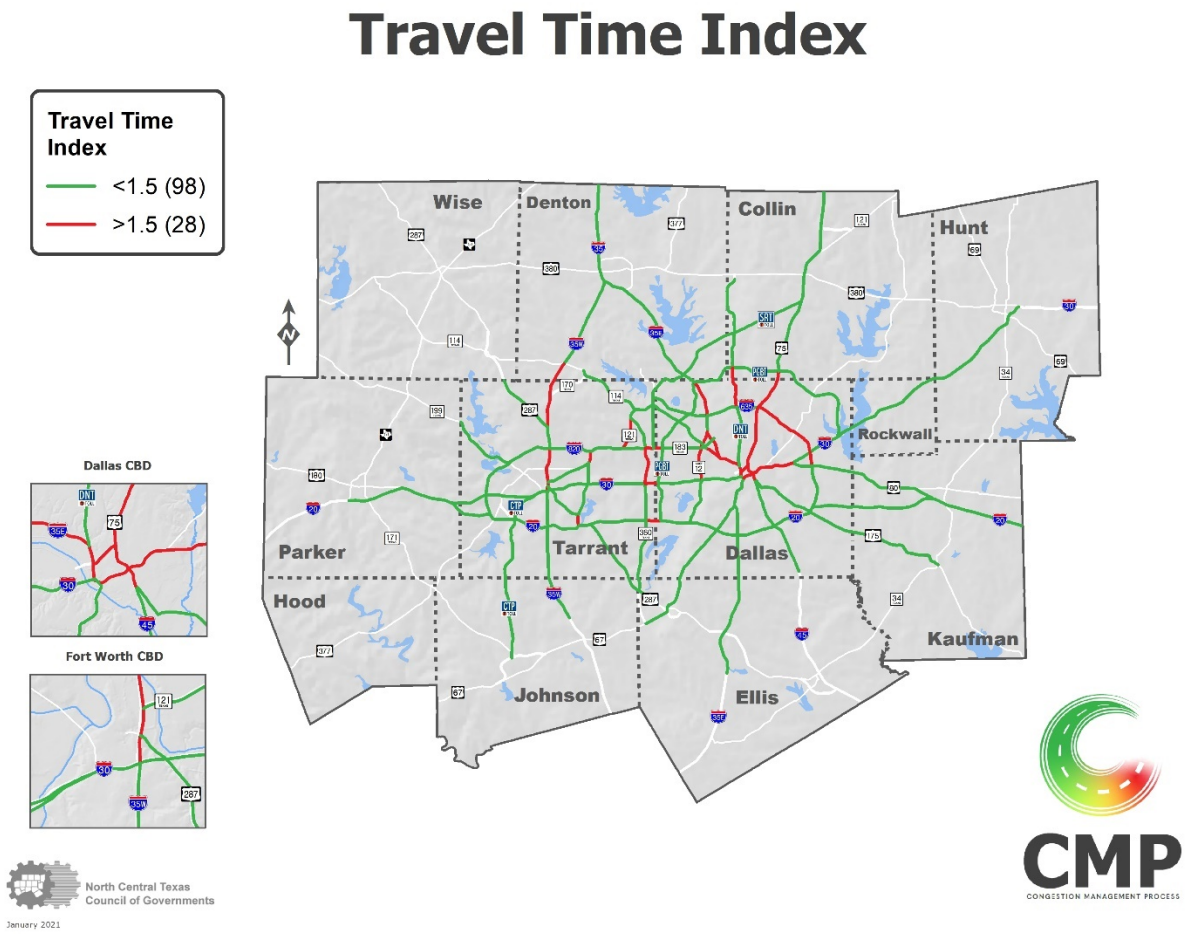
2. Travel Time Index (TTI)

   Procedure: The TTI metric is calculated from National Performance Management Research Dataset (NPMRDS) travel time data. This data is used for calculation of several Federal performance measures and other purposes. CMP segments are spatially joined with Traffic Message Channel (TMC) segments within 200 feet of the corridor. The segment-level TTI metric is calculated by taking a length-weighted average of reported TTI on these joined segments.

   More Information: This metric was calculated from the NPMRDS travel time dataset using observed travel times on weekdays in 2019. This metric is an index comparing median travel times during peak periods to median travel times during free-flow conditions. If a corridor has a travel time index of 1.0, travel takes the same amount of time during peaks as it does during free-flow conditions. If a corridor has a travel time index of 2.0, travel takes twice as long during the peak. Since this metric uses medians, it is less influenced by higher-than-usual travel times during non-recurring congestion events and is more comparable to similar metrics produced by the travel demand model.

   Rationale: Top 25 Corridors were selected as corridors in need of help, then adjusted to a natural break in the dataset.

Cutoff Number – Travel Time Index of 1.5 or greater
Number of Segments
Sufficient – 101
Needs Improvement – 28



3. Level of Travel Time Reliability (LOTTR)

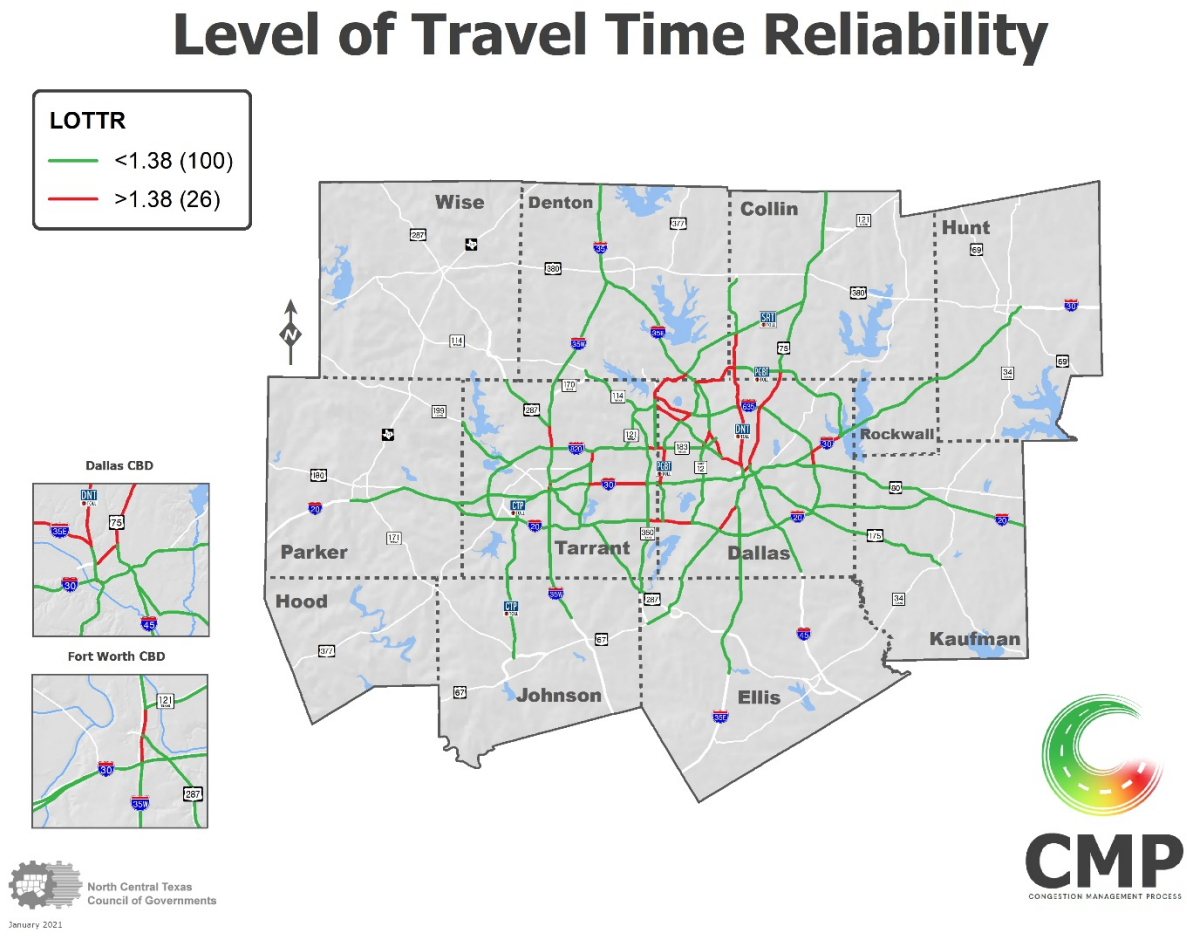
   Procedure: The LOTTR metric is calculated from National Performance Management Research Dataset (NPMRDS) travel time data. This data is used for calculation of several Federal performance measures and other purposes. CMP segments are spatially joined with TMC segments within 200 feet of the corridor. The segment-level LOTTR metric is calculated by taking a length-weighted average of reported LOTTR on these joined segments.

   More Information: This metric was calculated from the NPMRDS travel time dataset using observed travel times on weekdays in 2019. It uses a similar calculation procedure to the reliability measures in the PM3 Federal performance measure (PM) rulemaking. This metric is essentially an index indicating how much extra time needs to be added to trip planning time to arrive on time 80% of the time. If a corridor's median travel time is 5 minutes and the

LOTTR index is 1.0, no additional time needs to be added to trip planning. If the same corridor's LOTTR is 1.5, 7.5 minutes (1.5 x 5 minutes) needs to be planned for travel time.

Rationale: The top 25 Corridors were originally selected as corridors in need of help, cutoff moved slightly to include a segment within .001 of other deficient segments.

Cutoff Number – Level of Travel Time Reliability of 1.38 or greater
Number of Segments
Sufficient – 100
Needs Improvement – 26



4. Pavement Condition

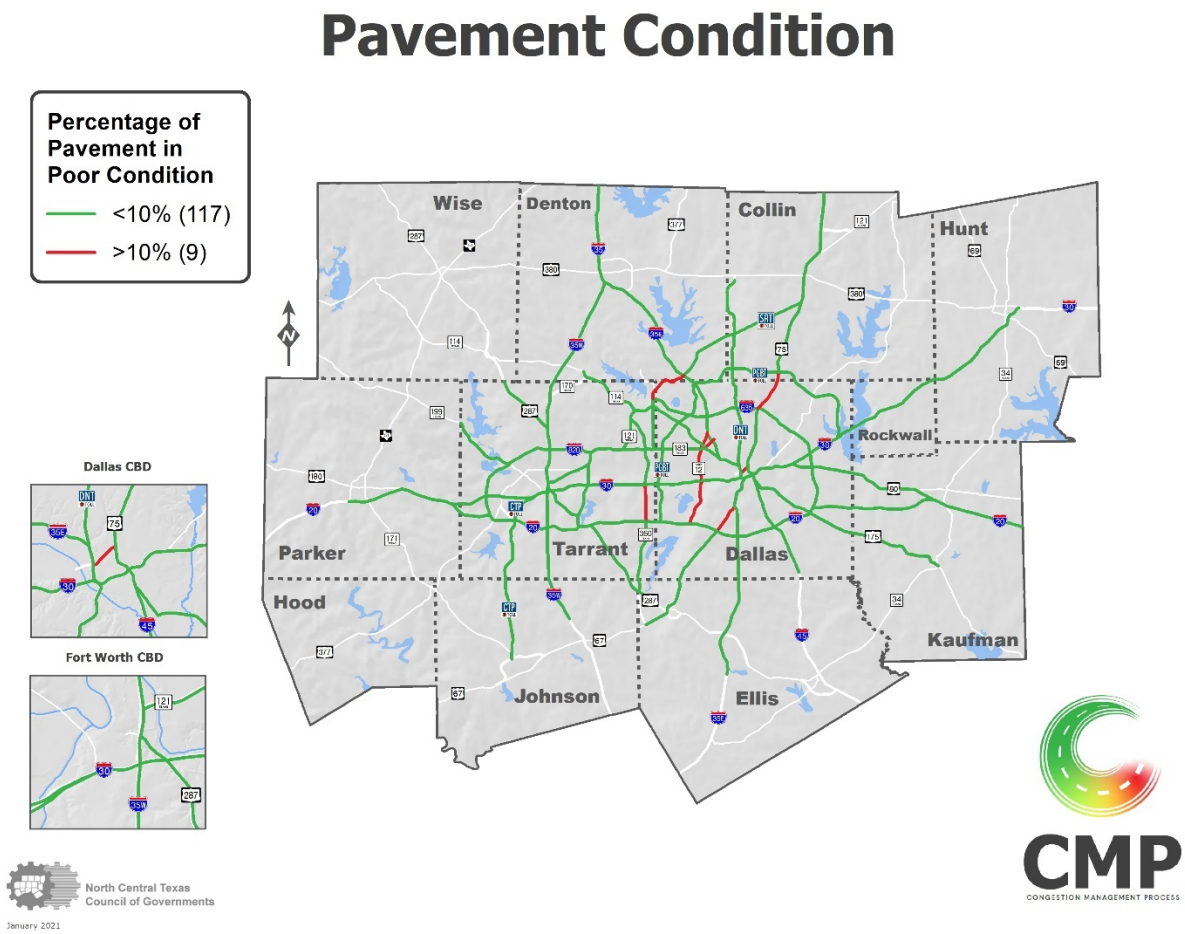
Procedure: Provided annually or biennially by the Texas Department of Transportation (TxDOT) as part of PM2 pavement and bridge condition performance measure target-setting activities. The 2018 dataset was utilized for this analysis. CMP segments are spatially joined with pavement segments within 150 feet of the corridor. Each pavement section is rated "Good," "Fair," and "Poor," and the final metric is the percentage of the total length of joined segments that are in "Poor" condition.

More Information: This is the same data that was used to calculate the PM2 Federal pavement condition measures. As part of the PM2 measure calculation process, small pavement segments are assigned scores of “Good,” “Fair,” or “Poor.” Dozens to hundreds of these segments nest into CMP corridors. This metric is the percentage of the corridor’s length that is classified as “Poor.”

Note: North Texas Tollway Authority (NTTA) segments are rated based on NTTA’s performance criteria. Due to being considered off-system in TxDOT’s Pavement Management Information System (PMIS), NTTA’s corridors had only been evaluated based on International Roughness Index. NTTA’s performance system provides a more comprehensive evaluation of those corridors.

Rationale: Evaluated based on percentage of pavement in poor condition (rather than good) because poor pavement condition can determine whether pavement should be a part of the corridor strategy.

Cutoff Number – 10% or more pavement in poor condition
Number of Segments
Sufficient –117
Needs Improvement – 9



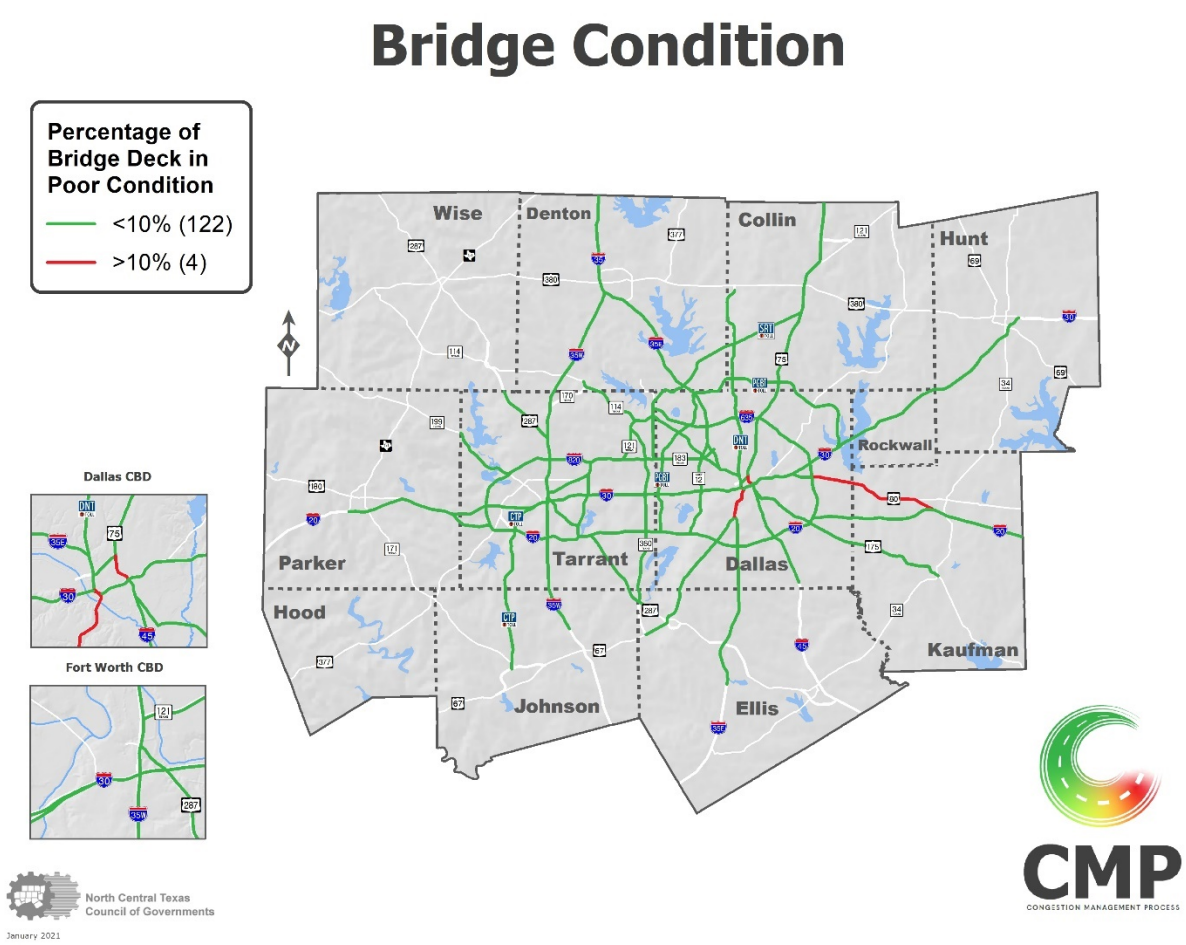
5. Bridge Condition

   Procedure: Provided annually or biennially by TxDOT as part of Performance Measure (PM) 2 pavement and bridge condition performance measure target-setting activities. The 2018 data set was utilized for this analysis. The input bridge dataset is queried from data from the latest available year and then projected using the provided coordinates. For each CMP corridor, all bridges within 500 feet of the corridor are spatially joined to the corridor. Subsequent calculations sum the total bridge deck area along the corridor in “Good,” “Fair,” “Poor” condition. The final output is the percentage of the corridor’s total bridge deck area that is in “Poor” condition.

   More Information: This metric was calculated from the 2018 TxDOT Metropolitan Planning Organization Bridge Dashboard dataset. This is the same data that was used to calculate the PM2 Federal bridge condition measures. As part of the PM2 measure calculation process, individual bridges are assigned scores of “Good,” “Fair,” or “Poor.” This metric is the percentage of the total bridge deck area of bridges on the corridor that are classified as “Good.”

   Rationale: Evaluated based on percentage of bridge deck in poor condition (rather than good) because poor bridge deck condition can determine whether pavement should be a part of the corridor strategy.

   Cutoff Number – 10% or more bridge deck in poor condition
   Number of Segments
   Sufficient – 122
   Needs Improvement – 4



The table below identified possible performance criteria statements based on the combination of performance criteria that are sufficient or needs improvement.

Travel Time Index (Demand Reduction)	Crash Rate (Operational)	Level of TT Reliability (Demand Reduction and Operational)	Poor/Bridge Pavement (Rehad or Rebuild)	Corridor Statements
Needs Improvement	Sufficient	Sufficient	Sufficient	Demand Reduction
Needs Improvement	Needs Improvement	Sufficient	Sufficient	Demand Reduction and Operational
Needs Improvement	Sufficient	Needs Improvement	Sufficient	Demand Reduction and Operational
Needs Improvement	Needs Improvement	Needs Improvement	Sufficient	Demand Reduction and Operational
Sufficient	Needs Improvement	Needs Improvement	Sufficient	Demand Reduction and Operational
Sufficient	Needs Improvement	Sufficient	Sufficient	Operational
Needs Improvement	Needs Improvement	Needs Improvement	Needs Improvement	Rebuild with Capacity
Sufficient	Sufficient	Sufficient	Needs Improvement	Rehab
Sufficient	Needs Improvement	Sufficient	Needs Improvement	Rehab and Operational
Needs Improvement	Sufficient	Needs Improvement	Needs Improvement	Rehab, Demand Reduction and Operational
Needs Improvement	Needs Improvement	Sufficient	Needs Improvement	Rehab, Demand Reduction and Operational
Sufficient	Sufficient	Needs Improvement	Needs Improvement	Rehab, Demand Reduction and Operational
Sufficient	Needs Improvement	Needs Improvement	Needs Improvement	Rehab, Demand Reduction and Operational
Needs Improvement	Sufficient	Sufficient	Needs Improvement	Rehad and Demand Reduction

Following the performance criteria evaluation to determine the corridor performance criteria statement, a review of available corridor assets was completed. Corridors were given scores based on available corridor assets inventoried. These assets are described below.

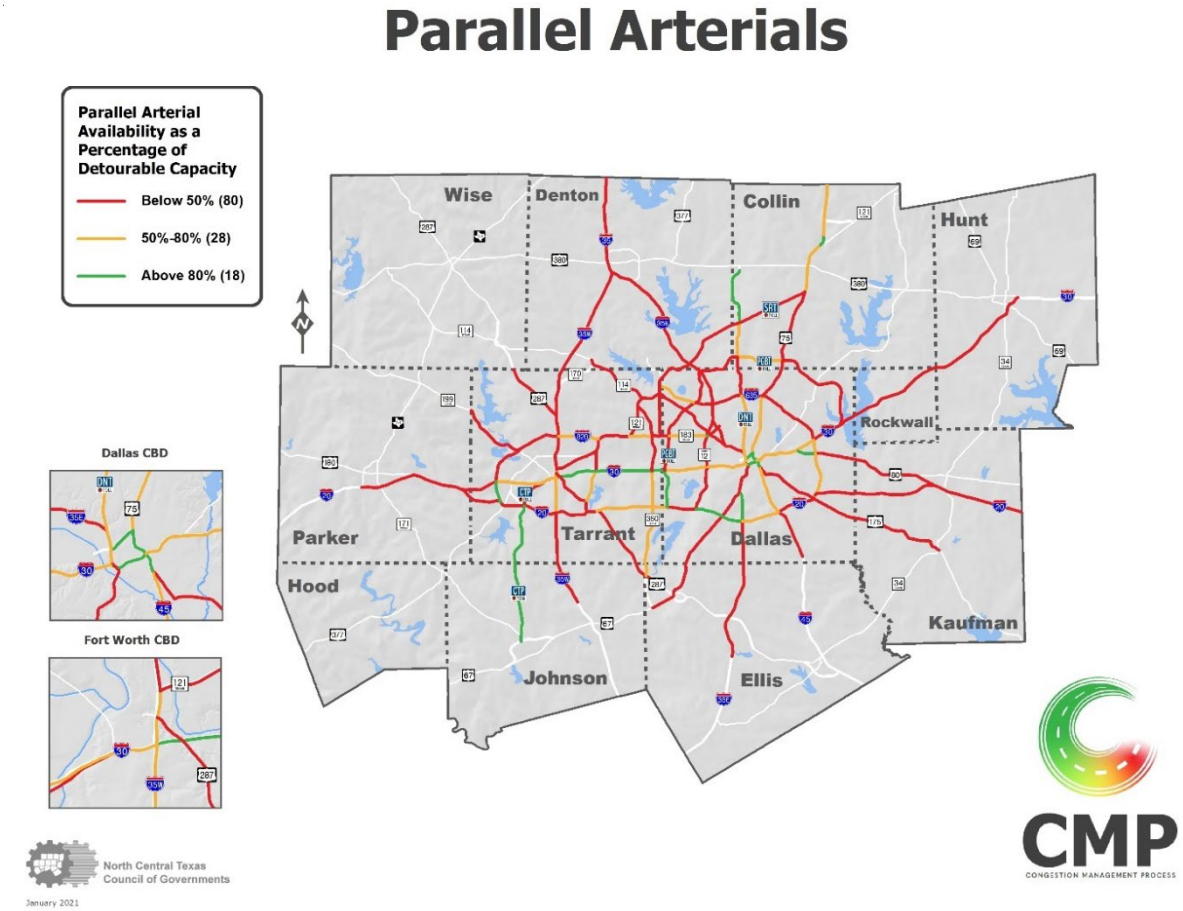
Asset Inventory

1. Roadway Infrastructure
    a. Parallel Arterial (10 Points)
    Procedure: For each CMP segment, this model finds arterial segments within 5 miles that are generally parallel to the CMP segment. For these parallel arterials, the model determines their available capacity mileage by subtracting the segment's modeled VMT from total capacity mileage.[1] A formula based on gravity is used to determine how much of this available capacity could serve as an effective detour under the assumption that arterials become less attractive as detours with increasing distance away from the facility. The final output is a daily volume that could reasonably be detoured from the CMP segment to nearby arterials.

    Rationale: Using the percentage of corridor volume that can be detoured from the corridor on parallel arterials, corridors were broken into three categories.

    Cutoff Number
        High >80%
        Medium 50-79.99%
        Low <50%
    Points
        High – 10 points
        Medium – 5 points
        Low – 0 points
    Number of Segments
        High – 18
        Medium – 28
        Low – 80

[1] This assumes that only arterials with volumes below their total capacity can serve as effective detours.



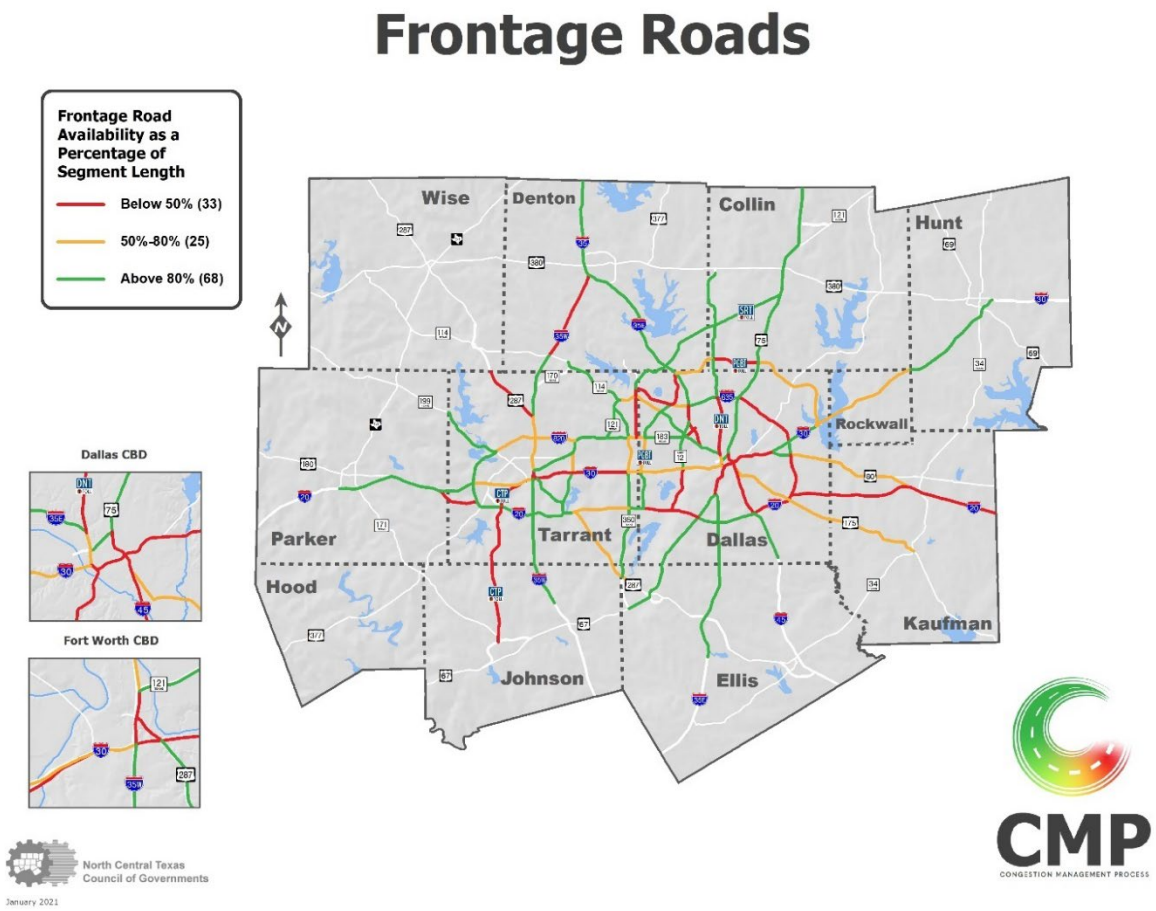
b. Frontage Roads (10 Points)
Procedure: This model finds roadway links classified as frontage roads within 500 ft. of each CMP corridor. The total length of these nearby frontage roads is compared to the length of the CMP corridor itself to determine completeness of frontage roads. The final output is a percentage of frontage road completeness along the corridor, where a value of 100% indicates that frontage roads are present along both sides of the corridor for its entire length.

Rationale: Using Percentage of frontage road to corridor length, corridors were broken into three categories.

Cutoff Number
- High >80%
- Medium 50-79.99%
- Low <50%

Points
- High – 10 points
- Medium – 5 points
- Low – 0 points

Number of Segments
High – 68
Medium – 25
Low – 33



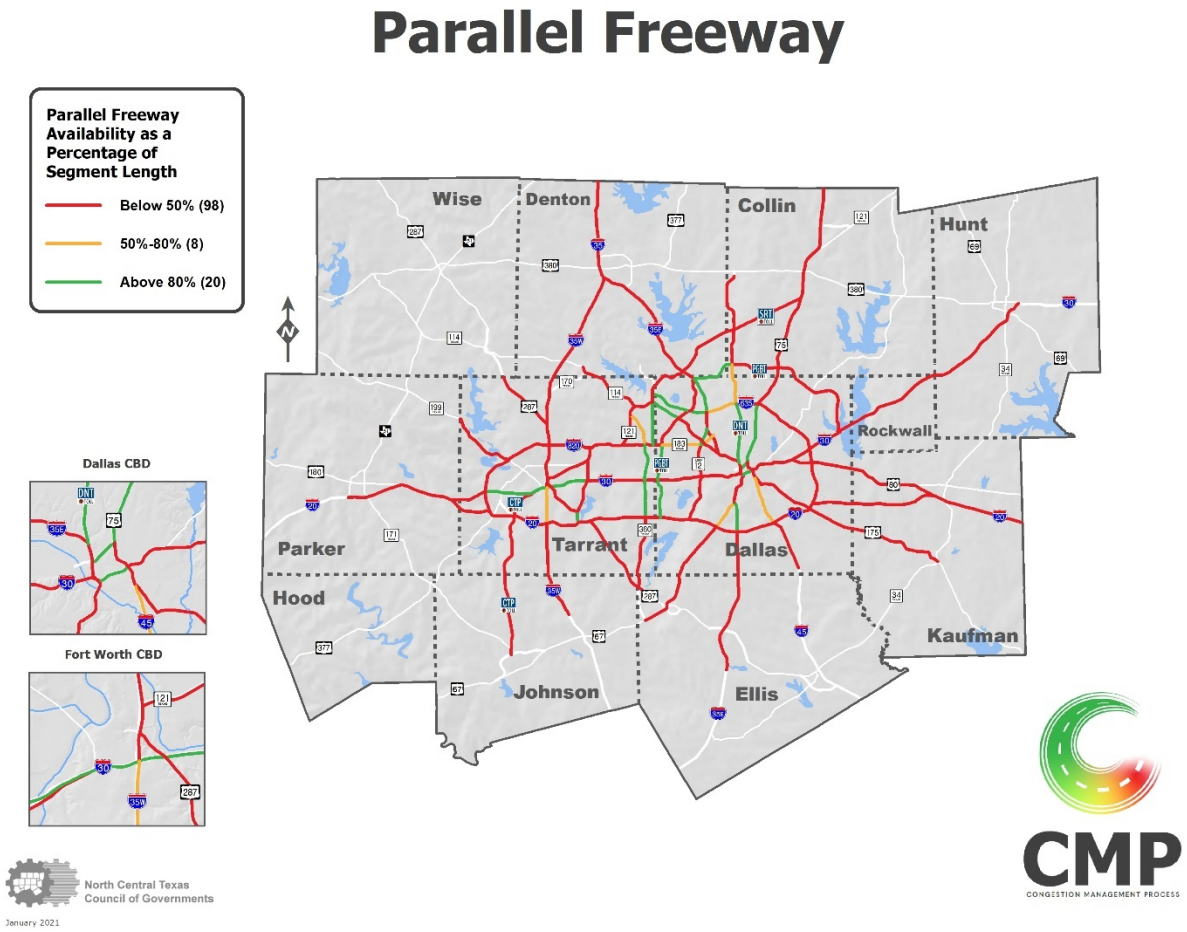
c. Parallel Freeway (20 Points)
Procedure: For each CMP corridor, this model finds other freeway/tollway facilities that are generally parallel within 5 miles. The length of these parallel facilities is compared to the length of CMP segment to yield a final percentage representing the extent to which the CMP segment is paralleled by another nearby freeway/tollway facility. A value of 100% indicates that the corridor is fully paralleled, but this value can rise above 100% in situations where more than one parallel facility exists.

Rationale: Using Percentage of parallel freeway to corridor length, corridors were broken into three categories.

Cutoff Number
High >80%
Medium 50-79.99%
Low <50%
Points
High – 20 points

Medium – 10 points
Low – 0 points

Number of Segments
High – 20
Medium – 8
Low – 98



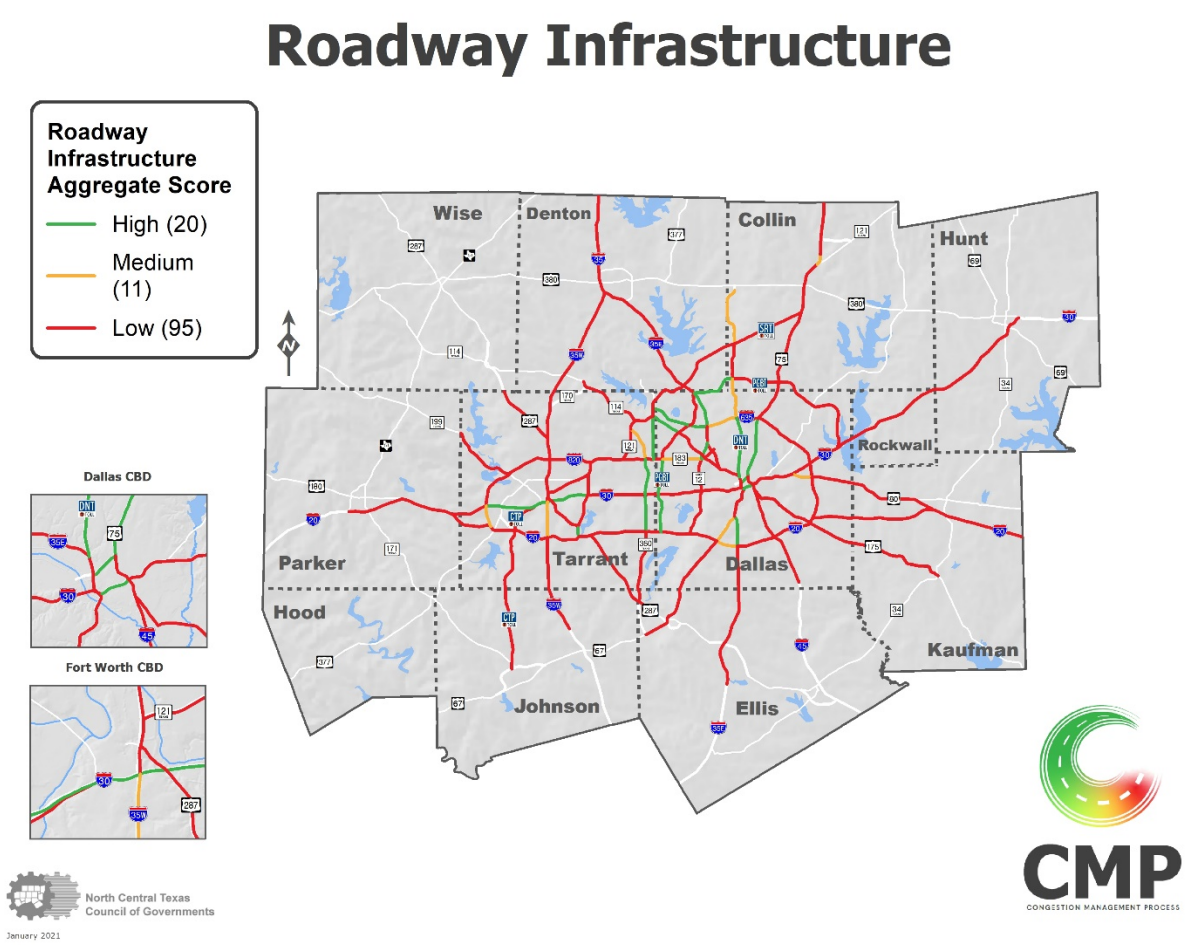
Roadway Infrastructure Total Points for Category

For each roadway infrastructure asset listed above, the points are aggregated to determine availability of road infrastructure assets within the CMP segment. Based on the aggregated score, a high, medium, or low ranking is identified that will allow that asset to be considered when identifying CMP strategies in a future step.

High >30 Points
Medium 20-29 Points
Low <20 points

Exceptions to Scoring Cutoffs

All corridors receiving maximum points in Parallel Freeway were scored as high.



2. Modal Options
    a. Park and Ride (10 Points)
    Procedure: The model identifies the locations of park and ride lots provided by the Travel Demand Management team in an excel file, using listed coordinates. The model then counts how many of these park and ride locations are within a two-mile buffer of each CMP corridor.

    Rationale: Any corridor with a park and ride was given maximum points, all with zero park and rides received no points.

        Cutoff Number
            High >0 park and ride lots
            Low 0 park and ride lots
        Points
            High – 10 points
            Low – 0 points
        Number of Segments
            High – 86
            Low – 40

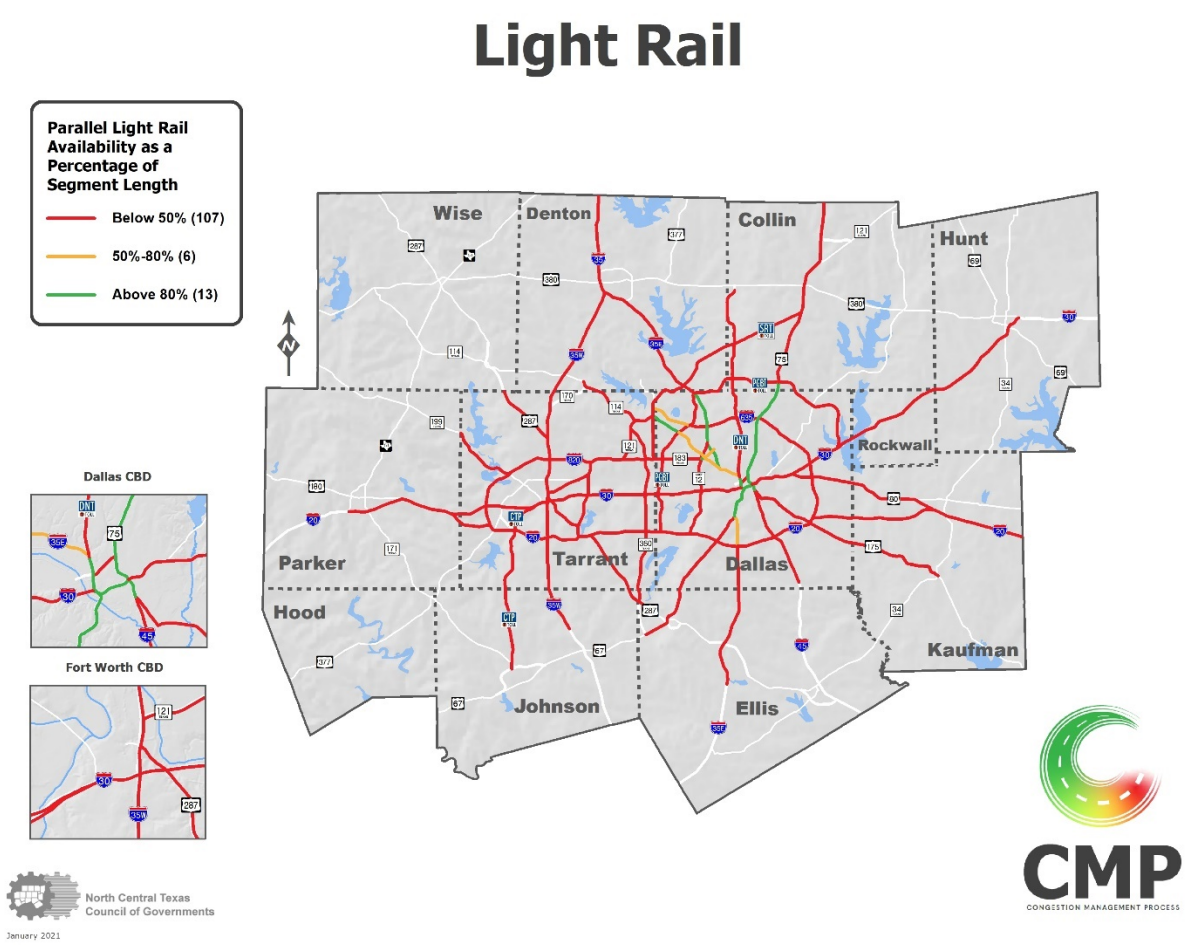
b. Light Rail (10 Points)
Procedure: The input transit dataset is queried to exclude people mover modes. For each CMP corridor, the model searches for parallel light rail segments within two miles of the corridor. The length of these parallel segments is compared to the total length of the corridor to yield a percentage of the corridor that is paralleled by fixed-rail transit. A value of 100% indicates that the corridor is paralleled along its whole length by a transit facility. Note that values may rise above 100% in areas where multiple nearby transit facilities are present.

Rationale: Using Percentage of parallel light rail to corridor length, corridors were broken into three categories.

Cutoff Number
- High >80%
- Medium 50-79.99%
- Low <50%

Points
- High – 10 points
- Medium – 5 points
- Low – 0 points

Number of Segments
- High – 13
- Medium – 6
- Low – 107



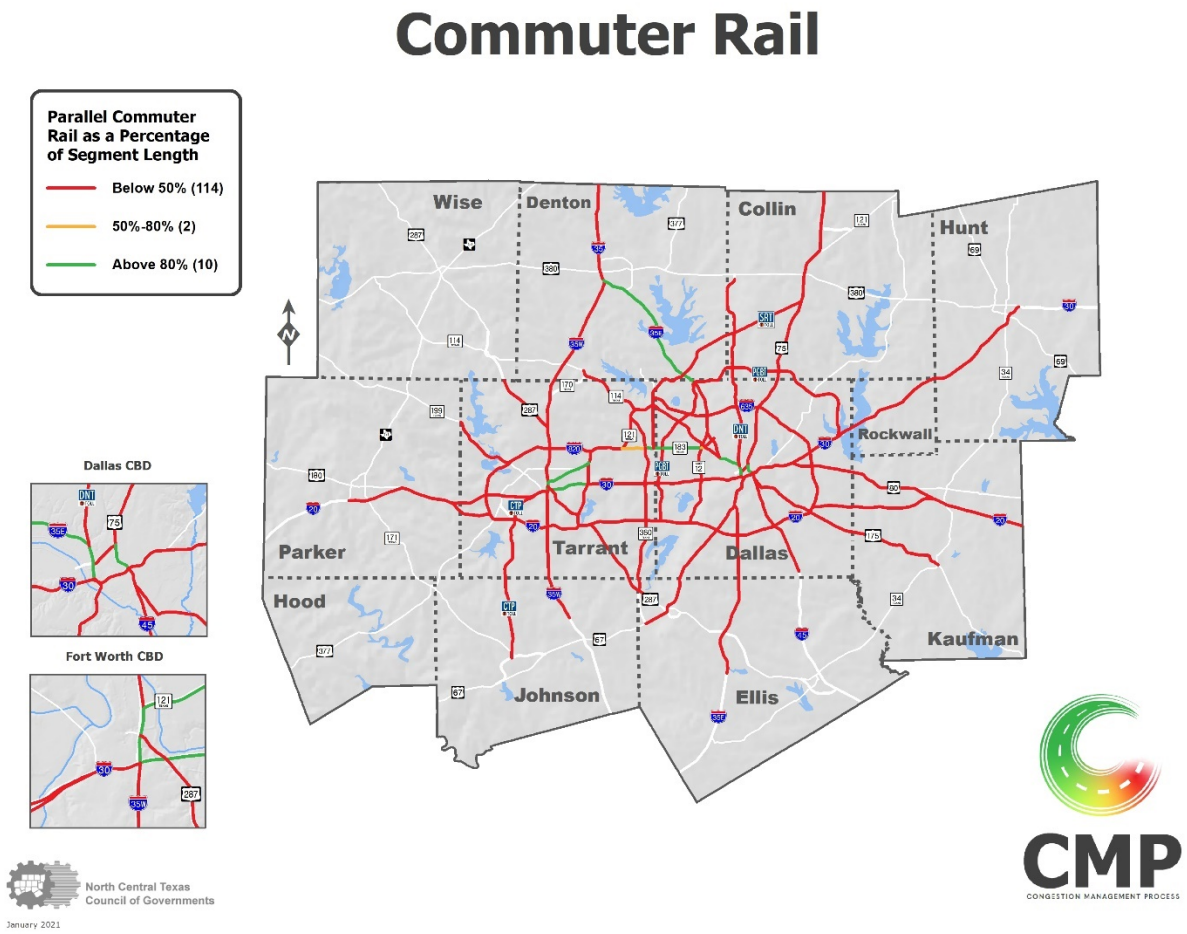
c. Commuter Rail (10 Points)
Procedure: The input transit dataset is queried to exclude people mover modes. For each CMP corridor, the model searches for parallel commuter rail segments within two miles of the corridor. The length of these parallel segments is compared to the total length of the corridor to yield a percentage of the corridor that is paralleled by fixed-rail transit. A value of 100% indicates that the corridor is paralleled along its whole length by a transit facility. Note that values may rise above 100% in areas where multiple nearby transit facilities are present.

Rationale: Using a percentage of parallel commuter rail to corridor length, corridors were broken into three categories.

Cutoff Number
- High >80%
- Medium 50-79.99%
- Low <50%

Points
- High – 10 points
- Medium – 5 points
- Low – 0 points

Number of Segments
High –10
Medium – 2
Low – 114



d. Bus Routes (10 Points)
Procedure: Two models were used to calculate the outcome for this item. The first model functions identically to the previous fixed-rail transit model. For each CMP corridor, the model searches for parallel bus route segments within 2 miles of the corridor. The length of these parallel segments is compared to the total length of the corridor to yield a percentage of the corridor that is paralleled by bus routes. A value of 100% indicates that the corridor is paralleled along its whole length by a bus route. Note that values may rise above 100% in areas where multiple nearby bus routes are present.

Additionally, a second metric was included to reflect density of bus service. This model used General Transit Feed Specification data feeds to analyze how frequent service is in a given area, making a trip substitution more likely. These two metrics were combined to evaluate bus service performance based on geometry and density.

Rationale: Using two different bus metrics, corridors were split into three categories.

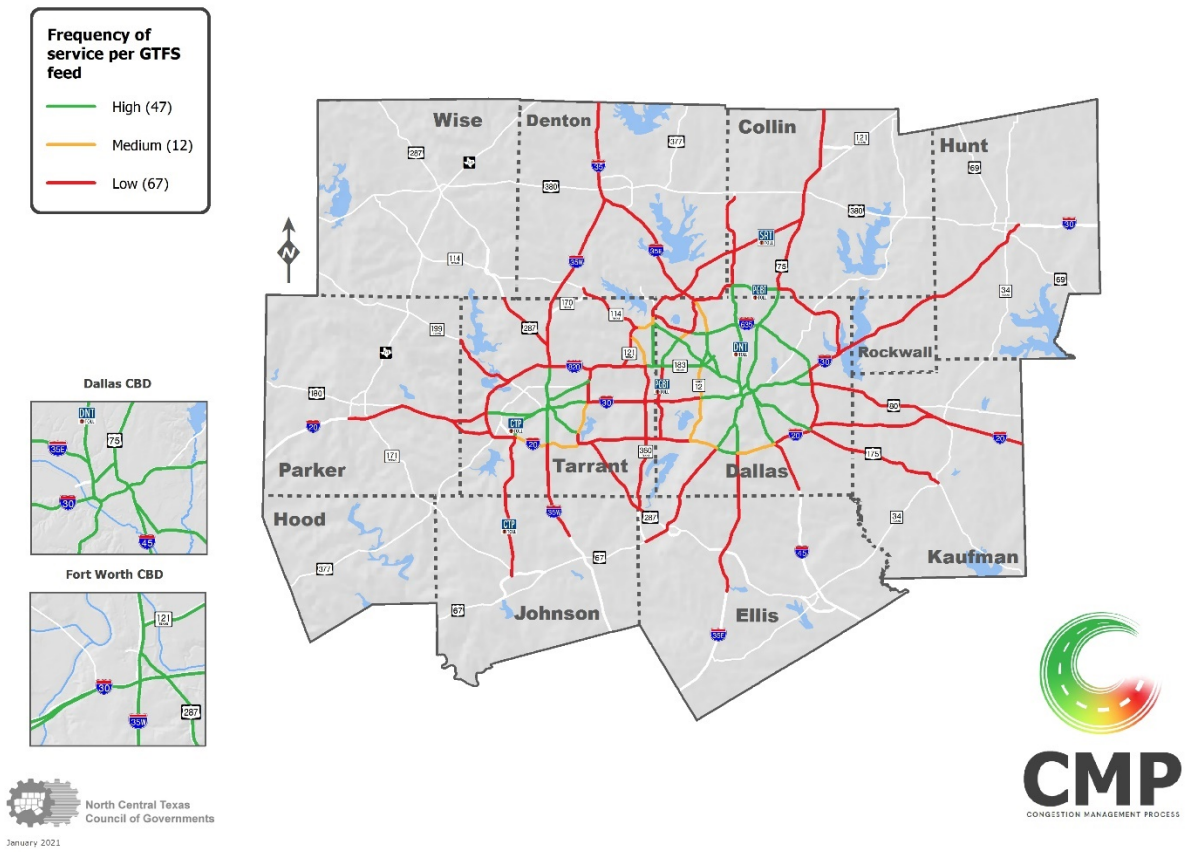
Cutoff Number (Max 5 points for each metric)
- High >80%
- Medium 50-79.99%
- Low <50%

Combined Bus Score
- High – Both High or High and Medium
- Medium – Both Medium or Medium and Low
- Low – Both Low

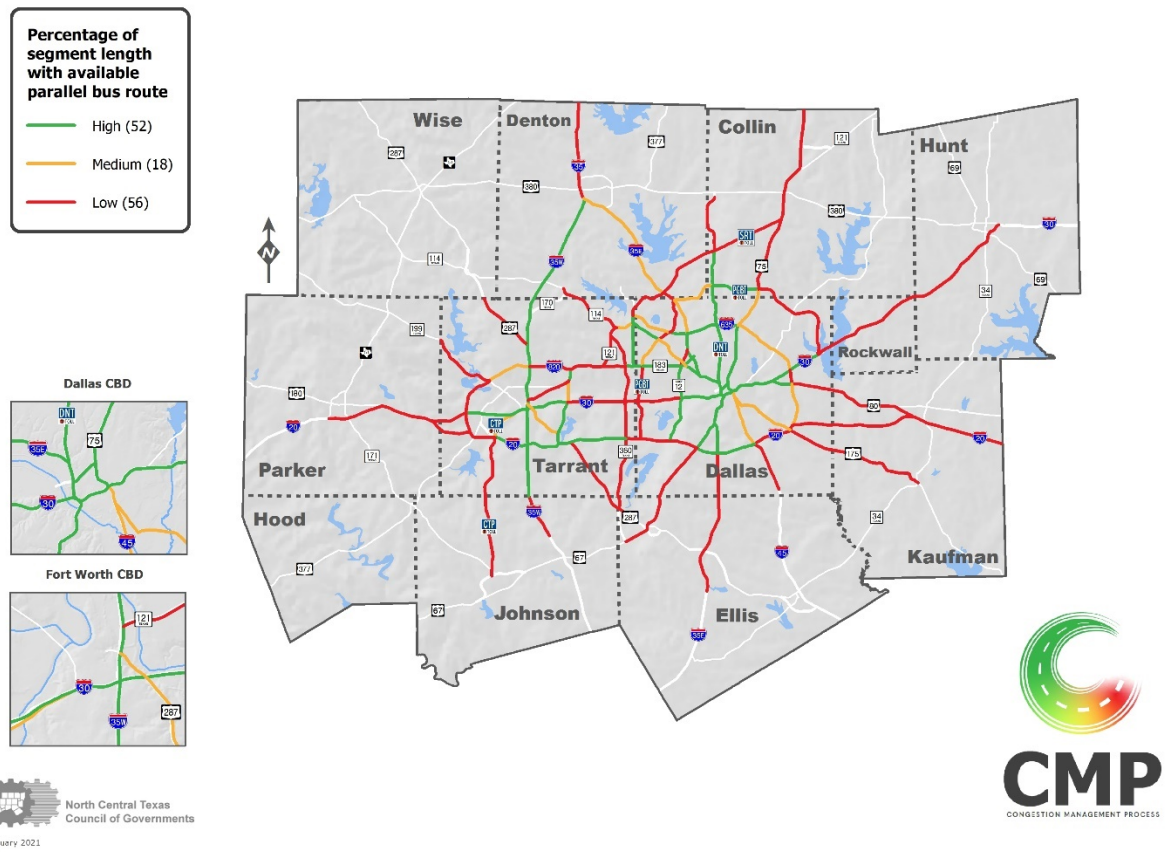
Points
- High – 10 points
- Medium – 5 points
- Low – 0 points

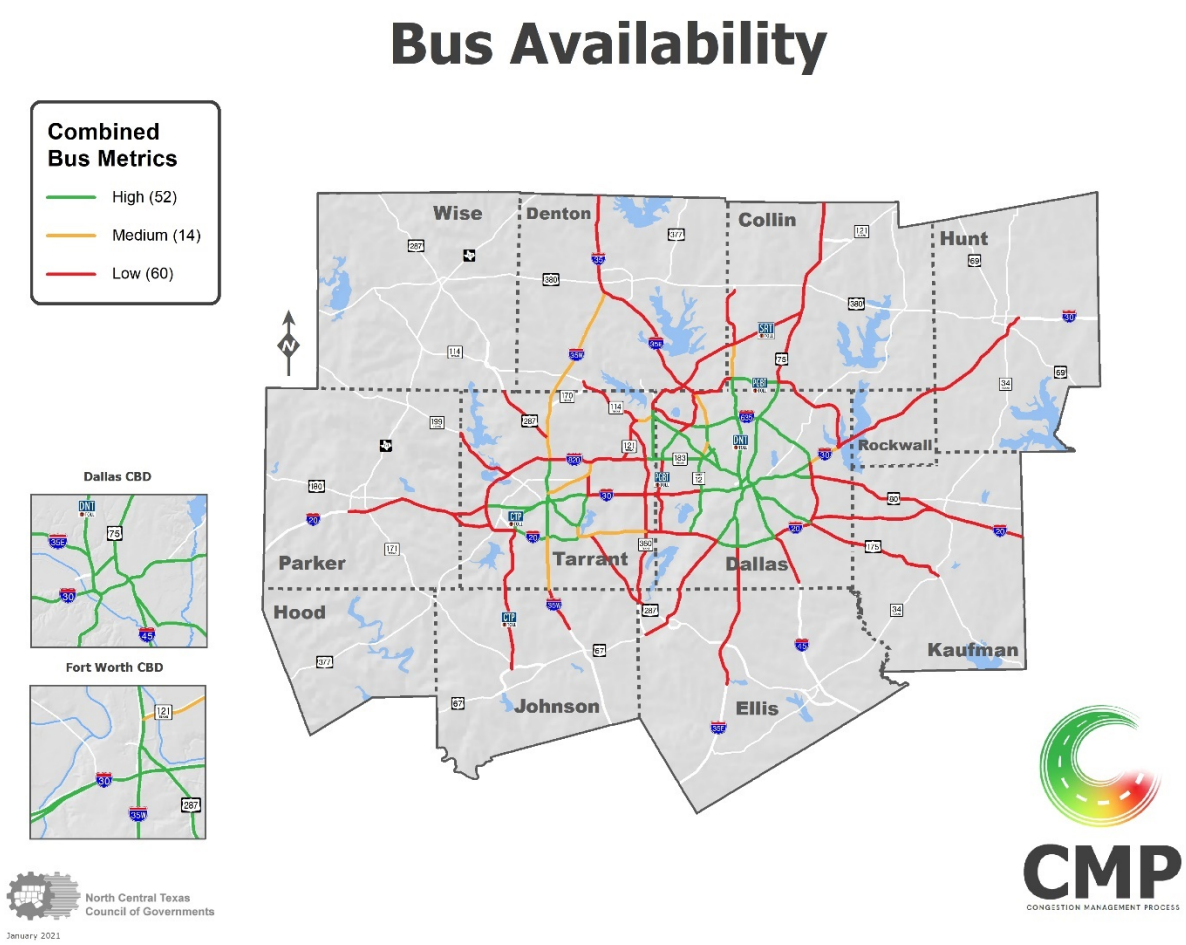
Number of Segments
- High – 52
- Medium – 14
- Low – 60

Bus Route Density



Parallel Bus Route





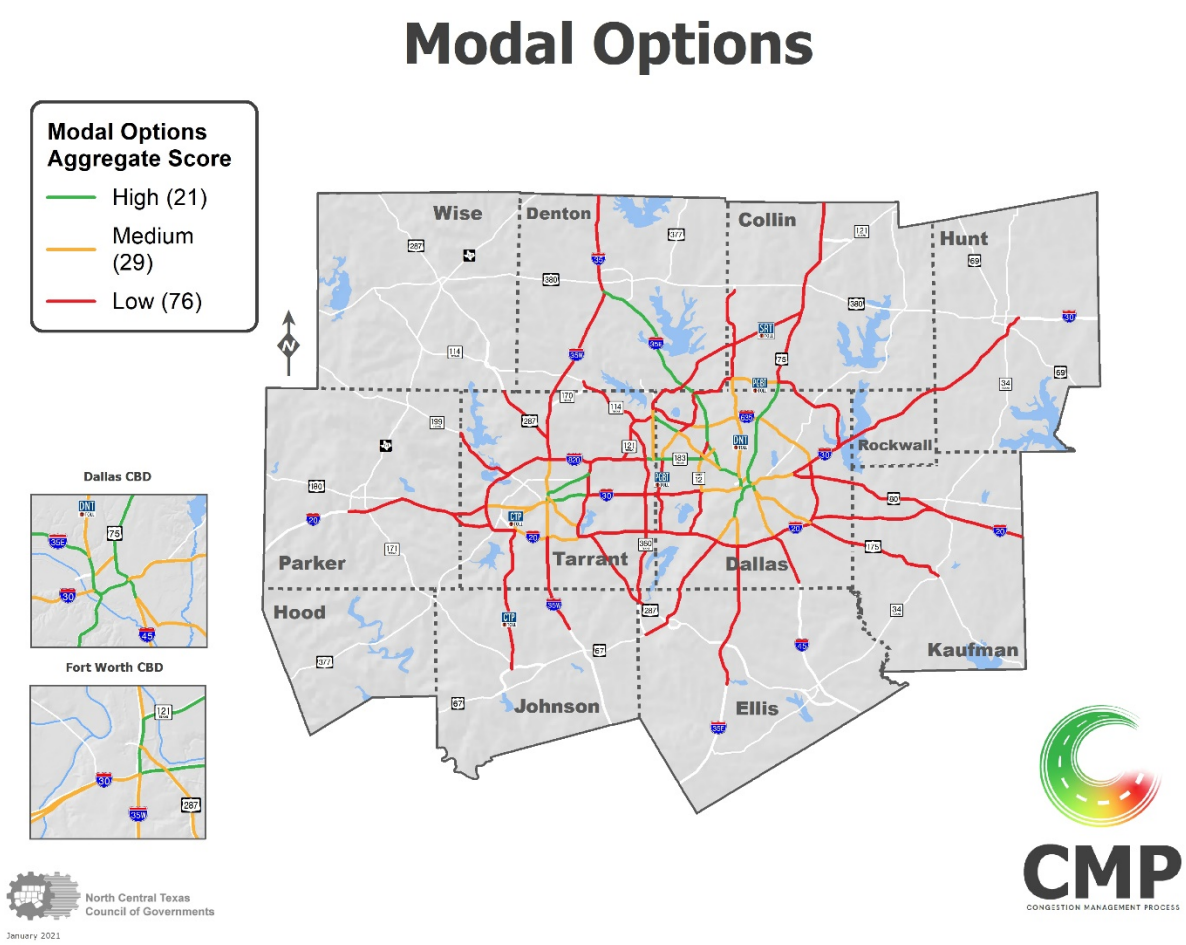
Total Aggregated Modal Options Points

For each model asset listed above, the points are aggregated to determine availability of modal assets within the CMP segment. Based on the aggregated score, a high, medium, or low ranking is identified that will allow that asset to be considered when identifying CMP strategies in a future step.

High >30 Points
Medium 20-29 Points
Low <20 points

Exceptions to Scoring Cutoffs

All corridors receiving maximum points in parallel light or commuter rail were scored as high.



3. Roadway Operations
    a. ITS (7 Points)

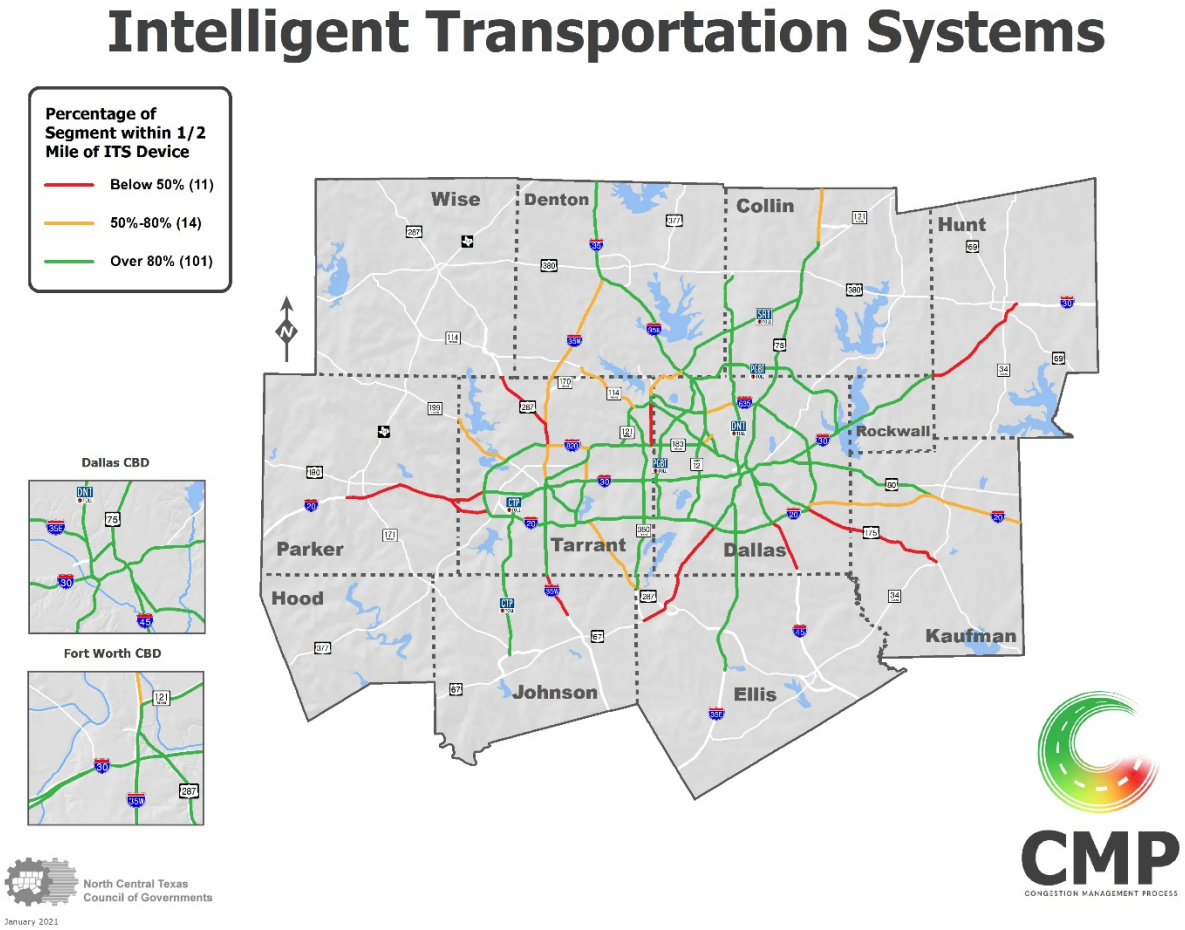
    Procedure: Based on the assumption that ITS equipment could potentially influence travel on facilities within a 1000-foot radius, this model buffers the input points to 1000 feet and dissolves the resulting polygon to yield a single ITS “area of influence” polygon. The model then intersects the CMP corridors with this polygon to yield their total length inside the ITS “area of influence.” This is then compared to the corridor’s total length, yielding a percentage of each corridor that is influenced by ITS equipment.

    Rationale: Using a 1000-foot buffer from ITS devices, corridors were split into three categories based on percentage of corridor falling within a distance of an ITS device.

    Cutoff Number
        High >80%
        Medium 50-79.99%
        Low <50%
    Points
        High – 7 points
        Medium – 3.5 points
        Low – 0 points

Number of Segments

High – 36
Medium – 48
Low – 42



b. Shoulder (5 Points)
Procedure: Segments were manually evaluated using a shapefile from TxDOT's public data portal supplemented with imagery from Google Earth and Google maps to verify due to incomplete data on some corridors.

Rationale: High, medium, and low shoulder classes assigned based on availability of 8 ft. shoulder on inside or outside of segment.

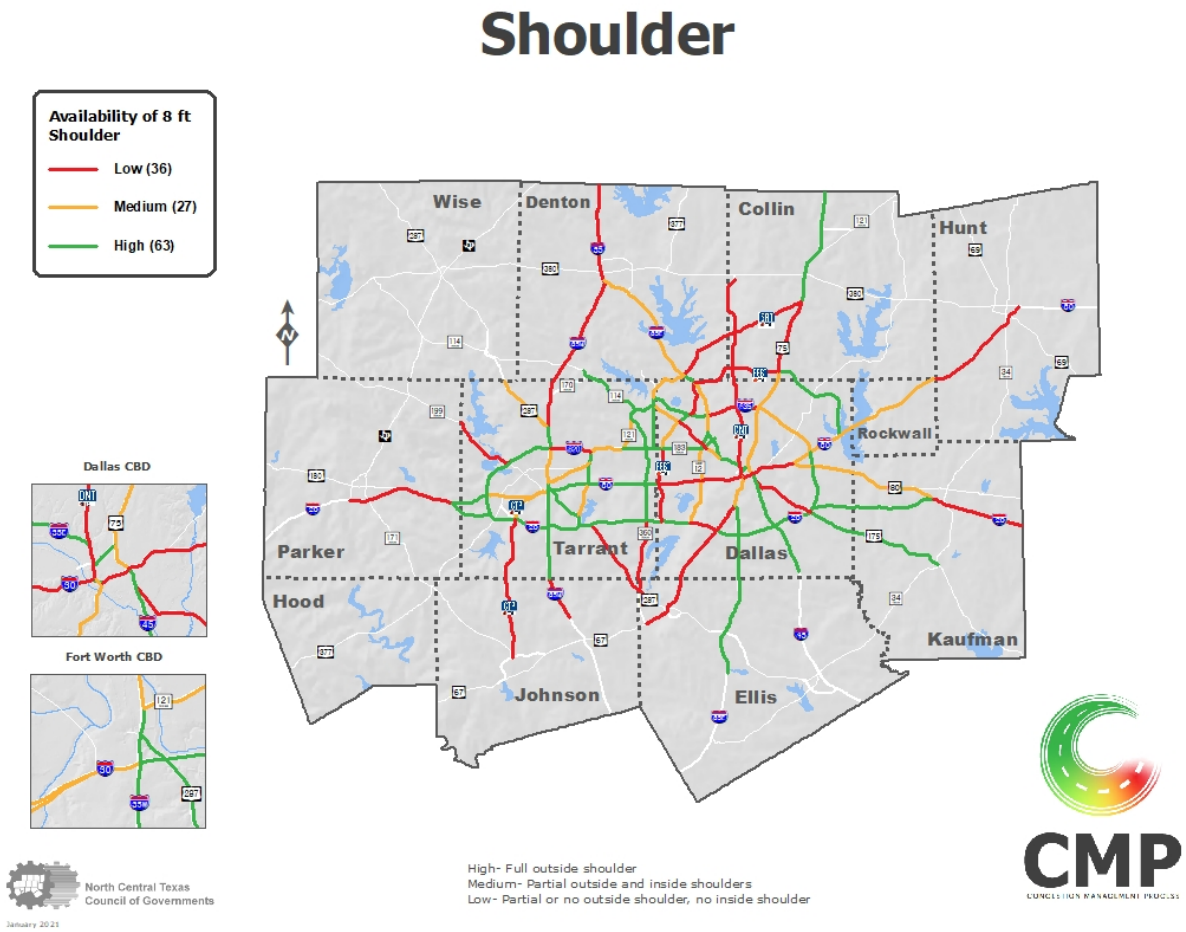
High – Full Outside Shoulder Available
Medium – Partial outside shoulder available, partial, or full inside shoulder available
Low – Partial or no outside shoulder available, no inside shoulder available

Points

High – 5 points
Medium – 2.5 points
Low – 0 points

Number of Segments

High – 63
Medium – 27
Low – 36



c. HOV/Managed Lane (20 Points)
Procedure: This model searches for parallel HOV/managed lane facilities within each CMP corridor using a small 150-foot buffer. The length of these parallel HOV/managed lane facilities is compared to the total length of the CMP corridor to yield a percentage of each corridor that contains an HOV/managed lane facility.

Rationale: Percentage of HOV or managed lane to corridor length was used to break corridors into three categories.

Cutoff Number

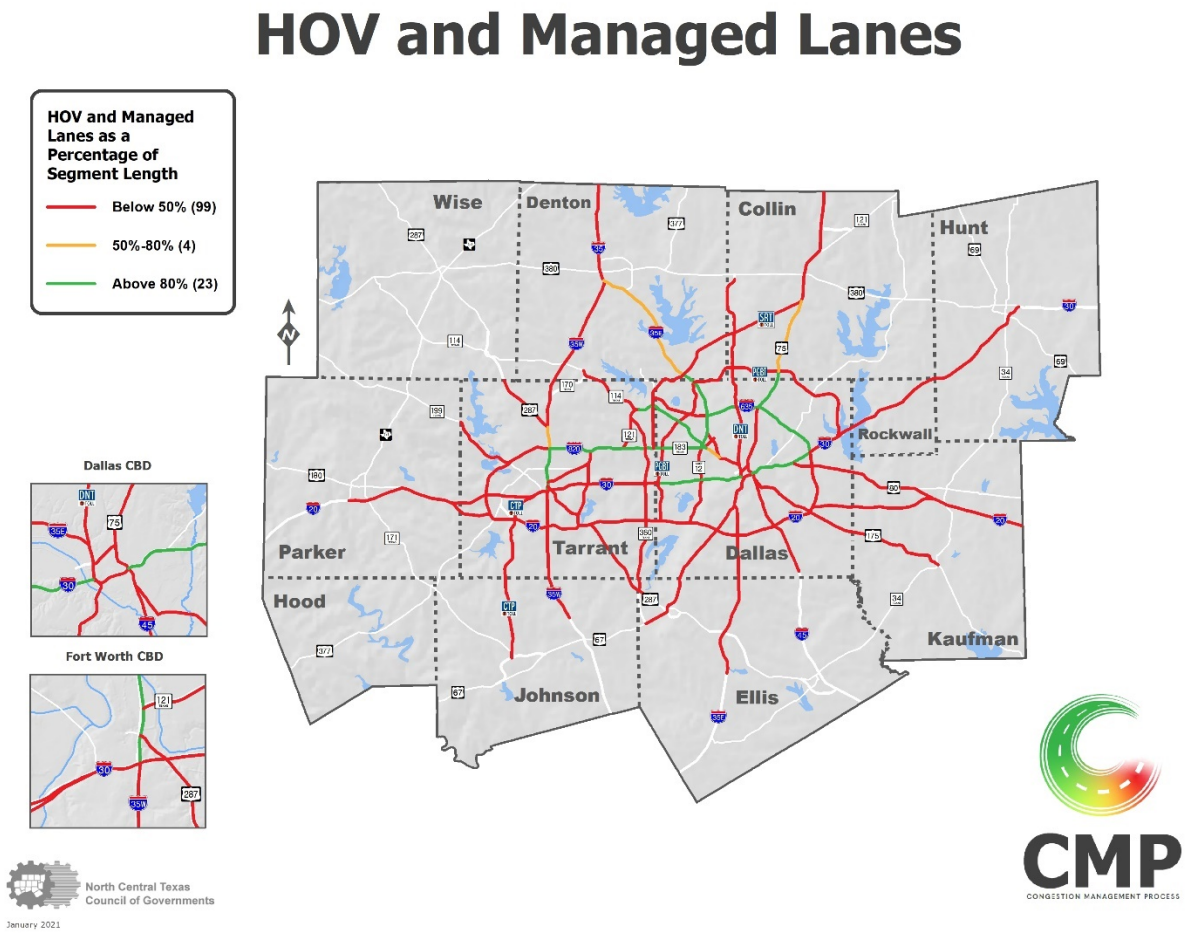
High >80%
Medium 50-79.99%
Low <50%

Points

- High – 20 points
- Medium – 10 points
- Low – 0 points

Number of Segments

- High – 23
- Medium – 4
- Low – 99



d. Truck Lane Restriction (3 Points)
Procedure: This model searches for parallel truck lane restrictions within each CMP corridor using a small 400-foot buffer. The length of the CMP corridor with nearby parallel truck lane restrictions is compared to the total length of the CMP corridor to yield a percentage of each corridor that contains truck lane restrictions.

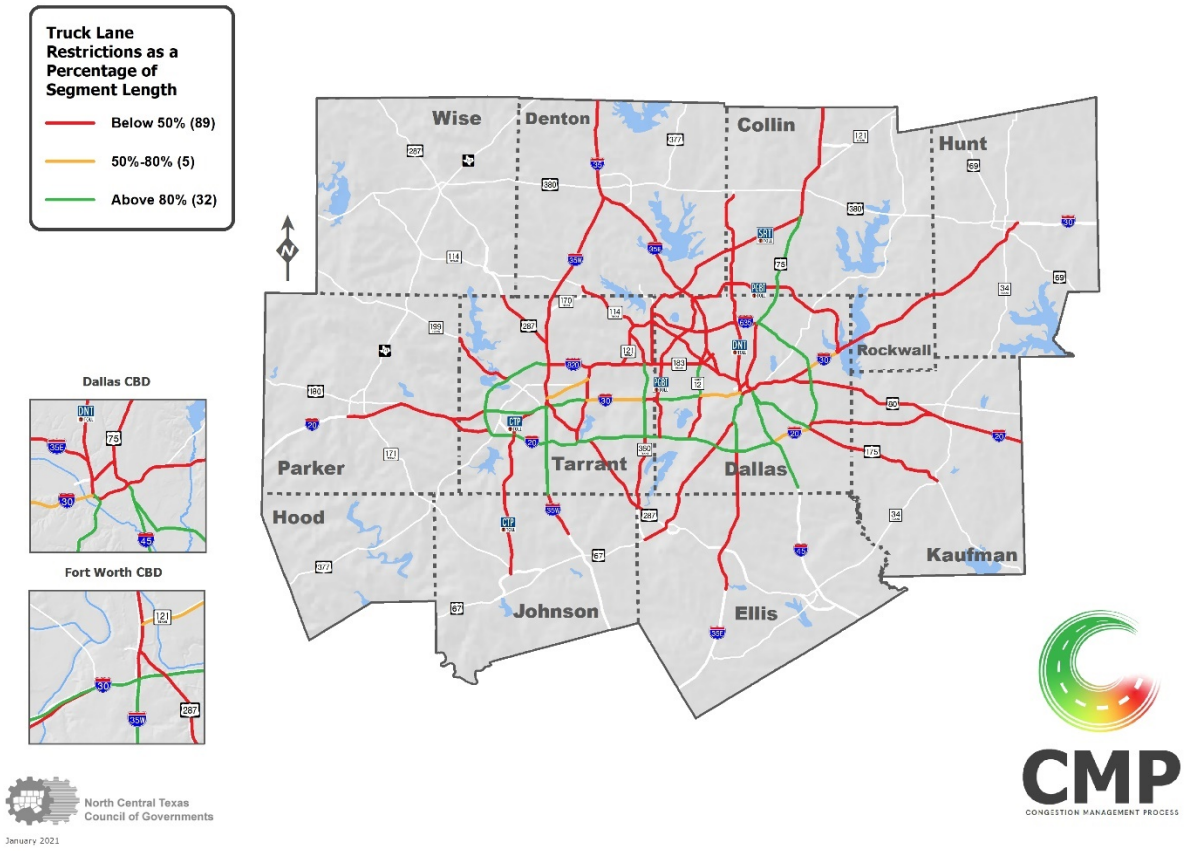
Rationale: Percentage of truck lane restrictions to corridor length was used to break corridors into three categories.

Cutoff Number
- High >80%
- Medium 50-79.99%
- Low <50%

Points
- High – 3 points
- Medium – 1.5 points
- Low – 0 points

Number of Segments
- High – 37
- Low – 89

Truck Lane Restrictions



Roadway Operations Asset Points

For each roadway operations asset listed above, the points are aggregated to determine availability of roadway operations assets within the CMP segment. Based on the aggregated score, a high, medium, or low ranking is identified that will allow that asset to be considered when identifying CMP strategie**s** in a future step.

High >30 Points
Medium 20-29 Points
Low <20 points

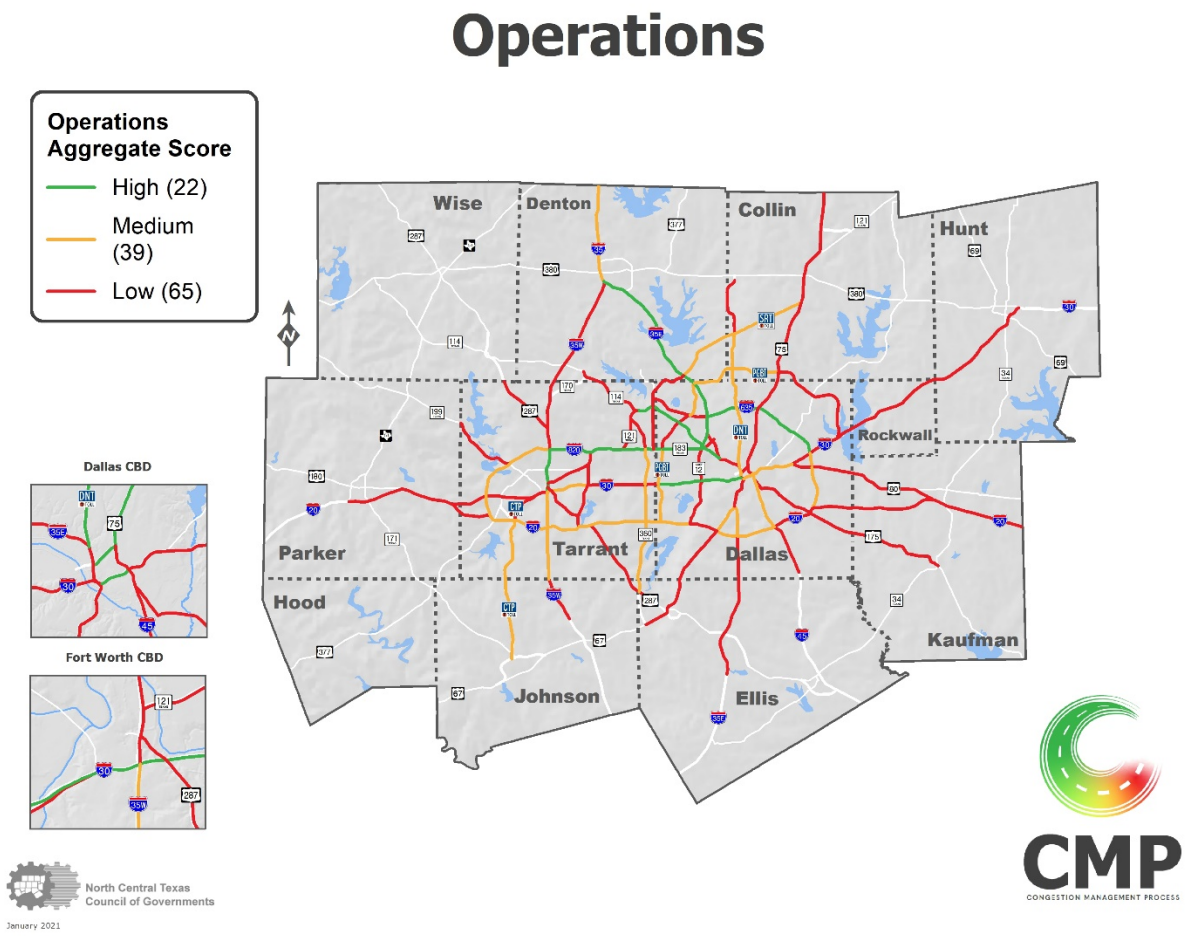
Exceptions to Scoring Cutoffs

Corridors receiving maximum points for HOV/Managed Lanes were scored as high.

Corridors receiving maximum points in ITS received a minimum score of medium.

Please note the following assets were considered but were not evaluated in the roadway operations asset inventory:

- Freight Route
- Traffic Incident Management Participation Percentages
- Mobility Assistance/Courtesy Patrol Coverage



Asset statements were written based on combinations of scores from each of the three categories; roadway infrastructure, modal options, and roadway operations assets. These statements were written based on asset availability in each category to be used with corridor performance statements. The link below provides a table with the various corridor statements.

CMP tables: CMP Scenario Calculator.xlsx

The next step in the process was to evaluate construction within each corridor limits. The congestion management statement was combined with construction information.

Construction Inventory

Procedure: This process assumes that corridor deficiencies will be resolved with major construction completed after data collection. Additionally, corridors with major construction programmed in the Transportation Improvement Program were removed from consideration for the assumption that these projects would be underway prior to congestion management intervention. Resources utilized to identify these corridors included the TxDOT Project Tracker Website and the Transportation Improvement Program. For this effort, corridors that were recently constructed, as of 2018, were included in the listing. In addition, this inventory considered construction of the entire corridor as well as any partial corridor construction.

Rationale: Segments were manually examined for portions of segments currently under construction. All construction project types were considered in analysis.

Number of Segments

Full Construction – 25

These are corridors with existing or funded construction the entire length of the corridor. These corridors will fall in the category of continue to monitor as construction activity has a positive impact on the corridor and should resolve performance deficiencies.

Partial Construction – 28

These are corridors with existing or funded construction on a portion of the corridor. These corridors will fall in the category of continue to monitor as construction activity has a positive impact on the corridor and should resolve performance deficiencies.

Recent Construction – 8

These are corridors with full or partial construction that was completed between 2018 and present. These corridors will fall in the category of continue to monitor as construction activity has a positive impact on the corridor and should resolve performance deficiencies.

No Construction – 65

Following the three steps above, the Corridor Asset Statements were combined with Corridor Performance Statements to determine a corridor category. This information was used to place corridors in “Action Groups,” listed below.

i. Continue to Monitor (45)

Corridors that were sufficient in all categories. These corridors were not noted as needing improvement in the five categories considered in performance criteria.

ii. Construction (61)
    - Full (25), Partial (28), Recent (8)
    - These corridors may be considered under their pre-construction statement following completion of construction. Ideally, construction activity has a positive impact on the corridor, resolving performance deficiencies.

iii. Rehab (3)
    These corridors fall into a category which only raises performance issue in bridge or pavement conditions. These items will not be considered for CMP strategies and will be passed along to our partner agency maintenance contacts.

iv. CMP Strategies (16)
    These corridors were noted as strong candidates for congestion management strategies based on matching performance deficiency with asset availability. These corridors can be improved through implementation of a CMP strategy.

v. Corridor Study (1)
    These corridors are deficient in aspects that cannot be solved using CMP strategies.

The final step in the process is to identify possible congestion management strategies for all corridors that fell in the category of CMP Strategies.

CMP Strategies

Congestion management strategies are selected using the process outlined below:

- All feasible congestion management strategies are identified.
- Following evaluation previously outlined, corridors resulting in a “CMP Strategy” output are identified.
- Using the tables linked below, each strategy is assigned a score for corridors based on matching assets with those identified for each strategy.
    - Assets are selected based on which infrastructure is necessary to implement a given strategy.
    - Assets are sorted into primary and secondary categories.
    - Corridors are given one point for any primary assets present and one-half point for any secondary assets present.
    - Assets and performance measures are evaluated on the same criteria as outlined in the evaluation previously, receiving points for assets for corridors that were evaluated as “high” availability.
    - Corridors are evaluated based on what percentage of maximum points it received for each given strategy, then evaluated manually for a potential fit.
    - Strategies with no necessary infrastructure will be considered for all corridors which are candidates for CMP strategies.
- Process will be used to narrow list of CMP strategies used for selection by an expert working group, to review and recommend strategies for funding in the Transportation Improvement Program.

List of CMP Strategies and associated items: CMPStrategyTables.docx