



Highway Improvements

In order to identify and prioritize candidates for highway freight improvements, Iowa DOT utilized the Value, Condition, and Performance (VCAP) matrix. This approach takes advantage of multiple tools available at Iowa DOT including the Freight Mobility Issues Survey, Iowa Travel Analysis Model (iTRAM), Infrastructure Condition Evaluation (ICE) tool, INRIX traffic speed data, and Iowa’s annual traffic counts. Below is a description of the prioritization process and an example of the VCAP matrix.

Example VCAP matrix

| MAP ID | LOCATION | VALUE | | CONDITION | | PERFORMANCE | | TIEBREAK | | PRIORITY RANK |
|--------|----------|-------|----------|-----------|----------|-------------|----------|-----------------|--------------|---------------|
| | | ITRAM | "V" RANK | ICE | "C" RANK | INRIX | "P" RANK | AVERAGE RANKING | TRUCK VOLUME | |
| 1 | | | | | | | | | | 1 |
| 2 | | | | | | | | | | 2 |
| 3 | | | | | | | | | | 3 |
| 4 | | | | | | | | | | 4 |
| 5 | | | | | | | | | | 5 |

Location list (Freight Mobility Issues Survey)

Iowa DOT initially developed a draft list of highway locations with freight mobility issues. This was completed by analyzing INRIX traffic speed data that can, among other things, identify “bottleneck” locations in the state and the number of times each occurs throughout the year. This data was retrieved for 2014 and overlaid with Iowa DOT truck traffic count data. INRIX bottleneck locations that occurred in each quarter of the year and had either 30 percent truck traffic or more than 5,000 total trucks per day were flagged as locations with potential freight mobility issues.

This draft list was presented to the Iowa Freight Advisory Council (FAC) for input and was sent to the Iowa DOT Transportation District offices, Metropolitan Planning Organizations (MPOs), and Regional Planning Affiliations (RPAs). Each of these groups was asked to review the list, make necessary additions, and assign priority votes to each location. This was used to populate the initial candidate list.

Value (Iowa Travel Analysis Model - iTRAM)

iTRAM is a statewide travel demand model used in the evaluation of Iowa’s transportation system. The first generation was completed in 2009 and the focus of this model version was to accurately predict the number of automobiles and trucks on the current primary road network, and then project traffic in the future. The second generation of iTRAM builds upon the original statewide model architecture and incorporates two additional model components: passenger and freight movement on the rail system.

This tool is used to evaluate the value of each project location to the overall freight transportation network. A run of the model was completed first to show a base case scenario. Then, a second series of runs was completed that excluded each one of the candidate locations individually. After each run, the truck vehicle hours traveled (VHT) was compared to the base case and the difference was assigned as the value of the location. Higher priority was assigned to locations with larger VHT increases when excluded from the network. In other words, higher priority was assigned to locations that make the truck network more efficient from a VHT perspective.

Condition (Infrastructure Condition Evaluation – ICE)

The ICE tool was developed originally as a tool for evaluating the interstate highway system based on seven criteria: Pavement Condition Index (PCI), International Roughness Index (IRI), structure sufficiency rating, passenger traffic, single unit truck traffic, combination truck traffic, and congestion. A normalization and weighting process is applied to each criterion and used to analyze



highway segments before ultimately ranking them against each other based upon a final composite rating. The original tool was then expanded to the entire primary highway system in Iowa.

ICE was used to evaluate the current condition of each candidate location. The segments that make up each location were analyzed using the seven criteria and the normalization and weighting processes that had already been established. This resulted in a composite ICE rating for each location. The process was completed for each individual candidate location.

Performance (INRIX Bottleneck Ranking tool)

As mentioned in the “Freight Mobility Issue Survey” section, INRIX has a tool that identifies and ranks bottleneck locations. This tool, with additional analysis using traffic data, was used to develop a draft list of highway locations with freight mobility issues. To determine the performance ranking of each project location, the number of annual bottleneck occurrences for each location was used.

VCAP matrix (final ranking and prioritization)

After each candidate location was assigned a Value, Condition, and Performance rating, each was ranked using those values for each of the three categories. The average of these three rankings was calculated and the candidate locations were assigned an overall priority rank. If two locations had the same average ranking, total truck traffic at the location was used as a tiebreaker. See the figures and tables below for VCAP results and Iowa’s highway freight priority locations.

Summary of the prioritization process:

1. *Freight Mobility Issues Survey*
 - *Populate initial improvement list*
2. *Iowa Travel Analysis Model (iTRAM)*
 - *Complete analysis and then rank each location*
3. *Infrastructure Condition Evaluation (ICE) tool*
 - *Complete analysis and then rank each location*
4. *INRIX Bottleneck Ranking tool*
 - *Complete analysis and then rank each location*
5. *Average the three rankings*
6. *Truck traffic counts*
 - *Tiebreaker if necessary*

| | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
|--------|----------|-------|----------|-----------|----------|-------------|----------|-----------------|--------------|---------------|--|---|---|
| | | VALUE | | CONDITION | | PERFORMANCE | | | | TIEBREAK | | | |
| MAP ID | LOCATION | ITRAM | "V" RANK | ICE | "C" RANK | INRIX | "P" RANK | AVERAGE RANKING | TRUCK VOLUME | PRIORITY RANK | | | |
| 1 | | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | | 2 |
| 3 | | | | | | | | | | | | | 3 |
| 4 | | | | | | | | | | | | | 4 |
| 5 | | | | | | | | | | | | | 5 |

| MAP ID | LOCATION | VALUE | | CONDITION | | PERFORMANCE | | AVERAGE RANKING | TIEBREAK | PRIORITY RANK |
|--------|--|--------|----------|-----------|----------|-------------|----------|-----------------|--------------|---------------|
| | | ITRAM | "V" RANK | ICE | "C" RANK | INRIX | "P" RANK | | TRUCK VOLUME | |
| 1 | I-29 N/S @ I-129/US-20/US-75/EXIT 144 | 36.03 | 53 | 78.39 | 63 | 756 | 8 | 41.33 | 4653 | 38 |
| 2 | I-29 N/S @ OLD IA-75/INDUSTRIAL RD/EXIT 143 | 4.78 | 72 | 82.13 | 78 | 815 | 7 | 52.33 | 4030 | 63 |
| 3 | I-29 N/S @ EXIT 134 | 3.17 | 78 | 86.04 | 91 | 35 | 57 | 75.33 | 3945 | 92 |
| 4 | I-29 N/S @ IA-141/EXIT 127 | 7.80 | 67 | 81.89 | 74 | 10 | 72 | 71.00 | 3729 | 85 |
| 5 | US-30 E/W THROUGH MISSOURI VALLEY | 21.80 | 58 | 54.31 | 3 | 1563 | 4 | 21.67 | 993 | 6 |
| 6 | I-29/680 N/S @ ROSEWOOD RD | 15.91 | 60 | 86.35 | 92 | 49 | 53 | 68.33 | 4057 | 81 |
| 7 | I-29 N @ CR-L31/EXIT 24 | 1.60 | 85 | 92.00 | 94 | 14 | 71 | 83.33 | 3425 | 94 |
| 8 | IA-2 W @ CR-L31/195TH AVE & I-29 N/S @ IA-2/EXIT 10 | 122.64 | 15 | 85.98 | 90 | 1256 | 5 | 36.67 | 2750 | 29 |
| 9 | IA-3 W @ US-71/130TH ST | 70.28 | 28 | 75.71 | 57 | 0 | 73 | 52.67 | 550 | 65 |
| 10 | IA-4 S @ US-20/270TH ST | 4.30 | 74 | 84.42 | 86 | 169 | 28 | 62.67 | 682 | 75 |
| 11 | US 30 E/W @ US-59/IA-141 | 60.33 | 33 | 70.81 | 41 | 387 | 15 | 29.67 | 1377 | 11 |
| 12 | I-80 W @ 385TH ST | 169.38 | 5 | 73.34 | 46 | 14 | 69 | 40.00 | 8158 | 36 |
| 13 | I-35 N @ US-18/EXIT 194 | 84.40 | 25 | 80.80 | 70 | 89 | 43 | 46.00 | 5452 | 51 |
| 14 | I-35 N @ CR-C47/EXIT 159 | 1.61 | 84 | 81.41 | 72 | 31 | 62 | 72.67 | 4125 | 90 |
| 15 | I-35 N/S @ US-20/EXIT 142 & US-20 E/W @ I-35/EXIT 153 | 114.43 | 17 | 73.91 | 51 | 420 | 14 | 27.33 | 5559 | 8 |
| 16 | I-35 S @ CR-D65/EXIT 128 | 2.33 | 81 | 79.44 | 67 | 17 | 68 | 72.00 | 6308 | 87 |
| 17 | I-35 N/S @ US-30/EXIT 111 & US-30 E/W @ I-35/EXIT 151 | 131.58 | 13 | 77.55 | 61 | 336 | 19 | 31.00 | 7633 | 17 |
| 18 | I-35 N/S FROM IA-210 TO US-30 | 149.62 | 9 | 63.76 | 21 | 0 | 73 | 34.33 | 7964 | 23 |
| 19 | I-35 N/S FROM NE 126TH AVE TO IA-210 | 142.71 | 11 | 64.93 | 22 | 0 | 73 | 35.33 | 8277 | 25 |
| 20 | I-35 N/S FROM 36TH ST TO NE 126TH AVE | 136.96 | 12 | 72.42 | 45 | 0 | 73 | 43.33 | 7957 | 44 |
| 21 | I-35 N/S @ FILLMORE ST (MP 61.5) | 99.75 | 20 | 75.37 | 55 | 0 | 73 | 49.33 | 5517 | 60 |
| 22 | I-35 N/S @ HOOVER ST (MP 58.5) | 99.86 | 19 | 75.37 | 54 | 0 | 73 | 48.67 | 5517 | 57 |
| 23 | I-35 N/S @ G-50/EXIT 52 | 6.20 | 68 | 84.86 | 87 | 68 | 50 | 68.33 | 5079 | 80 |
| 24 | I-35 N @ QUAKER ST (MP 49.1) | 166.54 | 6 | 80.45 | 68 | 0 | 73 | 49.00 | 5144 | 58 |
| 25 | I-35 N/S @ G-64/EXIT 47 | 3.10 | 79 | 85.49 | 88 | 90 | 42 | 69.67 | 5032 | 83 |
| 26 | I-35 N/S @ ROBIN ST (MP 40.8) | 172.88 | 4 | 88.10 | 93 | 0 | 73 | 56.67 | 5076 | 72 |
| 27 | IA-14 N/S FROM MARSHALLTOWN NCL TO IA-330 | 11.10 | 63 | 62.08 | 17 | 576 | 12 | 30.67 | 542 | 16 |
| 28 | IA 14 N/S @ DES MOINES RIVER | 30.49 | 55 | 66.00 | 26 | 88 | 44 | 41.67 | 416 | 39 |
| 29 | US 34 E/W @ IA-14 | 0.30 | 91 | 83.66 | 83 | 167 | 29 | 67.67 | 526 | 79 |
| 30 | US 63 N/S FROM IA-146 TO IA-85 | 5.83 | 70 | 81.57 | 73 | 0 | 73 | 72.00 | 393 | 88 |
| 31 | US 63 N/S @ IA-146 | 3.38 | 76 | 80.55 | 69 | 0 | 73 | 72.67 | 499 | 91 |
| 32 | US 63 N/S THROUGH OSKALOOSA | 3.94 | 75 | 56.19 | 5 | 143 | 32 | 37.33 | 633 | 31 |
| 33 | US-34 E/W FROM QUINCY AVE TO ROUNDABOUT | 5.28 | 71 | 66.50 | 28 | 14 | 69 | 56.00 | 699 | 71 |
| 34 | US 34 E/W @ US-63 (ROUNDABOUT) | -0.51 | 93 | 76.06 | 59 | 580 | 10 | 54.00 | 826 | 66 |
| 35 | US-34 E/W FROM ROUNDABOUT TO US-34/US-63 | 4.61 | 73 | 76.82 | 60 | 580 | 10 | 47.67 | 1122 | 55 |
| 36 | US 63 N/S @ 0.9 MILES S OF US-34 | 39.28 | 50 | 70.60 | 40 | 0 | 73 | 54.33 | 595 | 69 |
| 37 | US 63 N/S FROM OTTUMWA SCL TO IA-2 | 43.28 | 45 | 73.57 | 48 | 103 | 39 | 44.00 | 530 | 46 |
| 38 | US-63 N/S @ IA-2 | 6.00 | 69 | 82.00 | 75 | 548 | 13 | 52.33 | 447 | 64 |
| 39 | US 63 N/S FROM IA-2 TO MISSOURI STATE LINE | 40.75 | 48 | 79.00 | 65 | 331 | 20 | 44.33 | 432 | 47 |
| 40 | IA-150 N/S THROUGH INDEPENDENCE | 31.86 | 54 | 49.54 | 1 | 0 | 73 | 42.67 | 696 | 41 |
| 41 | US-61 S @ IA-92/GRANDVIEW AVE | 23.63 | 57 | 70.84 | 42 | 114 | 36 | 45.00 | 1862 | 49 |
| 42 | IA 78 E/W @ 2.0 MILES W OF W-66 | 0.60 | 89 | 83.00 | 81 | 0 | 73 | 81.00 | 122 | 93 |
| 43 | US-61 N/S THROUGH BURLINGTON | 18.63 | 59 | 61.30 | 15 | 172 | 27 | 33.67 | 1107 | 21 |
| 44 | IA-32 N/S @ CHAVENELLE RD | 1.63 | 83 | 61.20 | 14 | 0 | 73 | 56.67 | 1066 | 73 |
| 45 | US-52 N/S @ IA-3 | 2.27 | 82 | 65.53 | 24 | 303 | 22 | 42.67 | 731 | 40 |
| 46 | US-20 E/2 @ IA-946 | 55.22 | 35 | 58.80 | 8 | 79 | 48 | 30.33 | 2212 | 15 |
| 47 | US-151 N/S @ MAQUOKETA DR | 53.29 | 38 | 57.36 | 6 | 1040 | 6 | 16.67 | 2115 | 2 |
| 48 | I-80/29 N/S THROUGH COUNCIL BLUFFS | 60.79 | 32 | 52.82 | 2 | 374 | 16 | 16.67 | 13579 | 1 |
| 49 | I-29 N @ MILLS/POTTAWATTAMIE COUNTY LINE & I-29 N/S @ IA-370 | 175.72 | 3 | 83.93 | 84 | 40 | 56 | 47.67 | 4253 | 54 |
| 50 | I-35 S @ IA-5/ARMY POST RD/EXIT 68 | 63.04 | 31 | 82.35 | 79 | 49 | 53 | 54.33 | 5638 | 67 |
| 51 | I-80/I-35/I-235 N/S, E/W @ SW MIX MASTER | 92.24 | 22 | 73.83 | 50 | 365 | 18 | 30.00 | 6870 | 13 |
| 52 | I-35/80 N/S, E/W FROM SW MIX MASTER TO UNIVERSITY AVE | 29.11 | 56 | 71.89 | 44 | 18 | 67 | 55.67 | 13548 | 70 |
| 53 | I-35/80 N/S, E/W FROM UNIVERSITY AVE TO US-6/HICKMAN RD | 10.37 | 64 | 61.50 | 16 | 97 | 40 | 40.00 | 14092 | 35 |
| 54 | I-35/80 N/S @ US 6/HICKMAN | 53.37 | 37 | 58.96 | 9 | 61 | 51 | 32.33 | 12804 | 19 |
| 55 | I-35/80 N/S @ DOUGLAS AVE | 52.83 | 41 | 59.84 | 11 | 116 | 34 | 28.67 | 12884 | 9 |
| 56 | I-35/80 N/S, E/W FROM DOUGLAS AVE TO IA-141 | 41.47 | 47 | 59.15 | 10 | 0 | 73 | 43.33 | 13339 | 42 |
| 57 | I-35/80 N/S, E/W @ IA-141 | 49.26 | 43 | 61.17 | 13 | 2036 | 2 | 19.33 | 12761 | 4 |
| 58 | I-35/80 N/S, E/W FROM IA-141 TO NW 86TH ST | 36.33 | 52 | 62.59 | 18 | 0 | 73 | 47.67 | 13858 | 53 |
| 59 | I-35/80 N/S, E/W FROM NW 86TH ST TO MERLE HAY RD | 67.38 | 30 | 63.59 | 20 | 45 | 55 | 35.00 | 14089 | 24 |
| 60 | I-35/80 N/S, E/W FROM MERLE HAY RD TO IA-415 | 75.78 | 27 | 57.96 | 7 | 30 | 63 | 32.33 | 14124 | 18 |
| 61 | I-35/80 N/S, E/W FROM IA-415 TO US-69 | 53.25 | 40 | 63.50 | 19 | 33 | 59 | 39.33 | 13917 | 33 |
| 62 | I-35/80 N/S, E/W FROM US-69 TO NE MIX MASTER | 56.34 | 34 | 60.45 | 12 | 0 | 73 | 39.67 | 13478 | 34 |
| 63 | I-35 N/I-235 W @ I-80/I-235/EXIT 87 & I-80 E/W @ I-235/I-35/EXIT 137 | 119.00 | 16 | 78.31 | 62 | 226 | 25 | 34.33 | 11709 | 22 |
| 64 | I-80 E/W @ US-65/EXIT 141 | 38.21 | 51 | 66.59 | 29 | 147 | 30 | 36.67 | 10379 | 28 |
| 65 | US-6 E @ I-80 (EAST) & US-65 N/S @ I-80/US-6/NE HUBBELL AVE/EXIT 142 | 44.08 | 44 | 84.38 | 85 | 9375 | 1 | 43.33 | 9601 | 43 |
| 66 | IA 160 E/W @ I-35 & I-35 N/S @ IA-160/ EXIT 90 | 108.67 | 18 | 69.29 | 36 | 114 | 35 | 29.67 | 8331 | 10 |
| 67 | US 69 N/S FROM I-35/80 TO ANKENY SCL | -3.79 | 94 | 65.73 | 25 | 88 | 44 | 54.33 | 1406 | 68 |
| 68 | IA 415 N/S @ 0.6 MILES S OF I-35/80 (RR BRIDGE) | 1.59 | 86 | 66.73 | 30 | 329 | 21 | 45.67 | 1583 | 50 |
| 69 | IA 163 E/W THROUGH PLEASANT HILL | 41.62 | 46 | 73.61 | 49 | 72 | 49 | 48.00 | 2109 | 56 |
| 70 | IA-58 FROM US-20 TO GREENHILL RD | 2.95 | 80 | 70.60 | 39 | 0 | 73 | 64.00 | 1097 | 76 |
| 71 | I-380/US-218 N/S FROM SAN MARNAN DR TO W 9TH ST | 12.87 | 61 | 66.45 | 27 | 1764 | 3 | 30.33 | 2799 | 14 |
| 72 | I-380/US-218 N/S FROM US-20 TO SAN MARNAN DR | 9.93 | 66 | 85.73 | 89 | 88 | 44 | 66.33 | 2814 | 78 |
| 73 | I-380 S @ US-20/IA-27 & US-20 E @ I-380/US-218/EXIT 71 | 53.26 | 39 | 80.87 | 71 | 108 | 38 | 49.33 | 3906 | 61 |
| 74 | I-380 N/S @ EVANSDALE DR/EXIT 68 | 69.32 | 29 | 82.10 | 77 | 95 | 41 | 49.00 | 4688 | 59 |
| 75 | I-380 N/S @ IA-297/EXIT 66 | 166.51 | 7 | 82.53 | 80 | 51 | 52 | 46.33 | 5250 | 52 |
| 76 | I-380 N/S THROUGH CEDAR RAPIDS | 76.37 | 26 | 55.34 | 4 | 123 | 33 | 21.00 | 7226 | 5 |
| 77 | I-380 N/S @ US-30/EXIT 16 | 39.60 | 49 | 70.43 | 38 | 110 | 37 | 41.33 | 7015 | 37 |
| 78 | I-80 E/W FROM IRELAND AVE NW TO I-380 | 98.71 | 21 | 74.50 | 53 | 32 | 60 | 44.67 | 9918 | 48 |
| 79 | I-380 N/S @ I-80/EXIT 0 & I-80 E/W @ I-380/EXIT 239 | 146.63 | 10 | 73.35 | 47 | 250 | 24 | 27.00 | 11161 | 7 |
| 80 | I-80 E/W FROM I-380 TO IA-965 | 165.25 | 8 | 68.91 | 35 | 0 | 73 | 38.67 | 12726 | 32 |
| 81 | I-80 E/W FROM IA-965 TO 1ST AVE | 127.10 | 14 | 66.81 | 31 | 26 | 65 | 36.67 | 12390 | 27 |
| 82 | I-80 E/W FROM 1ST AVE TO DUBUQUE ST | 199.88 | 1 | 67.18 | 32 | 27 | 64 | 32.33 | 12240 | 20 |
| 83 | I-80 E/W FROM DUBUQUE ST TO IA-1 | 196.39 | 2 | 68.80 | 34 | 0 | 73 | 36.33 | 12389 | 26 |
| 84 | US-61 N/S @ I-80/EXIT 123 & I-80 E @ US-61/BRADY ST/EXIT 295 | 53.65 | 36 | 69.57 | 37 | 368 | 17 | 30.00 | 11230 | 12 |
| 85 | I-80 E/W @ I-74/EXIT 298 | 84.42 | 24 | 75.59 | 56 | 144 | 31 | 37.00 | 10162 | 30 |
| 86 | I-280 N @ IA-22/ROCKINGHAM RD/EXIT 8 | 3.35 | 77 | 78.85 | 64 | 26 | 65 | 68.67 | 5289 | 82 |
| 87 | I-74 @ MISSISSIPPI RIVER | 90.95 | 23 | 65.53 | 23 | 706 | 9 | 18.33 | 2908 | 3 |
| 88 | I-80 E/W @ US-67/EXIT 306 | 49.73 | 42 | 74.25 | 52 | 34 | 58 | 50.67 | 9519 | 62 |
| 89 | RR Bridge E of Sandyville | 12.06 | 62 | 71.50 | 43 | 192 | 26 | 43.67 | 354 | 45 |
| 90 | RR Bridge @ Chariton | 0.54 | 90 | 68.00 | 33 | 0 | 73 | 65.33 | 167 | 77 |
| 91 | RR Bridge @ Corydon | 0.76 | 88 | 79.00 | 66 | 287 | 23 | 59.00 | 121 | 74 |
| 92 | RR Bridge E of Centerville | 10.26 | 65 | 82.00 | 76 | 0 | 73 | 71.33 | 302 | 86 |
| 93 | RR Bridge @ Fairfield | -0.31 | 92 | 76.00 | 58 | 32 | 60 | 70.00 | 150 | 84 |
| 94 | RR Bridge @ Washington | 1.33 | 87 | 83.00 | 82 | 84 | 47 | 72.00 | 292 | 89 |