








SB EXISTING SECTION

* $10^{\prime}$ FROM SOUTHERN LIMTS TO SUPERIOR AVE


## HSR LEFT (INSIDE)



SB 4-LANE PROPOSED SECTION
\# $10^{\circ}$ FOR MAINLINE LANES OR 8' ADJACENT TO RAMP WHEN OUTSIDE EXISTING BRIDGE LIMITS.
WITHIN EXISTING BRIDGE LIMITS.
X. € 1 R-SO


| Bridge | Existing No. Lanes |  | Existing Lateral Clearance |  | Prop. Outside Shoulder |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Mainline | Ramp/Auxiliary | Plans | Survey |  |
| SR-2 | 2 | 0 | 39.25 | N/A | 2.25 |
| S Marginal Rd | 2 | 2 | 63.25 | N/A | 4.25 |
| Railroad | 2 | 2 | 63.04 | N/A | 4.04 |
| Lakeside Ave E | 3 | 1 | 63.25 | N/A | 4.25 |
| Railroad | 3 | 1 | 62.5 | N/A | 3.50 |
| Hamilton Ave | 3 | 1 | 63.25 | N/A | 4.25 |
| St Clair Ave NE | 3 | 1 | 63.25 | N/A | 4.25 |
| Superior Ave/US-6 | 3 | 0 | 53.25 | 56.20 | 8.20 |
| Payne Ave | 3 | 1 | 63.25 | 62.97 | 3.97 |
| Chester Ave/US-322 | 3 | 1 | 63.25 | 64.00 | 5.00 |
| Euclid Ave/US-20 | 3 | 1 | 63.25 | 61.83 | 2.83 |
| Prospect Ave E | 3 | 1 | 63.25 | N/A | 4.25 |
| Carnegie Ave | 4 | 0 | 60.79 | N/A | 1.79 |


|  |  |
| :--- | :--- |




Summary of Anticipated Safety Performance of the Project (average crashes/year)


| Project Summary Results (Without Animal Crashes) |  |  |  |  |  | KA |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |


| Emeat | Project Safety Performance Report |  |  |
| :---: | :---: | :---: | :---: |
| 4 | General Information |  |  |
| Project Name | 1-90 WB HSR | Contact Email |  |
| Project Descripition | No Build | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Performed | 1/14/2021 |
| Analyst | STB | Analy Sis Year |  |
| Agency ${ }^{\text {company }}$ | Burgess 8 Niple |  |  |


| Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Project Element ID | Common Name | KA | B | Crash Severity Level | - | Total |
| Re90N: 172.51-172.68 | 1R90WB: Add Lane to - -77S Exit | 0.2061 | 0.7079 | 0.8015 | 5.0544 | 6.76 |
| RR90N: 172.68-172.74 | IR90wB: Carnegie Bridge to Add Lane | 0.0908 | 0.2974 |  | 2.0832 | 280 |
| Re90N: 172.74-172.86 | RR90WB: Prospectave Entrance to Carnegie | 0.0356 | 0.1498 | 0.1547 | 0.6996 | 1.03 |
| Re90N: 172.86-172.94 | 1R90WB: Prospectave Exit to Prospectavel | 0.1093 | 0.3428 | 0.3746 | 2.2083 | 3.035 |
| RR90N: 172.94-173.13 | IR90WB: E24thStChesterAve Entrance to Pro | 0.3813 | 1.2198 | 1.3434 | 9.0168 | 11.9613 |
| RR90N: 173.13-173.23 | IR90WB: E24thst Exit to E24thtC hesterAve | 0.0886 | 0.2338 | 0.2642 | 1.3463 |  |
| Re90N: 173.23-173.35 | \|R90wB: E26thSt Entrance to E24thst Exit | 0.145 | 0.4968 | 0.5624 | 3.5915 |  |
| Re90N: 173.35-173.64 | R90WB: E26thst Exit to E26thst Entrance | 0.1648 | 0.5435 | 0.6059 | 3.0381 |  |
| Re90N: 173.64-173.86 | IR9owB: E26thSt Entrance to E26thSt Exit | 0.2145 | 0.6932 | 0.7617 | 4.4636 |  |
| R90N: 173.86-173.97 | IR90WB: SR2EB Entrance to E26thSt Entranc |  |  |  | 1.9787 | 2.7848 |
| Re90N: 173.97-173.99 | \|R9owB: HSRSStart2 to SR2 2 EB Entrance | ${ }^{0.0388}$ | ${ }^{0.1083}$ | 0.1124 | 1.0704 |  |
| R99N: 173.99-174.21 | Regowb: US2EB Exit to HSRStart2 | ${ }_{0}^{0.3586}$ | 1.0154 | 1.0587 | 10.0729 17 | 12.5056 <br> 24106 |
| N: 174.21-175 | 1R90WB: HSRStart to US2EB Exit | 0.8273 | 2.719 | 3.028 | 17.8363 | 24.4106 |


|  | Project Safety Performance Report |  |  |
| :---: | :---: | :---: | :---: |
| 4. | General Information |  |  |
| Project Name | \|1.90 WB HSR | Contact Email | sam.bel@burgessniple.com |
| Project Description | No Build | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Performed | 11/4/2021 |
| Analyst | STB | Analysis Year |  |
| Agency ${ }^{\text {company }}$ | Burgess \& Niple |  |  |


|  | Project Safety Performance Report |  |  |
| :---: | :---: | :---: | :---: |
| - | General Information |  |  |
| Project Name | \|-90 WB HSR | Contact Email | sam.bell@burgessniple.com |
| Project Description | No Build | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Performed | 1/14/2021 |
| Analyst | STB | Analysis Year |  |
| Agency ${ }^{\text {company }}$ | Burges \& Niple |  |  |



| Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Reond: 172.51-172.68 | RR90WB: Add Lane to - -77S Exit | kA | B |  | 0 | Total |
| Reon: 172.68-172.74 | IR900 B : Camegie Bridge to Add Lane |  |  |  |  |  |
| RR90N: 172.74-172.86 | 1R90WB: ProspectAveE Entrance to Carnegie |  |  |  |  |  |
| Reon: 172.86-172.94 | RRoow P ProspectAvee Exit to Prospectave |  |  |  |  |  |
| RR90N: 172.94-173.13 | IR9owB: E24thSUChesterAve Entrance to Pro |  |  |  |  |  |
| Reon: 17 | IR90WB: E24thSt Exit o E24thtt hesterAve |  |  |  |  |  |
| Re90N: 173.23-173.35 | \|R90wB: E26thst Entrance to E24thst Exit |  |  |  |  |  |
| Re90N: 173.35-173.64 | \|R90wB: E26thSt Exit to E26thSt Entrance |  |  |  |  |  |
| RR90N: 173.64-173.86 | IRoowB: E26thst Entrance to E26thst Exit |  |  |  |  |  |
| RR90N: 173.86-173.97 | IR9owB: SR2EB Entrance to E26thst Entranc |  |  |  |  |  |
| R990N: 173.97-173.99 | RR90WB: HSRSSart2 to SR2 EB Entrance |  |  |  |  |  |
| R900N: 173.99-174.21 | RR9owB: US2EB Exit to HSRRStart2 |  |  |  |  |  |
| 90N: 174.21-175 | RR9OWB: HSRStart to US2EB Exit |  |  |  |  |  |




| Project Summary Results (Without Animal Crashes) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | KA | B | c | 0 | Total |
| $\mathrm{N}_{\text {presilited }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathrm{N}_{\text {expected }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathbf{N}_{\text {potential for improvenent }}$ - Existing Conditions | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $\mathrm{N}_{\text {preselicted }}$ - Proposed Conditions | 0.2061 | 0.7079 | 0.8015 | 5.0544 | 6.7699 |


| Emeat | Project Safety Performance Report |  |  |
| :---: | :---: | :---: | :---: |
| - | General Information |  |  |
| Project Name | 1.90 WB HSR | Contact Email | sam.bel@burgessniple.com |
| Project Description | HSR Closed - No CMFs | Contact Phone | 513-579.0042 |
| Reference Number |  | Date Performed | 1/14/2021 |
| Analyst | STB | Analysis Year |  |
| Agency/Company | Burgess \& Niple |  |  |


| Existing Condifions Project Element Predicted Crash Summary (Without Animal Crashes) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Project Element ID | Name | KA | B | Crash Severity Level | - | Total |
| RP0N: 172.51-172.68 | IR90WB: Add Lane tol -77S Exit | 0.2061 | 0.7079 | 0.8015 | 5.0544 | 6.7699 |
| Re90: 172.68-172.74 | \|R9owB: Carmegie Bridge to Add Lane |  | 0.304 |  |  | 2.6164 |
| Re90N: 172.74-172.86 | RR9owB: ProspectAveE Entrance to Carnegie | 0.0519 | ${ }^{0.1951}$ | 0.2057 | 0.9884 |  |
| Re90N: 172.86-172.94 | RRow ${ }^{\text {P P ProspectAveE Exit to ProspectaveE }}$ | 0.117 | 0.3365 | 0.3532 | 1.8618 | 2.6685 |
| Re90: 172.94-173.13 | RR90WB: E24thStChesterAve Entrance to Pro | 0.3949 | 1.1635 | 1.2368 | 7.2636 | 10.0588 |
| Re9N: 173.13-173.23 |  | 0.0639 | 0.2067 | 0.2287 |  |  |
| RP90N: 173.23-173.35 | \|R90WB: E26thSt Entrance to E24thst Exit | 0.135 | 0.4391 | 0.4866 | 2.7308 |  |
| Re90N: 173.35-173.64 | R90wB: E26thst Exit to E26thst Entrance | 0.1577 | 0.4898 | ${ }^{0.5328}$ | 2.31 | 3.4903 |
| R90N: 173.644717.86 | R90WB: E26thSt Entrance to E26thst Exit | 0.2197 |  | 0.7054 |  |  |
| Re90N: 173.86-173.97 | RR9OWB: SR2EB Entrance to E26thst Entranc | 0.1238 | 0.3404 | 0.3499 | 1.7424 |  |
| Re90N: 173.977-17.99, | RR90WB: HSRSStar2 to SR2 EB Entrance | 0.0502 | 0.1266 | 0.1244 | ${ }^{1.0231}$ | ${ }^{1.3243}$ |
| (R90N: $173.999-17421$ | \|Reowe US2EB Exit to HSRStart | ${ }^{0.352}$ | -0.9101 | ${ }^{0.9363}$ | 8.1848 | 10.3612 |
| RR90N: 174.21-175 | IR90WB: HSRStart to US2EB Exit | 0.7522 | 2.3792 | 2.6088 | 13.8074 | 19.5476 |





| Project Summary Results (Without Animal Crashes) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | KA | B | c | 0 | Total |
| $\mathrm{N}_{\text {presilicted }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathrm{N}_{\text {expected }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathbf{N}_{\text {potential for }}$ improvenent - Existing Condifions | 0.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $\mathrm{N}_{\text {presilited }}$ - Proposed Condifions | 1.9771 | 6.0705 | 6.5518 | 38.0400 | 52.6394 |


| \%-mex | Project Safety Performance Report |  |  |
| :---: | :---: | :---: | :---: |
| 4 | General Information |  |  |
| Project Name | 1.90 WB HSR | Contact Email |  |
| Project Descripition | HSR Closed with VSL | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Peformed | $11 / 412021$ |
| Analyst | STB | Analysis $Y$ |  |
| AgencylCompany | Burgess \& Niple |  |  |


| Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Project Element ID | Common Name | KA | B | Crash Severity Level | - | Total |
| R90N: 172.51-172.68 | \|R90WB: Add Lane to -77T Exit | 0.2061 | 0.7079 | 0.8015 | 5.0544 | 6.7699 |
| R90N: 172.68-172.74 | R9owB: Carnegie Bridge to Add Lane |  | 0.304 | 0.3305 |  | 2.6164 |
| R90N: 172.744 .172 .86 | IR90WB: ProspectAveE Entrance to Carnegie | 0.0519 | 0.1951 | 0.2057 | 0.9884 | 1.4411 |
| Re90N: 172.86-172.94 | 1R90WB: ProspectAveE Exit to ProspectiveE | 0.117 | 0.3365 | 0.3532 | 1.8618 | 2.6685 |
| R90N: 172.94-173.13 | \|R90wB: E24thStChesterave Entance to Pro | 0.3949 | 1.1635 | 1.2368 | 7.2636 | 10.0588 |
| Re90N: 173.13-173.23 | IR90wB: E24thSt Exit to E24thstChesterAve | 0.0639 | 0.2067 | 0.2287 | 1.0236 |  |
| R90N: 173.23-173.35 | \|RR90WB: E264tSt Entrance to E24thSt Exit | 0.135 | 0.4391 | 0.4866 | 2.7308 | 3.7 |
| Re90N: $173.35-173.64$ | \|R90WB: E206tht Exit to E2ethst Entrance | 0.1577 | 0.4898 0.6618 | 0.5328 | $\begin{array}{r}2.31 \\ \hline 6385\end{array}$ | 3.4 <br> 5 <br> 5 |
|  | \|R90wB: E26thst Entrance to E26thst Exit | ${ }^{0.2197}$ | 0.6618 0.3404 | 0.7054 0.349 | ${ }^{3.6385}$ |  |
| R990N: 173.97-173.99 | 1 1R90WB: HSRSStart to SR2 2 EB Entrance | 0.0502 | 0.1266 | 0.1244 | 1.0231 | 1.3243 |
| R990N: 173.99-174.21 | IR90WB: US2EB Exit o HSRSStart2 | 0.33 | 0.9101 | 0.9363 | 8.1848 |  |
| RR90N: 174.21-175 | IR90WB: HSRStart to US2EB Exit | 0.7522 | 2.3792 | 2.6088 | 13.8074 | 19.5476 |



## Project Safety Performance Report

 General Information| General Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Project Name | \|1-90 WB HSR | Contact Email | sam.bel@burgessiiple.com |
| Project Description | HSR Closed with VSL | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Periormed | 11/4/2021 |
| Analyst | STB | Analysis Year |  |
| Agency ${ }^{\text {company }}$ | Burgess \& Niple |  |  |




Summary of Anticipated Safety Performance of the Project (average crashes/year)


| Project Summary Results (Without Animal Crashes) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | KA | B | c | 0 | Total |
| $\mathrm{N}_{\text {presilicted }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathrm{N}_{\text {expected }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathbf{N}_{\text {potential for }}$ improvenent - Existing Condifions | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $\mathrm{N}_{\text {presilited }}$ - Proposed Condifions | 3.1579 | ${ }^{9.3716}$ | 9.9649 | 44.4945 | 66.9889 |


| Emeat | Project Safety Performance Report |  |  |
| :---: | :---: | :---: | :---: |
| 4 | General Information |  |  |
| Project Name | 1.90 WB HSR | Contact Email |  |
| Project Descripition | HSR Open - No CMFs | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Performed | 1/14/2021 |
| Analyst | STB | Analy Sis Year |  |
| Agency ${ }^{\text {company }}$ | Burgess \& Niple |  |  |


| Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Project Element ID | Common Name | KA | B | Crash Severity Level | - | Total |
| 1R90N: 172.51-172.68 | IR90WB: Add Lane to - -77S Exit | 0.2061 | 0.7079 | 0.8015 | 5.0544 | 6.7699 |
| Re90: 172.68-172.74 | IR9owB: Carnegie Bridge to Add Lane | 0.1526 | 0.4413 | 0.4653 | 2.8079 | 3.8671 |
| Re90N: 172.74-172.86 | \|R9owB: ProspectAveE Entrance to Carnegie | 0.0643 | 0.2294 | ${ }^{0.2397}$ | 1.3194 |  |
| RR90N: 172.86-172.94 | 1R9ows: Prospectave Exit to Prospectave | 0.2076 | 0.5559 | 0.5635 | 3.1048 | 4.4318 |
| Reon: 172.94-173.13 | RR90WB: E24thstChesterAve Entrance to Pro | 0.384 | 1.1332 | 1.2053 | 4.5188 | 7.2413 |
| Reon: 173.13-173.23 | RRoows: E24thst Exit to E24thStChesterave | 0.1047 | 0.315 | ${ }^{0.3379}$ | 1.6622 | ${ }_{2.419}$ |
| RR90N: 173.23-173.35 | \|R90wB: E26thst Entrance to E24thst Exit | 0.1325 | 0.4323 | 0.4796 | 1.6903 | 2.73 |
| Reoov: 173.35-173.64 | \|R90wB: E26thst Exit to E26thSt Entrance | 0.2649 | 0.7614 | 0.8 | 3.8105 |  |
| Re90N: 173.64-173.86 | 1R90WB: E26thSt Entrance to E26thSt Exit | 0.2165 | 0.6602 | 0.7078 | 2.2876 | ${ }^{3.8721}$ |
| Re90N: 173.86-173.97 | RR9owB: SR2EB Entrance to E26thst Entanc | 0.1225 | 0.3431 | 0.356 | 1.1091 |  |
| Reon: $173.97-173.99$ | 1R90WB: HSRStar2 to SR2 EB Entrance | 0.078 | 0.189 1.3059 | - ${ }_{\text {0.1808 }}^{13079}$ | 0.9781 77621 |  |
| (R90N: $173.99-174.21$ | \|R90wB: US2EE Exit to HSRStart2 | 0.49899 |  | 1.3079 | 7.7621 8 | (10.8748 |
| 90N: 174.21-175 | IR90WB: HSRStart to US2EB Exit | 0.7253 | 2.297 | ${ }^{2.5196}$ | ${ }^{8.3893}$ | ${ }^{13.9312}$ |




| 4 | General Information |  |  |
| :---: | :---: | :---: | :---: |
| Project Name | $\left.\right\|^{1-90}$ WB HSR | Contact Email | sam. bell@burgessniple.com |
| Project Descripition | HSR Open with VSL | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Performed | 1/14/2021 |
| Analyst | STB | Analysis Year |  |
| Agency/Company | Burgess \& Niple |  |  |



| Project Summary Results (Without Animal Crashes) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | KA | B | c | 0 | Total |
| $\mathrm{N}_{\text {prealicted }}$ - Existing Conditions |  |  |  |  | 0.0000 |
| $\mathrm{N}_{\text {expected }}$ - Existing Condifions |  |  |  |  | 0.0000 |
| $\mathbf{N}_{\text {pootential or }}$ improvement - Existing Condifions | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $\mathrm{N}_{\text {preadicted }}$ - Proposed Conditions | 2.3019 | 6.8591 | 7.3076 | 33.0570 | 49.5256 |

C- 13

| 4 | General Information |  |  |
| :---: | :---: | :---: | :---: |
| Project Name | ${ }^{1-90}$ WB HSR | Contact Email | sam.bel@burgessniple.com |
| Project Description | HSR Open with VSL | Contact Phone | 513-579-0042 |
| Reference Number |  | Date Performed | 1/14/2021 |
| Analyst | STB | Analysis Year |  |
| Agency ${ }^{\text {company }}$ | Burgess \& Niple |  |  |





Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)
Crash Severity Level


| Summary by Crash Type |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Crash Type | Existing |  |  | Proposed |
|  | Predicted Crash Frequency | Expected Crash Frequency | PSI | $\underset{\substack{\text { Expected Crash } \\ \text { Frequency }}}{\text { Pr }}$ |
| Unknown |  | 0.1709 |  |  |
| Head On | 0.1504 | 0.0935 |  |  |
| Rear End | 37.6600 | 19.8454 |  |  |
| Backing | 0.4562 | 0.2066 |  |  |
| eswipe - Meeting |  | 0.4104 |  |  |
| deswipe - Passing | 25.8250 | 12.9227 |  |  |
| Angle | 0.9979 | 0.5233 |  |  |
| Parked Venicle | ${ }^{0.7330}$ | 0.5497 |  |  |
| Pedestrian | 0.0877 | ${ }_{0}^{0.0793}$ |  |  |
| Animal | ${ }^{4.8405}$ | ${ }^{3.4666}$ |  |  |
| Train | 0.0000 | ${ }^{0.0000}$ |  |  |
| Pedalacres | 0.0014 | 0.0012 |  |  |
| Other Non-Vehicle | 0.0000 | 0.0000 |  |  |
| Fixed Object | 11.8939 | 9.1997 |  |  |
| Other Object | 1.7080 | 1.2208 |  |  |
| Overturning | 0.6534 | 0.5387 |  |  |
| Other Non-Collision | 2.4151 0.2842 |  |  |  |
| Right Turn | 0.0000 | 0.0000 |  |  |



# 2021 Traffic <br> Volumes 

|  | Volume |
| :--- | :---: |
| East of EB SR $\mathbf{2}$ Off | 7740 |
| WB SR 2 Off | 3010 |
| North of EB SR $\mathbf{2}$ On | 4730 |
| EB SR 2 On | 700 |
| South of EB SR $\mathbf{2}$ On | 5430 |
| Lakeside On | 30 |
| South of Lakeside On | 5460 |
| Superior Off | 740 |
| South of Superior Off | 4720 |
| Superior On | 370 |
| South of Superior On | 5090 |
| Chester Off | 430 |
| South of Chester Off | 4660 |
| Chester On | 600 |
| South of Chester On | $\mathbf{5 2 6 0}$ |
| Prospect Off | 830 |
| South of Prospect Off | 4430 |
| Prospect On | 270 |
| South of Prospect On | 4700 |
| I-77 Off | 1640 |
| South of I-77 Off | $\mathbf{3 0 6 0}$ |

AM
Truck
387
6
327
35
362
3
3
338
3
3
3
3
3

PM Peak AM Peak \% Trucks Volume PM Peak
Trucks $\qquad$ \% Trucks 5760 0.058
0.020 $\begin{array}{ll}0.050 & 5760 \\ 0.020 & 1850\end{array}$ $0.069 \quad 3910$ 0.050720 $0.067 \quad 4630$ $\begin{array}{ccc}0.200 & 380 & 813 \\ 0.067 & 5010 & 321\end{array}$

| 0.2067 | 5010 |
| :--- | :--- |
| 0.041 | 400 |

0.041
0.072
0.011 0.011 0.067
0.021 0.02 $\begin{array}{ll}0.021 & 70 \\ 0.071 & 5090\end{array}$
$0.050 \quad 750 \quad 298$

| 0.071 | 5069 | 15 |
| :---: | :---: | :---: |
| 0.069 | 5840 | 313 |


| 0.069 | 80 |
| :---: | :---: |
| 0.078 | 5760 |

$0.078 \quad 5760$
0.059 290
0.0776050

| 0.090 | 318 |  |
| :---: | :---: | :---: |
| 0.090 | 1500 | 90 |
| .070 | 4550 | 228 | 0.020

0.076 0.076
0.019 0.068 0.021 0.064
0.070 0.070
0.064 0.064 0.011
0.058 0.058 0.014 0.059 0.020
0.054 0.054
0.013 0.013 0.054 0.021 0.021
0.053 I-77 Off
South of l-77 Off
0.050

## Chosen Analysis Volumes



XXX = AM / PM Volumes, January 2015 Count (Michael Baker)
Interstates




## 2021 AM Peak

## No-Build

Capacity Analysis

|  | HCS7 Freeway Facilities Report |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Project Information |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Analyst |  |  |  |  | MEL |  |  | Date |  |  |  |  | 7/15/2021 |  |  |
|  | Agency |  |  |  |  | Burgess \& Niple, Inc. |  |  | Analysis Year |  |  |  |  | 2021 No-Build |  |  |
|  | Jurisdiction |  |  |  |  |  |  |  | Time An |  |  |  |  | AM Peak W | estbound |  |
|  | Project Description |  |  |  |  | I-90 HSR |  |  | Units |  |  |  |  | U.S. Customary |  |  |
|  | Facility Global Input |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Jam Density, pc/mi/ln |  |  |  |  | 190.0 |  |  | Density at Capacity, pc/mi/ln |  |  |  |  | 45.0 |  |  |
|  | Queue Discharge Capacity Drop, \% |  |  |  |  | 7 |  |  | Total Segments |  |  |  |  | 16 |  |  |
|  | Total Analysis Periods |  |  |  |  | 1 |  |  | Analysis Period Duration, min |  |  |  |  | 15 |  |  |
|  | Facility Length, mi |  |  |  |  | 3.95 |  |  |  |  |  |  |  |  |  |  |
|  | Facility Segment Data |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | No. | Coded |  |  |  | Analyzed |  | Name |  |  |  | Length, ft |  |  | Lanes |  |
|  | 1 | Basic |  |  |  | Basic |  | West of E. 55th On-Ramp |  |  |  | 3400 |  |  | 4 |  |
|  | 2 | Basic |  |  |  | Basic |  | East of WB SR 2 Off-Ramp |  |  |  | 2300 |  |  | 4 |  |
|  | 3 | Diverge |  |  |  | Diverge |  | WB SR 2 Off-Ramp |  |  |  | 1500 |  |  | 4 |  |
|  | 4 | Basic |  |  |  | Basic |  | North of EB SR 2 On-Ramp |  |  |  | 1100 |  |  | 2 |  |
|  | 5 | Merge |  |  |  | Merge |  | EB SR 2 On-Ramp |  |  |  | 575 |  |  | 2 |  |
|  | 6 | Merge |  |  |  | Basic |  | 26th Street On-Ramp |  |  |  | 970 |  |  | 4 |  |
|  | 7 | Diverge |  |  |  | Basic |  | Superior Ave Off-Ramp |  |  |  | 200 |  |  | 4 |  |
|  | 8 | Basic |  |  |  | Basic |  | North of Superior Ave On-Ramp |  |  |  | 1075 |  |  | 3 |  |
|  | 9 | Weaving |  |  |  | Weaving |  | Superior On to Chester Off |  |  |  | 1345 |  |  | 4 |  |
|  | 10 | Basic |  |  |  | Basic |  | North of Chester Ave On-Ramp |  |  |  | 100 |  |  | 3 |  |
|  | 11 | Weaving |  |  |  | Weaving |  | Chester On to Prospect Off |  |  |  | 1510 |  |  | 4 |  |
|  | 12 | Basic |  |  |  | Basic |  | North of Prospect On-Ramo |  |  |  | 100 |  |  | 3 |  |
|  | 13 | Merge |  |  |  | Merge |  | Prospect Ave On-Ramp |  |  |  | 1180 |  |  | 3 |  |
|  | 14 | Overlap |  |  |  | Basic |  | North of 13-77 Off-Ramp |  |  |  | 320 |  |  | 3 |  |
|  | 15 | Diverge |  |  |  | Diverge |  | 1-77 Off-Ramp |  |  |  | 1180 |  |  | 4 |  |
|  | 16 |  | Basic |  |  | Basic |  | South of 1-77 Off-Ramp |  |  |  | 4000 |  |  | 3 |  |
|  | Facility Segment Data |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Segment 1: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | Density(pc/mi/ln) |  | LOS |
|  | 1 |  | 0.94 | 0.95 |  | 720 |  |  | 400 |  | 0.92 |  | 22.8 | 78 |  | F |
|  | Segment 2: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| E-1 | 1 |  | 0.94 | 0.95 |  | 691 |  | 90 | 000 |  | 0.96 |  | 23.1 | 74 |  | F |
|  | Segment 3: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity <br> ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | LOS |
|  |  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |


| 1 | 0.94 | 0.94 | 0.952 | 0.980 | 6730 | 3267 | 9000 | 4400 | 0.96 | 0.74 | 21.1 | 49.0 | 79.9 | 44.4 | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Segment 4: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | Density$(\mathrm{pc} / \mathrm{mi} / \mathrm{ln})$ |  | Los |
| 1 | 0.94 |  | 0.935 |  | 3408 |  | 4400 |  | 1.22 |  | 22.1 |  | 77.1 |  | F |
| Segment 5: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \text { Capacity } \\ (\mathrm{pc} / \mathrm{h}) \end{gathered}$ |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.935 | 0.952 | 4190 | 782 | 4500 | 3800 | 0.93 | 0.21 | 39.1 | 43.3 | 48.4 | 37.9 | F |
| Segment 6: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.937 | 0.833 | 4228 | 38 | 9000 | 1800 | 0.47 | 0.02 | 50.5 | 51.6 | 20.5 | 20.5 | c |
| Segment 7: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\underset{\text { d/c }}{\text { Ratio }}$ |  | $\begin{aligned} & \text { Speed } \\ & \text { (mi/h) } \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/lın) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.937 | 0.961 | 4228 | 819 | 9000 | 2000 | 0.47 | 0.41 | 53.2 | 53.2 | 19.9 | 19.9 | c |
| Segment 8: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | $\begin{gathered} \text { Capacity } \\ (\mathrm{pc} / \mathrm{h}) \end{gathered}$ |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.933 |  | 3409 |  | 6750 |  | 0.80 |  | 54.4 |  | 20.7 |  | c |
| Segment 9: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\underset{\text { Ratio }}{\substack{\text { R/c }}}$ |  | Speed$(\mathrm{mi} / \mathrm{h})$ (mi/h) |  | Density$(\mathrm{pc} / \mathrm{mi} / \mathrm{ln})$ |  | Los |
| 1 | 0.94 |  | 0.929 |  | 3807 |  | 7980 |  | 0.72 |  | 45.5 |  | 20.9 |  | c |
| Segment 10: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \\ \hline \end{gathered}$ |  | Speed(mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.934 |  | 3340 |  | 6750 |  | 0.79 |  | 52.1 |  | 20.2 |  | c |
| Segment 11: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\underset{\text { Ratio }}{d / c}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.926 |  | 4011 |  | 7740 |  | 0.77 |  | 42.3 |  | 23.7 |  | c |
| Segment 12: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\underset{\text { d/c }}{\text { Ratio }}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.928 |  | 3110 |  | 6750 |  | 0.75 |  | 51.6 |  | 18.8 |  | c |
| Segment 13: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \\ \hline \end{gathered}$ |  | Speed(mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/In) } \end{gathered}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.928 | 0.943 | 3415 | 305 | 6300 | 1900 | 0.54 | 0.16 | 51.3 | 50.8 | 22.2 | 18.7 | B |
| Segment 14: Overlap |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.94 |  | 0.929 |  | 3415 |  | 6750 |  | 0.80 |  | 53.9 |  | 32.6 |  | D |
| Segment 15: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.929 | 0.917 | 3415 | 1903 | 9000 | 4200 | 0.38 | 0.45 | 52.1 | 48.9 | 16.4 | 15.4 | в |
| Segment 16: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.935 |  | 1512 |  | 6750 |  | 0.52 |  | 55.0 |  | 9.2 |  | A |
| Facility Analysis Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | Speed, mi/h |  |  |  | Density, pc/mi/ln |  | Density, veh/mi/ln |  |  | Travel Time, min |  |  | LOS |  |  |
| 1 | 28.8 |  |  |  | 43.6 |  | 41.2 |  |  | 8.20 |  |  | F |  |  |
| Facility Overall Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Space Mean Speed, mi/h |  |  |  |  | 28.8 |  |  | Density, veh/mi/ln |  |  |  |  | 41.2 |  |  |
| Average Travel Time, min |  |  |  |  | 8.20 |  | Density, pc/mi/ln |  |  |  | 43.6 |  |  |  |  |
| Messages |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| WARNING 1 |  |  |  |  | Oversaturated conditions currently exist in boundary analysis period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 2 |  |  |  |  | Oversaturated conditions currently exist on segment 7 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 3 |  |  |  |  | Oversaturated conditions currently exist on segment 10 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 4 |  |  |  |  | Oversaturated conditions currently exist on segment 12 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 5 |  |  |  |  | Queue extends past the beginning of the facility on analysis period 1. Consider expanding the length of the facility to account for these vehicles performance and affect on upstream segments. |  |  |  |  |  |  |  |  |  |  |
| WARNING 6 |  |  |  |  | The merge segment 6 and diverge segment 7 could be potentially analyzed together as a weaving segment because of the presence of an added lane which could serve as an auxiliary lane. Consider combining these two segments into a weaving segment. |  |  |  |  |  |  |  |  |  |  |
| WARNING 7 |  |  |  |  | Weaving Segment (segment 9) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |
| WARNING 8 |  |  |  |  | Weaving Segment (segment 11) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |
| Comments |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Analyst | MEL | Date | 7/15/2021 |
| Agency | Burgess \& Niple, Inc. | Analysis Year | 2021 No-Build |
| Jurisdiction |  | Time Analyzed | AM Peak Westbound I-90 |
| Project Description | 1-90 HSR | Units | U.S. Customary |
| Segment Number | 1 | Segment Name | West of E. 55th On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 3400 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 65.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 7740 | Heavy Vehicle Adjustment Factor (fHV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 2162 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2350 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2350 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (fiw) | - | Average Speed (S), mi/h | 22.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), pc/mi/n | 78.9 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 65.0 |  |  |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 2 | Segment Name | East of WB SR 2 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 2300 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 7740 | Heavy Vehicle Adjustment Factor (ftV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 2162 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 23.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 74.9 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 3 | Segment Name | WB SR 2 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 55.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1500 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 7740 | 3010 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.00 | 2.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.952 | 0.980 |  |
| Flow Rate (vi),pc/h |  | 8649 | 3267 |  |
| Capacity (c), pc/h |  | 9000 | 4400 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.75 | 0.74 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.462 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1992 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 49.0 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (SO), mi/h |  | 56.5 |
| Flow in Lanes 1 and 2 (v12), pc/h | 4666 | Ramp Junction Speed (S), mi/h |  | 21.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/mi/ln |  | 79.9 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 44.4 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 4 | Segment Name | North of EB SR 2 OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 2 | Terrain Type | Level |
| Segment Length (L), ft | 1100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Base | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | 45.0 | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | 12 | Free-Flow Speed (FFS), mi/h | 40.1 |
| Right-Side Lateral Clearance, ft | 10 |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4730 | Heavy Vehicle Adjustment Factor (fHV) | 0.935 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 2691 |
| Total Trucks, \% | 6.90 | Capacity (c), pc/h/ln | 2200 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2200 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | 0.0 | Average Speed (S), mi/h | 22.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | 0.0 | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 77.1 |
| Total Ramp Density Adjustment | 4.9 | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 40.1 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 5 | Segment Name | EB SR 2 On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 2 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 45.0 | 25.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 575 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4730 | 700 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.90 | 5.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.935 | 0.952 |  |
| Flow Rate (vi),pc/h |  | 5382 | 782 |  |
| Capacity (c), pc/h |  | 4500 | 3800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.93 | 0.21 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 0 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.578 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | - |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 43.3 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 1.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 45.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 3408 | Ramp Junction Speed (S), mi/h |  | 39.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 4190 | Average Density (D), pc/mi/n |  | 48.4 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 37.9 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 6 | 6 | Segment Name |  | 26th Street On-Ramp |
| Analysis Period Number 1 | 1 | Segment Analysis Period |  | 08:00-08:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 10.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 970 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5430 | 30 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.70 | 20.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  |  | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.937 | 0.833 |  |
| Flow Rate (vi), pc/h |  | 6165 | 38 |  |
| Capacity (c), pc/h |  | 9000 | 1800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.47 | 0.02 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.343 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1257 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 51.6 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 52.3 |
| Flow in Lanes 1 and 2 (v12), pc/h | 1676 | Ramp Junction Speed (S), mi/h |  | 50.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 1714 | Average Density (D), pc/mi/ln |  | 20.5 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 20.5 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 7 | 7 | Segment Name |  | Superior Ave Off-Ramp |
| Analysis Period Number 1 | 1 | Segment Analysis Period |  | 08:00-08:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 35.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 200 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5460 | 740 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.70 | 4.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.937 | 0.961 |  |
| Flow Rate (vi),pc/h |  | 6199 | 819 |  |
| Capacity (c), pc/h |  | 9000 | 2000 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.47 | 0.41 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway (No) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.502 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 962 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 53.2 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.436 | Outer Lanes Freeway Speed (SO), mi/h |  | 60.3 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2305 | Ramp Junction Speed ( S ), mi/h |  | 53.2 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density ( D , $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ |  | 19.9 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 19.9 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 8 | Segment Name | North of Superior Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 1075 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4720 | Heavy Vehicle Adjustment Factor (fHV) | 0.933 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1136 |
| Total Trucks, \% | 7.20 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% |  | Volume-to-Capacity Ratio (v/c) | 0.51 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 54.4 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 20.7 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 9 | Segment Name | Superior On to Chester Off |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N ), In | 4 | Segment Type | Freeway |
| Segment Length (Ls), ft | 620 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR) , Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF RR | FR |
| Demand Volume (Vi), veh/h | 4310 | 350 20 | 410 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 7.60 | 1.00 1.00 | 2.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.929 | 1.990 0.990 | 0.980 |
| Flow Rate (vi), pc/h | 3127 | 377 | 282 |
| Weaving Flow Rate (vw), pc/h | 659 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 3148 | Density-Based Capacity (ciwl), pc/h/ln | 1995 |
| Total Flow Rate (v), pc/h | 3807 | Demand Flow-Based Capacity (ciw), pc/h | 16901 |
| Volume Ratio (VR) | 0.142 | Weaving Segment Capacity (cw), veh/h | 7478 |
| Minimum Lane Change Rate (LCMIN), IC/h | 659 | Adjusted Weaving Area Capacity, pc/h | 7980 |
| Maximum Weaving Length (LMAX), ft | 3952 | Volume-to-Capacity Ratio (v/c) | 0.48 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 325 | Average Weaving Speed (SW), mi/h | 44.4 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 214 | Average Non-Weaving Speed (SNw), mi/h | 45.7 |
| Weaving Lane Change Rate (LCW), IC/h | 904 | Average Speed ( S ), mi/h | 45.5 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1118 | Density (D), pc/mi/ln | 20.9 |
| Weaving Intensity Factor (W) | 0.360 | Level of Service (LOS) | c |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 10 | Segment Name | North of Chester Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4660 | Heavy Vehicle Adjustment Factor (fHV) | 0.934 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1113 |
| Total Trucks, \% | 7.10 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% |  | Volume-to-Capacity Ratio (v/c) | 0.49 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 52.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 20.2 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 11 | Segment Name | Chester On to Prospect Off |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N ), In | 4 | Segment Type | Freeway |
| Segment Length (Ls), ft | 960 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF $\quad$ RR | FR |
| Demand Volume (Vi), veh/h | 3860 | 570 | 800 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 8.00 | 5.00 | 2.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.926 |   <br> 0.952 0.980 | 0.980 |
| Flow Rate (vi), pc/h | 2794 | 637 (33 | 547 |
| Weaving Flow Rate (vw), pc/h | 1184 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 2827 | Density-Based Capacity (ciwl), pc/h/ln | 1935 |
| Total Flow Rate (v), pc/h | 4011 | Demand Flow-Based Capacity (ciw), pc/h | 9524 |
| Volume Ratio (VR) | 0.252 | Weaving Segment Capacity (cw), veh/h | 7252 |
| Minimum Lane Change Rate (LCMIN), Ic/h | 1184 | Adjusted Weaving Area Capacity, pc/h | 7740 |
| Maximum Weaving Length (LMAX), ft | 5075 | Volume-to-Capacity Ratio (v/c) | 0.52 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 452 | Average Weaving Speed (SW), mi/h | 43.9 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 332 | Average Non-Weaving Speed (SNw), mi/h | 41.7 |
| Weaving Lane Change Rate (LCW), IC/h | 1535 | Average Speed ( S ), mi/h | 42.3 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1867 | Density (D), pc/mi/ln | 23.7 |
| Weaving Intensity Factor (W) | 0.382 | Level of Service (LOS) | c |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 12 | Segment Name | North of Prospect OnRamo |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4430 | Heavy Vehicle Adjustment Factor (fHV) | 0.928 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 1037 |
| Total Trucks, \% | 7.80 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.46 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 51.6 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 18.8 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | C |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 13 | 13 | Segment Name | Prospect Ave On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 3 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 30.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 1180 | 560 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Highway/CD Roadway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4430 | 270 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.80 | 6.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.928 | 0.943 |  |
| Flow Rate (vi),pc/h |  | 5078 | 305 |  |
| Capacity (c), pc/h |  | 6300 | 1900 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.54 | 0.16 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 146.1 | Number of Outer Lanes on Freeway ( N ) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 4130 | Speed Index (MS) |  | 0.321 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (VOA), pc/h/ln |  | 1266 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 50.8 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.593 | Outer Lanes Freeway Speed (SO), mi/h |  | 52.2 |
| Flow in Lanes 1 and 2 (vi2), pc/h | 1844 | Ramp Junction Speed (S), mi/h |  | 51.3 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2149 | Average Density (D), pc/mi/n |  | 22.2 |
| Level of Service (LOS) | B | Density in Ramp Influence Area (DR), pc/mi/In |  | 18.7 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 14 | Segment Name | North of 13-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 320 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4700 | Heavy Vehicle Adjustment Factor (fHV) | 0.929 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1138 |
| Total Trucks, \% | 7.70 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.51 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 53.9 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 32.6 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 15 | 15 | Segment Name | 1-77 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 45.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1180 | 960 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4700 | 1640 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.70 | 9.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.929 | 0.917 |  |
| Flow Rate (vi),pc/h |  | 5382 | 1903 |  |
| Capacity (c), pc/h |  | 9000 | 4200 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.38 | 0.45 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.469 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 560 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 48.9 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (SO), mi/h |  | 60.3 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2296 | Ramp Junction Speed (S), mi/h |  | 52.1 |
| Flow Entering Ramp-lnfl. Area (vR12), pc/h | - | Average Density (D), pc/mi/n |  | 16.4 |
| Level of Service (LOS) | B | Density in Ramp Influence Area (DR), pc/mi/ln |  | 15.4 |



| LOS |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | F | F | F | F | F | c | c | c | C | c | c |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | C | B | D | B | A |  |  |  |  |  |  |
| Speed (mi/h) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 22.8 | 23.1 | 21.1 | 22.1 | 39.1 | 50.5 | 53.2 | 54.4 | 45.5 | 52.1 | 42.3 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 51.6 | 51.3 | 53.9 | 52.1 | 55.0 |  |  |  |  |  |  |
| Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 78.9 | 74.9 | 79.9 | 77.1 | 48.4 | 20.5 | 19.9 | 20.7 | 20.9 | 20.2 | 23.7 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 18.8 | 22.2 | 32.6 | 16.4 | 9.2 |  |  |  |  |  |  |
| Demand - Capacity Ratio (D/C) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 0.92 | 0.96 | 0.96 | 1.22 | 0.93 | 0.47 | 0.47 | 0.80 | 0.72 | 0.79 | 0.77 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.75 | 0.54 | 0.80 | 0.38 | 0.52 |  |  |  |  |  |  |
| Density (veh/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 75.1 | 71.3 | 76.0 | 72.0 | 45.3 | 19.2 | 18.6 | 19.3 | 19.6 | 18.9 | 22.2 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 17.5 | 20.6 | 30.3 | 15.2 | 8.6 |  |  |  |  |  |  |
| Ramp Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | 44.4 | - | 37.9 | 20.5 | 19.9 | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | 18.7 | - | 15.4 | - |  |  |  |  |  |  |
| Density-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | F | F | F | F | F | c | c | C | c | c | c |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | c | B | D | B | A |  |  |  |  |  |  |
| Demand-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - |  | F | F | - | - |  | - | - |  |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | - | - | - |  |  |  |  |  |  |  |
| Volume - Capacity Ratio (V/C) |  |  |  |  |  |  |  |  |  |  |  |

# 2021 PM Peak No-Build <br> Capacity Analysis 

HCS7 Freeway Facilities Report

## Project Information



## Facility Segment Data

| Segment 1: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | Los |
| 1 | 0.94 |  | 0.945 |  | 6314 |  | 9400 |  | 0.69 |  | 64.5 |  | 24.5 |  | c |
| Segment 2: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
| 1 | 0.94 |  | 0.945 |  | 5803 |  | 9000 |  | 0.72 |  | 24.5 |  | 59.2 |  | F |
| Segment 3: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $d / c$Ratio |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |


| 1 | 0.94 | 0.94 | 0.945 | 0.980 | 5472 | 2008 | 9000 | 4400 | 0.72 | 0.46 | 15.5 | 50.5 | 88.1 | 31.5 | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Segment 4: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | Density( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | LOS |
| 1 | 0.94 |  | 0.929 |  | 3409 |  | 4400 |  | 1.02 |  | 22.1 |  | 77.0 |  | F |
| Segment 5: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\underset{\text { Ratio }}{\mathrm{d} / \mathrm{c}}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.929 | 0.981 | 4190 | 781 | 4500 | 3800 | 0.93 | 0.21 | 39.1 | 43.3 | 48.4 | 37.9 | F |
| Segment 6: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.936 | 0.979 | 4603 | 413 | 9000 | 1800 | 0.51 | 0.23 | 50.5 | 51.4 | 22.4 | 22.4 | c |
| Segment 7: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.940 | 0.935 | 4603 | 455 | 9000 | 2000 | 0.51 | 0.23 | 53.2 | 53.9 | 21.3 | 21.3 | c |
| Segment 8: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | Density$(\mathrm{pc} / \mathrm{mi} / \mathrm{ln})$ |  | Los |
| 1 | 0.94 |  | 0.940 |  | 4148 |  | 6750 |  | 0.77 |  | 54.4 |  | 25.1 |  | c |
| Segment 9: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
| 1 | 0.94 |  | 0.940 |  | 4739 |  | 8072 |  | 0.72 |  | 44.6 |  | 26.6 |  | c |
| Segment 10: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.944 |  | 4664 |  | 6750 |  | 0.85 |  | 51.8 |  | 28.3 |  | D |
| Segment 11: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\underset{\text { Ratio }}{\mathrm{d} / \mathrm{c}}$ |  | Speed(mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.944 |  | 5478 |  | 8108 |  | 0.81 |  | 42.4 |  | 32.3 |  | D |
| Segment 12: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | Los |
| 1 | 0.94 |  | 0.949 |  | 5392 |  | 6750 |  | 0.96 |  | 51.6 |  | 32.7 |  | D |
| Segment 13: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{gathered}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.949 | 0.979 | 5707 | 315 | 6300 | 1900 | 0.91 | 0.17 | 49.3 | 49.6 | 38.6 | 29.3 | F |
| Segment 14: Overlap |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/cRatio |  | Speed(mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/In) } \end{gathered}$ |  | LOS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.94 |  | 0.950 |  | 5707 |  | 6750 |  | 1.00 |  | 50.0 |  | 45.0 |  | F |
| Segment 15: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) <br> (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.950 | 0.943 | 5707 | 1692 | 9000 | 4200 | 0.63 | 0.40 | 53.5 | 49.2 | 26.6 | 19.1 | B |
| Segment 16: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP |  | PHF |  | HV | Flow (pc |  |  |  |  |  |  |  | $\begin{gathered} \text { Dens } \\ \text { (pc/m} \end{gathered}$ |  | LOS |
| 1 |  | 0.94 |  | 952 | 40 |  | 67 |  |  |  |  |  | 24.3 |  | c |
| Facility Analysis Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | Speed, mi/h |  |  |  | Density, pr/mi/ln |  | Density, veh/mi/ln |  |  | Travel Time, min |  |  | Los |  |  |
| 1 | 38.3 |  |  |  | 37.8 |  | 35.7 |  |  | 6.20 |  |  | F |  |  |

## Facility Overall Results

| Space Mean Speed, mi/h | 38.3 | Density, veh/mi/n | 35.7 |
| :---: | :---: | :---: | :---: |
| Average Travel Time, min | 6.20 | Density, pc/mi/n | 37.8 |
| Messages |  |  |  |
| WARNING 1 | Oversaturated conditions currently exist in boundary analysis period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning. |  |  |
| WARNING 2 | Oversaturated conditions currently exist on segment 7 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |
| WARNING 3 | Oversaturated conditions currently exist on segment 10 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |
| WARNING 4 | Oversaturated conditions currently exist on segment 12 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |
| WARNING 5 | The merge segment 6 and diverge segment 7 could be potentially analyzed together as a weaving segment because of the presence of an added lane which could serve as an auxiliary lane. Consider combining these two segments into a weaving segment. |  |  |
| WARNING 6 | Weaving Segment (segment 9) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |
| WARNING 7 | Weaving Segment (segment 11) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |

## Comments

$\qquad$




HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Analyst | MEL | Date | 7/15/2021 |
| Agency | Burgess \& Niple, Inc. | Analysis Year | 2021 No-Build |
| Jurisdiction |  | Time Analyzed | PM Peak Westbound I-90 |
| Project Description | I-90 HSR | Units | U.S. Customary |
| Segment Number | 1 | Segment Name | West of E. 55th On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 3400 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi |  |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft |  | Free-Flow Speed (FFS), mi/h | 65.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.945 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1579 |
| Total Trucks, \% | 5.80 | Capacity (c), pc/h/ln | 2350 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2350 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.67 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 64.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 24.5 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 65.0 |  |  |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 2 | Segment Name | East of WB SR 2 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 2300 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.945 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1621 |
| Total Trucks, \% | 5.80 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.64 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ) , mi/h | 24.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 59.2 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |


| HCS7 Freeway Diverge Report |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Project Information |  |  |  |  |
| Segment Number 3 | 3 | Segment Name | WB SR 2 Off-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 55.0 |  |
| Segment Length (L) / Deceleration Length (LA),ft |  | 1500 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5760 | 1850 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.80 | 2.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.945 | 0.980 |  |
| Flow Rate (vi),pc/h |  | 6484 | 2008 |  |
| Capacity (c), pc/h |  | 9000 | 4400 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.61 | 0.46 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on | ( No ) | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (Ds) |  | 0.349 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (vOA), p |  | 1656 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area | ( ${ }^{\text {a }}$, mi/h | 50.5 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Spe |  | 57.8 |
| Flow in Lanes 1 and 2 (v12), pc/h | 3172 | Ramp Junction Speed (S) |  | 15.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/m |  | 88.1 |
| Level of Service (LOS) | F | Density in Ramp Influenc | R), pc/mi/ln | 31.5 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 4 | Segment Name | North of EB SR 2 OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 2 | Terrain Type | Level |
| Segment Length (L), ft | 1100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Base | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | 45.0 | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | 12 | Free-Flow Speed (FFS), mi/h | 40.1 |
| Right-Side Lateral Clearance, ft | 10 |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 3910 | Heavy Vehicle Adjustment Factor (fHV) | 0.929 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 2238 |
| Total Trucks, \% | 7.60 | Capacity (c), p//h/ln | 2200 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2200 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | 0.0 | Average Speed ( S ) $\mathrm{mi} / \mathrm{h}$ | 22.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | 0.0 | Density (D), pc/mi/ln | 77.0 |
| Total Ramp Density Adjustment | 4.9 | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 40.1 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 5 | Segment Name | EB SR 2 On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 2 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 45.0 | 25.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 575 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 3910 | 720 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.60 | 1.90 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.929 | 0.981 |  |
| Flow Rate (vi),pc/h |  | 4477 | 781 |  |
| Capacity (c), pc/h |  | 4500 | 3800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.93 | 0.21 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 0 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (Ms) |  | 0.578 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | - |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 43.3 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 1.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 45.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 3409 | Ramp Junction Speed (S), mi/h |  | 39.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 4190 | Average Density ( D ), pc/mi/ln |  | 48.4 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 37.9 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 6 | Segment Name |  | 26th Street On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period |  | 17:00-17:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 10.0 |  |
| Segment Length (L) / Acceleration Length (LA),ft |  | 970 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4630 | 380 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.80 | 2.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.936 | 0.979 |  |
| Flow Rate (vi),pc/h |  | 5262 | 413 |  |
| Capacity (c), pc/h |  | 9000 | 1800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.51 | 0.23 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway (No) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.352 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (vOA), pc/h/ln |  | 1257 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 51.4 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 52.3 |
| Flow in Lanes 1 and 2 (vi2), $\mathrm{pc} / \mathrm{h}$ | 1676 | Ramp Junction Speed ( S ), mi/h |  | 50.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2089 | Average Density (D), pc/mi/n |  | 22.4 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 22.4 |

HCS7 Basic Freeway Report


HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 8 | Segment Name | North of Superior Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 1075 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4610 | Heavy Vehicle Adjustment Factor (fHV) | 0.940 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1383 |
| Total Trucks, \% | 6.40 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.61 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 54.4 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 25.1 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 9 | Segment Name | Superior On to Chester Off |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes (N), In | 4 | Segment Type | Freeway |
| Segment Length (Ls), ft | 620 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF ${ }^{\text {R }}$ | FR |
| Demand Volume (Vi), veh/h | 4550 | 540 10 | 60 |
| Peak Hour Factor (PHF) | 0.94 |   <br> 0.94 0.94 | 0.94 |
| Total Trucks, \% | 6.40 | 1.00 1.00 | 1.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.940 | 0.990 0.990 | 0.990 |
| Flow Rate (vi), pc/h | 4097 | 580 | 51 |
| Weaving Flow Rate (vw), pc/h | 631 | Freeway Max Capacity (cIFL), pc/h/n | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 4108 | Density-Based Capacity (ciwl), pc/h/ln | 2018 |
| Total Flow Rate (v), pc/h | 4739 | Demand Flow-Based Capacity (ciw), pc/h | 21622 |
| Volume Ratio (VR) | 0.111 | Weaving Segment Capacity (cw), veh/h | 7633 |
| Minimum Lane Change Rate (LCMIN), IC/h | 631 | Adjusted Weaving Area Capacity, pc/h | 8072 |
| Maximum Weaving Length (LMAX), ft | 3647 | Volume-to-Capacity Ratio (v/c) | 0.59 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 425 | Average Weaving Speed (SW), mi/h | 43.5 |
| Non-Weaving Lane Change Rate (LCNW), IC/h | 412 | Average Non-Weaving Speed (SNW), mi/h | 44.8 |
| Weaving Lane Change Rate (LCW), Ic/h | 876 | Average Speed ( 5 ) mi/h | 44.6 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1288 | Density ( D ), pc/mi/n | 26.6 |
| Weaving Intensity Factor (W) | 0.402 | Level of Service (LOS) | C |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 10 | Segment Name | North of Chester Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5090 | Heavy Vehicle Adjustment Factor (fHV) | 0.944 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1555 |
| Total Trucks, \% | 5.90 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.69 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 51.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 28.3 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 11 | Segment Name | Chester On to Prospect Off |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes (N), In | 4 | Segment Type | Freeway |
| Segment Length (Ls), ft | 960 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF $\quad$ RR | FR |
| Demand Volume (Vi), veh/h | 5020 | 740 | 70 |
| Peak Hour Factor (PHF) | 0.94 | 740  <br> 0.94 0.94 | 0.94 |
| Total Trucks, \% | 5.90 | 2.00 1.00 | 1.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.944 | 0.980 0.990 | 0.990 |
| Flow Rate (vi), pc/h | 4603 | 803 (11 | 61 |
| Weaving Flow Rate (vw), pc/h | 864 | Freeway Max Capacity (cIFL), pc/h/n | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 4614 | Density-Based Capacity (ciwl), pc/h/ln | 2027 |
| Total Flow Rate (v), pc/h | 5478 | Demand Flow-Based Capacity (ciw), pc/h | 17910 |
| Volume Ratio (VR) | 0.134 | Weaving Segment Capacity (cw), veh/h | 7695 |
| Minimum Lane Change Rate (LCMIN), IC/h | 864 | Adjusted Weaving Area Capacity, pc/h | 8108 |
| Maximum Weaving Length (LMAX), ft | 3873 | Volume-to-Capacity Ratio (v/c) | 0.68 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 738 | Average Weaving Speed (SW), mi/h | 43.8 |
| Non-Weaving Lane Change Rate (LCNW), IC/h | 700 | Average Non-Weaving Speed (SNW), mi/h | 42.2 |
| Weaving Lane Change Rate (LCW), Ic/h | 1215 | Average Speed ( 5 ) mi/h | 42.4 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1915 | Density ( D ), pc/mi/n | 32.3 |
| Weaving Intensity Factor (W) | 0.390 | Level of Service (LOS) | D |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 12 | Segment Name | North of Prospect OnRamo |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.949 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1797 |
| Total Trucks, \% | 5.40 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.80 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 51.6 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 32.7 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 13 | 13 | Segment Name | Prospect Ave On-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 3 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 30.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 1180 | 560 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Highway/CD Roadway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5760 | 290 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.40 | 2.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.949 | 0.979 |  |
| Flow Rate (vi),pc/h |  | 6457 | 315 |  |
| Capacity (c), pc/h |  | 6300 | 1900 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.91 | 0.17 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 636.5 | Number of Outer Lanes on Freeway (No) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 4130 | Speed Index (MS) |  | 0.418 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 2195 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 49.6 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.593 | Outer Lanes Freeway Speed (SO), mi/h |  | 48.9 |
| Flow in Lanes 1 and 2 (vi2), $\mathrm{pc} / \mathrm{h}$ | 3197 | Ramp Junction Speed (S), mi/h |  | 49.3 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 3512 | Average Density (D), pc/mi/ln |  | 38.6 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 29.3 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 14 | Segment Name | North of 13-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 320 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 6050 | Heavy Vehicle Adjustment Factor (fHV) | 0.950 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1902 |
| Total Trucks, \% | 5.30 | Capacity (c), p//h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.85 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 50.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 45.0 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |


| HCS7 Freeway Diverge Report |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Project Information |  |  |  |  |
| Segment Number 15 | 15 | Segment Name | 1-77 Off-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 45.0 |  |
| Segment Length (L) / Deceleration Length (LA),ft |  | 1180 | 960 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 6050 | 1500 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.30 | 6.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.950 | 0.943 |  |
| Flow Rate (vi), pc/h |  | 6775 | 1692 |  |
| Capacity (c), pc/h |  | 9000 | 4200 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.63 | 0.40 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on | ( No ) | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (Ds) |  | 0.450 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), p |  | 1486 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area | ( ${ }^{\text {a }}$, mi/h | 49.2 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Spe |  | 58.4 |
| Flow in Lanes 1 and 2 (v12), $\mathrm{pc} / \mathrm{h}$ | 2736 | Ramp Junction Speed (S) |  | 53.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/m |  | 26.6 |
| Level of Service (LOS) | B | Density in Ramp Influenc | R), pc/mi/ln | 19.1 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 16 | Segment Name | South of l-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 4000 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4550 | Heavy Vehicle Adjustment Factor (ftV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1338 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.59 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), pc/mi/l | 24.3 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | C |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |
| Copyright © 2021 University of Florida. All Rights Reserved. $\quad \begin{aligned} & \text { HCS } \\ & 202\end{aligned}$ |  |  | Generated: 08/27/2021 11:50:5 |


| LOS |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | C | F | F | F | F | c | c | c | c | D | D |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | D | F | F | B | c |  |  |  |  |  |  |
| Speed (mi/h) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 64.5 | 24.5 | 15.5 | 22.1 | 39.1 | 50.5 | 53.2 | 54.4 | 44.6 | 51.8 | 42.4 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 51.6 | 49.3 | 50.0 | 53.5 | 55.0 |  |  |  |  |  |  |
| Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 24.5 | 59.2 | 88.1 | 77.0 | 48.4 | 22.4 | 21.3 | 25.1 | 26.6 | 28.3 | 32.3 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 32.7 | 38.6 | 45.0 | 26.6 | 24.3 |  |  |  |  |  |  |
| Demand - Capacity Ratio (D/C) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 0.69 | 0.72 | 0.72 | 1.02 | 0.93 | 0.51 | 0.51 | 0.77 | 0.72 | 0.85 | 0.81 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.96 | 0.91 | 1.00 | 0.63 | 0.75 |  |  |  |  |  |  |
| Density (veh/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 23.1 | 56.0 | 83.3 | 71.6 | 45.0 | 21.0 | 20.0 | 23.6 | 25.2 | 26.7 | 30.7 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 31.0 | 36.6 | 42.7 | 25.3 | 23.2 |  |  |  |  |  |  |
| Ramp Density (pc/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | 31.5 | - | 37.9 | 22.4 | 21.3 | - | - |  | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | 29.3 | - | 19.1 | - |  |  |  |  |  |  |
| Density-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | c | F | F | F | F | c | c | c | c | D | D |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | D | D | E | B | c |  |  |  |  |  |  |
| Demand-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | - | F | F | - | - | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | F | F | - | - |  |  |  |  |  |  |
| Volume - Capacity Ratio (V/C) |  |  |  |  |  |  |  |  |  |  |  |


|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AP 1 | 0.67 | 0.64 | 0.61 | 0.77 | 0.93 | 0.51 | 0.51 | 0.61 | 0.59 | 0.69 | 0.68 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.80 | 0.91 | 0.85 | 0.63 | 0.59 |  |  |  |  |  |  |

## 2021 AM Peak

 HSR East of SR 2Capacity Analysis


| 1 | 0.94 | 0.94 | 0.952 | 0.980 | 8649 | 3267 | 11250 | 4400 | 0.77 | 0.74 | 52.5 | 49.0 | 32.9 | 40.5 | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Segment 4: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.935 |  | 5382 |  | 6600 |  | 0.82 |  | 45.0 |  | 39.9 |  | E |
| Segment 5: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \text { Capacity } \\ (\mathrm{pc} / \mathrm{h}) \end{gathered}$ |  | $\begin{gathered} d / c \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.935 | 0.952 | 6164 | 782 | 6750 | 3800 | 0.91 | 0.21 | 41.4 | 43.5 | 49.6 | 35.3 | E |
| Segment 6: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.937 | 0.833 | 6203 | 38 | 11250 | 1800 | 0.55 | 0.02 | 51.1 | 55.0 | 22.6 | 22.6 | c |
| Segment 7: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.937 | 0.961 | 6199 | 819 | 11250 | 2000 | 0.55 | 0.41 | 53.5 | 55.0 | 22.5 | 22.5 | c |
| Segment 8: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.933 |  | 5382 |  | 9000 |  | 0.60 |  | 54.5 |  | 24.5 |  | c |
| Segment 9: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed$(\mathrm{mi} / \mathrm{h})$ (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.929 |  | 5778 |  | 9975 |  | 0.58 |  | 43.3 |  | 26.7 |  | c |
| Segment 10: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | $\begin{aligned} & \text { Flow Rate } \\ & (\mathrm{pc} / \mathrm{h}) \end{aligned}$ |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed(mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/lin) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.934 |  | 5308 |  | 9000 |  | 0.59 |  | 51.4 |  | 24.1 |  | c |
| Segment 11: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | $\begin{aligned} & \text { Capacity } \\ & (\mathrm{pc} / \mathrm{h}) \end{aligned}$ |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.926 |  | 5973 |  | 9524 |  | 0.63 |  | 39.2 |  | 30.5 |  | D |
| Segment 12: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.928 |  | 5078 |  | 9000 |  | 0.56 |  | 50.7 |  | 23.1 |  | c |
| Segment 13: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/cRatio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.928 | 0.943 | 5383 | 305 | 8400 | 1900 | 0.64 | 0.16 | 51.0 | 50.7 | 26.4 | 20.1 | c |
| Segment 14: Overlap |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $d / c$Ratio |  | Speed (mi/h) |  | Density(pc/mi/In) |  | Los |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.94 |  | 0.929 |  | 5382 |  | 9000 |  | 0.60 |  | 53.8 |  | 24.5 |  | C |
| Segment 15: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $d / c$Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.929 | 0.917 | 5382 | 1903 | 11250 | 4200 | 0.48 | 0.45 | 53.3 | 48.9 | 20.2 | 18.6 | B |
| Segment 16: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{In}$ ) |  | Los |
| 1 | 0.94 |  | 0.935 |  | 3482 |  | 6750 |  | 0.52 |  | 55.0 |  | 21.1 |  | c |
| Facility Analysis Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | Speed, mi/h |  |  |  | Density, pc/mi/ln |  | Density, veh/mi/ln |  |  | Travel Time, min |  |  | LOS |  |  |
| 1 | 51.4 |  |  |  | 29.3 |  | 27.3 |  |  | 4.60 |  |  | D |  |  |
| Facility Overall Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Space Mean Speed, mi/h |  |  |  |  | 51.4 |  |  | Density, veh/mi/ln |  |  |  |  | 27.3 |  |  |
| Average Travel Time, min |  |  |  |  | 4.60 |  |  | Density, pc/mi/ln |  |  |  |  | 29.3 |  |  |
| Messages |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| WARNING 1 |  |  |  |  | The merge segment 6 and diverge segment 7 could be potentially analyzed together as a weaving segment because of the presence of an added lane which could serve as an auxiliary lane. Consider combining these two segments into a weaving segment. |  |  |  |  |  |  |  |  |  |  |
| WARNING 2 |  |  |  |  | Weaving Segment (segment 9) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |
| WARNING 3 |  |  |  |  | Weaving Segment (segment 11) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |
| Comments |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |





HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Analyst | MEL | Date | 7/15/2021 |
| Agency | Burgess \& Niple, Inc. | Analysis Year | 2021 HSR East of SR 2 |
| Jurisdiction |  | Time Analyzed | AM Peak Westbound I-90 |
| Project Description | I-90 HSR | Units | U.S. Customary |
| Segment Number | 1 | Segment Name | West of E. 55th On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 3400 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 65.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 7740 | Heavy Vehicle Adjustment Factor (fHV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 2162 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2350 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2350 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.92 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 56.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), pc/mi/n | 38.1 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | E |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 65.0 |  |  |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 2 | Segment Name | East of WB SR 2 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 5 | Terrain Type | Level |
| Segment Length (L), ft | 2300 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 7740 | Heavy Vehicle Adjustment Factor (fHV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1730 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 31.5 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 3 | Segment Name | WB SR 2 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 5 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 55.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1500 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 7740 | 3010 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.00 | 2.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.952 | 0.980 |  |
| Flow Rate (vi),pc/h |  | 8649 | 3267 |  |
| Capacity (c), pc/h |  | 11250 | 4400 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.77 | 0.74 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.462 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1351 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 49.0 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (SO), mi/h |  | 59.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 4217 | Ramp Junction Speed (S), mi/h |  | 52.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/mi/n |  | 32.9 |
| Level of Service (LOS) | E | Density in Ramp Influence Area (DR), pc/mi/ln |  | 40.5 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 4 | Segment Name | North of EB SR 2 OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 1100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 45.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4730 | Heavy Vehicle Adjustment Factor (fHV) | 0.935 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 1794 |
| Total Trucks, \% | 6.90 | Capacity (c), pc/h/ln | 2200 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2200 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.82 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 45.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 39.9 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | E |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 45.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 5 | Segment Name | EB SR 2 On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 3 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 45.0 | 25.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 575 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4730 | 700 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.90 | 5.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.935 | 0.952 |  |
| Flow Rate (vi),pc/h |  | 5382 | 782 |  |
| Capacity (c), pc/h |  | 6750 | 3800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.91 | 0.21 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 224.1 | Number of Outer Lanes on Freeway ( N O ) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 1100 | Speed Index (MS) |  | 0.506 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 2307 |
| Distance to Downstream Ramp (LDown), ft | 5875 | On-Ramp Influence Area Speed (SR), mi/h |  | 43.5 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.555 | Outer Lanes Freeway Speed (SO), mi/h |  | 38.4 |
| Flow in Lanes 1 and 2 (v12), pc/h | 3075 | Ramp Junction Speed (S), mi/h |  | 41.4 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 3857 | Average Density (D), pc/mi/n |  | 49.6 |
| Level of Service (LOS) | E | Density in Ramp Influence Area (DR), pc/mi/ln |  | 35.3 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 6 | 6 | Segment Name |  | 26th Street On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period |  | 08:00-08:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) In |  | 5 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 10.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 970 | 800 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5430 | 30 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.70 | 20.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.937 | 0.833 |  |
| Flow Rate (vi),pc/h |  | 6165 | 38 |  |
| Capacity (c), pc/h |  | 11250 | 1800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.55 | 0.02 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 9999.0 | Number of Outer Lanes on Freeway ( N ) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 575 | Speed Index (MS) |  | 55.000 |
| Downstream Equilibrium Distance (LEQ), ft | 9999.0 | Flow Outer Lanes (voA), pc/h/ln |  | 0 |
| Distance to Downstream Ramp (LDown), ft | 5300 | On-Ramp Influence Area Speed (SR), mi/h |  | 55.0 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 1.000 | Outer Lanes Freeway Speed (So), mi/h |  | 75.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 0 | Ramp Junction Speed (S), mi/h |  | 51.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 0 | Average Density ( D , $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ |  | 22.6 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 22.6 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 7 | 7 | Segment Name |  | Superior Ave Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period |  | 08:00-08:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 5 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 35.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 200 | 800 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5460 | 740 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.70 | 4.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.937 | 0.961 |  |
| Flow Rate (vi),pc/h |  | 6199 | 819 |  |
| Capacity (c), pc/h |  | 11250 | 2000 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.55 | 0.41 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 9999.0 | Number of Outer Lanes on Freeway (NO) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 1170 | Speed Index (DS) |  | 55.000 |
| Downstream Equilibrium Distance (LEQ), ft | 9999.0 | Flow Outer Lanes (voA), pc/h/ln |  | 0 |
| Distance to Downstream Ramp (LDown), ft | 4130 | Off-Ramp Influence Area Speed (SR), mi/h |  | 55.0 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 1.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 75.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 0 | Ramp Junction Speed (S), mi/h |  | 53.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 0 | Average Density (D), pc/mi/n |  | 22.5 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 22.5 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 8 | Segment Name | North of Superior Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length ( L , ft | 1075 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4720 | Heavy Vehicle Adjustment Factor (ftV) | 0.933 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1346 |
| Total Trucks, \% | 7.20 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.60 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (fiw) | - | Average Speed ( S ), mi/h | 54.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 24.5 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 9 | Segment Name | Superior On to Chester Off |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N ), In | 5 | Segment Type | Freeway |
| Segment Length (Ls), ft | 620 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR) , Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF RR | FR |
| Demand Volume (Vi), veh/h | 4310 | 350 20 | 410 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 7.60 | 1.00 1.00 | 2.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.929 | 1.990 0.990 | 0.980 |
| Flow Rate (vi), pc/h | 4936 | 376 | 445 |
| Weaving Flow Rate (vw), pc/h | 821 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 4957 | Density-Based Capacity (ciwl), pc/h/ln | 1995 |
| Total Flow Rate (v), pc/h | 5778 | Demand Flow-Based Capacity (ciw), pc/h | 16901 |
| Volume Ratio (VR) | 0.142 | Weaving Segment Capacity (cw), veh/h | 9348 |
| Minimum Lane Change Rate (LCMIN), IC/h | 821 | Adjusted Weaving Area Capacity, pc/h | 9975 |
| Maximum Weaving Length (LMAX), ft | 3952 | Volume-to-Capacity Ratio (v/c) | 0.58 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 512 | Average Weaving Speed (SW), mi/h | 42.1 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 394 | Average Non-Weaving Speed (SNw), mi/h | 43.5 |
| Weaving Lane Change Rate (LCW), IC/h | 1203 | Average Speed ( S ), mi/h | 43.3 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1597 | Density (D), pc/mi/ln | 26.7 |
| Weaving Intensity Factor (W) | 0.477 | Level of Service (LOS) | c |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 10 | Segment Name | North of Chester Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4660 | Heavy Vehicle Adjustment Factor (fHV) | 0.934 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1327 |
| Total Trucks, \% | 7.10 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% |  | Volume-to-Capacity Ratio (v/c) | 0.59 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 51.4 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 24.1 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 11 | Segment Name | Chester On to Prospect Off |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N ), In | 5 | Segment Type | Freeway |
| Segment Length (Ls), ft | 960 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF $\quad$ RR | FR |
| Demand Volume (Vi), veh/h | 3860 | 570 | 800 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 8.00 | 5.00 | 2.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.926 |   <br> 0.952 0.980 | 0.980 |
| Flow Rate (vi), pc/h | 4435 | 637 (33 | 868 |
| Weaving Flow Rate (vw), pc/h | 1505 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 4468 | Density-Based Capacity (ciwl), pc/h/ln | 1935 |
| Total Flow Rate (v), pc/h | 5973 | Demand Flow-Based Capacity (ciw), pc/h | 9524 |
| Volume Ratio (VR) | 0.252 | Weaving Segment Capacity (cw), veh/h | 8923 |
| Minimum Lane Change Rate (LCMIN), Ic/h | 1505 | Adjusted Weaving Area Capacity, pc/h | 9524 |
| Maximum Weaving Length (LMAX), ft | 5075 | Volume-to-Capacity Ratio (v/c) | 0.63 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 715 | Average Weaving Speed (SW), mi/h | 41.9 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 478 | Average Non-Weaving Speed (SNw), mi/h | 38.4 |
| Weaving Lane Change Rate (LCW), IC/h | 2054 | Average Speed ( S ), mi/h | 39.2 |
| Weaving Lane Change Rate (LCAll), Ic/h | 2532 | Density (D), pc/mi/ln | 30.5 |
| Weaving Intensity Factor (W) | 0.486 | Level of Service (LOS) | D |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 12 | Segment Name | North of Prospect OnRamo |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4430 | Heavy Vehicle Adjustment Factor (fHV) | 0.928 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 1270 |
| Total Trucks, \% | 7.80 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.56 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 50.7 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 23.1 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 13 | 13 | Segment Name | Prospect Ave On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 30.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 1180 | 560 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Highway/CD Roadway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4430 | 270 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.80 | 6.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.928 | 0.943 |  |
| Flow Rate (vi),pc/h |  | 5078 | 305 |  |
| Capacity (c), pc/h |  | 8400 | 1900 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.64 | 0.16 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.328 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1524 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 50.7 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.180 | Outer Lanes Freeway Speed (SO), mi/h |  | 51.3 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2031 | Ramp Junction Speed (S), mi/h |  | 51.0 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2336 | Average Density (D), pc/mi/n |  | 26.4 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 20.1 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 14 | Segment Name | North of 13-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 320 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4700 | Heavy Vehicle Adjustment Factor (fHV) | 0.929 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1346 |
| Total Trucks, \% | 7.70 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.60 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 53.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 24.5 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 15 | 15 | Segment Name | I-77 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 5 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 45.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1180 | 960 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4700 | 1640 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.70 | 9.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.929 | 0.917 |  |
| Flow Rate (vi),pc/h |  | 5382 | 1903 |  |
| Capacity (c), pc/h |  | 11250 | 4200 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.48 | 0.45 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.469 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1088 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 48.9 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (SO), mi/h |  | 60.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2668 | Ramp Junction Speed (S), mi/h |  | 53.3 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/mi/n |  | 20.2 |
| Level of Service (LOS) | B | Density in Ramp Influence Area (DR), pc/mi/ln |  | 18.6 |


| HCS7 Basic Freeway Report |  |  |  |
| :---: | :---: | :---: | :---: |
| Project Information |  |  |  |
| Segment Number | 16 | Segment Name | South of I-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 4000 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 3060 | Heavy Vehicle Adjustment Factor (fHV) | 0.935 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1161 |
| Total Trucks, \% | 7.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.52 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S , mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 21.1 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |
|  |  |  |  |


| LOS |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | E | D | E | E | E | c | c | C | C | c | D |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | C | C | C | B | C |  |  |  |  |  |  |
| Speed (mi/h) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 56.8 | 55.0 | 52.5 | 45.0 | 41.4 | 51.1 | 53.5 | 54.5 | 43.3 | 51.4 | 39.2 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 50.7 | 51.0 | 53.8 | 53.3 | 55.0 |  |  |  |  |  |  |
| Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 38.1 | 31.5 | 32.9 | 39.9 | 49.6 | 22.6 | 22.5 | 24.5 | 26.7 | 24.1 | 30.5 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 23.1 | 26.4 | 24.5 | 20.2 | 21.1 |  |  |  |  |  |  |
| Demand - Capacity Ratio (D/C) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 0.92 | 0.77 | 0.77 | 0.82 | 0.91 | 0.55 | 0.55 | 0.60 | 0.58 | 0.59 | 0.63 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.56 | 0.64 | 0.60 | 0.48 | 0.52 |  |  |  |  |  |  |
| Density (veh/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 36.3 | 30.0 | 31.3 | 37.3 | 46.4 | 21.2 | 21.1 | 22.9 | 23.3 | 22.5 | 26.5 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 21.4 | 24.5 | 22.8 | 18.8 | 19.7 |  |  |  |  |  |  |
| Ramp Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | 40.5 | - | 35.3 | 22.6 | 22.5 | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | 20.1 | - | 18.6 | - |  |  |  |  |  |  |
| Density-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | E | D | E | E | E | c | c | C | c | c | D |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | c | c | c | B | c |  |  |  |  |  |  |
| Demand-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 |  | - | - | - |  | - |  |  | - | - |  |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | - |  | - | - |  |  |  |  |  |  |
| Volume - Capacity Ratio (V/C) |  |  |  |  |  |  |  |  |  |  |  |

# 2021 PM Peak <br> HSR East of SR 2 <br> Capacity Analysis 

HCS7 Freeway Facilities Report

## Project Information



## Facility Segment Data

| Segment 1: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AP | PHF |  | fHV |  |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} d / c \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.945 |  |  | 6484 |  | 9400 |  | 0.69 |  | 64.3 |  | 25.2 |  | c |
| Segment 2: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/In) } \end{gathered}$ |  | Los |
| 1 | 0.94 |  | 0.945 |  |  | 6484 |  | 11250 |  | 0.58 |  | 55.0 |  | 23.6 |  | c |
| Segment 3: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F |  | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |


| 1 | 0.94 | 0.94 | 0.945 | 0.980 | 6484 | 2008 | 11250 | 4400 | 0.58 | 0.46 | 54.3 | 50.5 | 23.9 | 29.4 | D |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Segment 4: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed ( $\mathrm{mi} / \mathrm{h}$ ) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | Los |
| 1 | 0.94 |  | 0.929 |  | 4477 |  | 6600 |  | 0.68 |  | 40.1 |  | 37.2 |  | E |
| Segment 5: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\underset{\text { Ratio }}{d / c}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | Density( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.929 | 0.981 | 5258 | 781 | 6750 | 3800 | 0.78 | 0.21 | 42.2 | 43.7 | 41.5 | 31.2 | D |
| Segment 6: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\underset{\text { Ratio }}{\mathrm{d} / \mathrm{c}}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.936 | 0.979 | 5675 | 413 | 11250 | 1800 | 0.50 | 0.23 | 51.3 | 55.0 | 20.6 | 20.6 | c |
| Segment 7: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\underset{\text { Ratio }}{\mathrm{d} / \mathrm{c}}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.940 | 0.935 | 5670 | 455 | 11250 | 2000 | 0.50 | 0.23 | 53.6 | 55.0 | 20.6 | 20.6 | c |
| Segment 8: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.940 |  | 5217 |  | 9000 |  | 0.58 |  | 54.5 |  | 23.7 |  | c |
| Segment 9: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
| 1 | 0.94 |  | 0.940 |  | 5804 |  | 10090 |  | 0.58 |  | 44.6 |  | 26.0 |  | c |
| Segment 10: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.944 |  | 5736 |  | 9000 |  | 0.64 |  | 51.8 |  | 26.1 |  | D |
| Segment 11: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.944 |  | 6546 |  | 10135 |  | 0.65 |  | 42.5 |  | 30.8 |  | D |
| Segment 12: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\mathrm{d} / \mathrm{c}$Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.949 |  | 6457 |  | 9000 |  | 0.72 |  | 51.6 |  | 29.3 |  | D |
| Segment 13: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.949 | 0.979 | 6772 | 315 | 8400 | 1900 | 0.81 | 0.17 | 50.0 | 50.3 | 33.9 | 24.5 | c |
| Segment 14: Overlap |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | Density(pc/mi/In) |  | Los |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.94 |  | 0.950 |  | 6775 |  | 9000 |  | 0.75 |  | 53.5 |  | 30.8 |  | D |
| Segment 15: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | $\begin{aligned} & \text { Capacity } \\ & (\mathrm{pc} / \mathrm{h}) \end{aligned}$ |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.950 | 0.943 | 6775 | 1692 | 11250 | 4200 | 0.60 | 0.40 | 53.6 | 49.2 | 25.3 | 19.3 | в |
| Segment 16: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | $\begin{gathered} \text { Capacity } \\ (\mathrm{pc} / \mathrm{h}) \end{gathered}$ |  | $\begin{gathered} \mathbf{d} / \mathbf{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.952 |  | 5084 |  | 6750 |  | 0.75 |  | 55.0 |  | 30.8 |  | D |
| Facility Analysis Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | Speed, mi/h |  |  |  | Density, pc/mi/ln |  | Density, veh/mi/ln |  |  | Travel Time, min |  |  | LOS |  |  |
| 1 | 52.5 |  |  |  | 27.2 |  | 25.4 |  |  | 4.50 |  |  | D |  |  |
| Facility Overall Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Space Mean Speed, mi/h |  |  |  |  | 52.5 |  | Density, veh/mi/ln |  |  |  |  |  | 25.4 |  |  |
| Average Travel Time, min |  |  |  |  | 4.50 |  | Density, pc/mi/ln |  |  |  | 27.2 |  |  |  |  |
| Messages |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| WARNING 1 |  |  |  |  | The merge segment 6 and diverge segment 7 could be potentially analyzed together as a weaving segment because of the presence of an added lane which could serve as an auxiliary lane. Consider combining these two segments into a weaving segment. |  |  |  |  |  |  |  |  |  |  |
| WARNING 2 |  |  |  |  | Weaving Segment (segment 9) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |
| WARNING 3 |  |  |  |  | Weaving Segment (segment 11) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |

## Comments





HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Analyst | MEL | Date | 7/15/2021 |
| Agency | Burgess \& Niple, Inc. | Analysis Year | 2021 HSR East of SR 2 |
| Jurisdiction |  | Time Analyzed | PM Peak Westbound I-90 |
| Project Description | I-90 HSR | Units | U.S. Customary |
| Segment Number | 1 | Segment Name | West of E. 55th On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 3400 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi |  |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft |  | Free-Flow Speed (FFS), mi/h | 65.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.945 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1621 |
| Total Trucks, \% | 5.80 | Capacity (c), pc/h/ln | 2350 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2350 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.69 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 64.3 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 25.2 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 65.0 |  |  |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 2 | Segment Name | East of WB SR 2 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 5 | Terrain Type | Level |
| Segment Length (L), ft | 2300 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.945 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1297 |
| Total Trucks, \% | 5.80 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.58 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ) , mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 23.6 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 3 | 3 | Segment Name | WB SR 2 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 5 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 55.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1500 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5760 | 1850 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.80 | 2.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.945 | 0.980 |  |
| Flow Rate (vi), p/h |  | 6484 | 2008 |  |
| Capacity (c), pc/h |  | 11250 | 4400 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.58 | 0.46 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.349 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1296 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 50.5 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (So), mi/h |  | 59.2 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2919 | Ramp Junction Speed (S), mi/h |  | 54.3 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/mi/n |  | 23.9 |
| Level of Service (LOS) | D | Density in Ramp Influence Area (DR), pc/mi/ln |  | 29.4 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 4 | Segment Name | North of EB SR 2 OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 1100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Base | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | 45.0 | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | 12 | Free-Flow Speed (FFS), mi/h | 40.1 |
| Right-Side Lateral Clearance, ft | 10 |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 3910 | Heavy Vehicle Adjustment Factor (fHV) | 0.929 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1492 |
| Total Trucks, \% | 7.60 | Capacity (c), pc/h/ln | 2200 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2200 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.68 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | 0.0 | Average Speed ( S ), mi/h | 40.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | 0.0 | Density (D), pc/mi/n | 37.2 |
| Total Ramp Density Adjustment | 4.9 | Level of Service (LOS) | E |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 40.1 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 5 | 5 | Segment Name | EB SR 2 On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 3 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 45.0 | 25.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 575 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 3910 | 720 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.60 | 1.90 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.929 | 0.981 |  |
| Flow Rate (vi),pc/h |  | 4477 | 781 |  |
| Capacity (c), pc/h |  | 6750 | 3800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.78 | 0.21 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 30.2 | Number of Outer Lanes on Freeway (No) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 1100 | Speed Index (MS) |  | 0.431 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1919 |
| Distance to Downstream Ramp (LDown), ft | 5875 | On-Ramp Influence Area Speed (SR), mi/h |  | 43.7 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.555 | Outer Lanes Freeway Speed (SO), mi/h |  | 39.9 |
| Flow in Lanes 1 and 2 (vi2), $\mathrm{pc} / \mathrm{h}$ | 2558 | Ramp Junction Speed (S), mi/h |  | 42.2 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 3339 | Average Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ |  | 41.5 |
| Level of Service (LOS) | D | Density in Ramp Influence Area (DR), pc/mi/ln |  | 31.2 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 6 | 6 | Segment Name |  | 26th Street On-Ramp |
| Analysis Period Number 1 | 1 | Segment Analysis Period |  | 17:00-17:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 5 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 10.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 970 | 800 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4630 | 380 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.80 | 2.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.936 | 0.979 |  |
| Flow Rate (vi), pc/h |  | 5262 | 413 |  |
| Capacity (c), pc/h |  | 11250 | 1800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.50 | 0.23 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 9999.0 | Number of Outer Lanes on Freeway ( N ) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 575 | Speed Index (Ms) |  | 55.000 |
| Downstream Equilibrium Distance (LEQ), ft | 9999.0 | Flow Outer Lanes (voA), pc/h/ln |  | 0 |
| Distance to Downstream Ramp (LDown), ft | 5300 | On-Ramp Influence Area Speed (SR), mi/h |  | 55.0 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 1.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 75.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 0 | Ramp Junction Speed ( S ), mi/h |  | 51.3 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 0 | Average Density ( D , $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ |  | 20.6 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 20.6 |

HCS7 Basic Freeway Report


HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 8 | Segment Name | North of Superior Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 1075 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4610 | Heavy Vehicle Adjustment Factor (fHV) | 0.940 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1304 |
| Total Trucks, \% | 6.40 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.58 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 54.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 23.7 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 9 | Segment Name | Superior On to Chester Off |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes (N), In | 5 | Segment Type | Freeway |
| Segment Length (Ls), ft | 620 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF ${ }^{\text {R }}$ | FR |
| Demand Volume (Vi), veh/h | 4550 | 540 10 | 60 |
| Peak Hour Factor (PHF) | 0.94 |   <br> 0.94 0.94 | 0.94 |
| Total Trucks, \% | 6.40 | 1.00 1.00 | 1.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.940 | 0.990 0.990 | 0.990 |
| Flow Rate (vi), pc/h | 5149 | 580 | 64 |
| Weaving Flow Rate (vw), pc/h | 644 | Freeway Max Capacity (cIFL), pc/h/n | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 5160 | Density-Based Capacity (ciwl), pc/h/ln | 2018 |
| Total Flow Rate (v), pc/h | 5804 | Demand Flow-Based Capacity (ciw), pc/h | 21622 |
| Volume Ratio (VR) | 0.111 | Weaving Segment Capacity (cw), veh/h | 9542 |
| Minimum Lane Change Rate (LCMIN), IC/h | 644 | Adjusted Weaving Area Capacity, pc/h | 10090 |
| Maximum Weaving Length (LMAX), ft | 3647 | Volume-to-Capacity Ratio (v/c) | 0.58 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 533 | Average Weaving Speed (SW), mi/h | 42.7 |
| Non-Weaving Lane Change Rate (LCNW), IC/h | 436 | Average Non-Weaving Speed (Snw), mi/h | 44.8 |
| Weaving Lane Change Rate (LCW), Ic/h | 1026 | Average Speed ( 5 ) mi/h | 44.6 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1462 | Density ( D ), pc/mi/n | 26.0 |
| Weaving Intensity Factor (W) | 0.445 | Level of Service (LOS) | C |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 10 | Segment Name | North of Chester Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5090 | Heavy Vehicle Adjustment Factor (fHV) | 0.944 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1434 |
| Total Trucks, \% | 5.90 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.64 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 51.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 26.1 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |


| HCS7 Freeway Weaving Report |  |  |  |
| :---: | :---: | :---: | :---: |
| Project Information |  |  |  |
| Segment Number | 11 | Segment Name | Chester On to Prospect Off |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N , In | 5 | Segment Type | Freeway |
| Segment Length (Ls), ft | 960 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF $\quad$ RR | FR |
| Demand Volume (Vi), veh/h | 5020 | $740 \times 10$ | 70 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 5.90 | 2.00 | 1.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.944 | 0.980 0.990 | 0.990 |
| Flow Rate (vi), pc/h | 5657 | 803 (11 | 75 |
| Weaving Flow Rate (vw), pc/h | 878 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 5668 | Density-Based Capacity (ciwl), pc/h/ln | 2027 |
| Total Flow Rate (v), pc/h | 6546 | Demand Flow-Based Capacity (ciw), pc/h | 17910 |
| Volume Ratio (VR) | 0.134 | Weaving Segment Capacity (cw), veh/h | 9618 |
| Minimum Lane Change Rate (LCMIN), IC/h | 878 | Adjusted Weaving Area Capacity, pc/h | 10135 |
| Maximum Weaving Length (LMAX), ft | 3873 | Volume-to-Capacity Ratio (v/c) | 0.65 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 907 | Average Weaving Speed (SW), mi/h | 43.0 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 725 | Average Non-Weaving Speed (SNw), mi/h | 42.4 |
| Weaving Lane Change Rate (LCW), IC/h | 1427 | Average Speed ( S ) , mi/h | 42.5 |
| Weaving Lane Change Rate (LCAll), Ic/h | 2152 | Density (D), pc/mi/ln | 30.8 |
| Weaving Intensity Factor (W) | 0.427 | Level of Service (LOS) | D |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 12 | Segment Name | North of Prospect OnRamo |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.949 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1614 |
| Total Trucks, \% | 5.40 | Capacity (c), p//h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.72 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ) $\mathrm{mi} / \mathrm{h}$ | 51.6 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 29.3 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 13 | 13 | Segment Name | Prospect Ave On-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 30.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 1180 | 560 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Highway/CD Roadway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5760 | 290 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.40 | 2.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.949 | 0.979 |  |
| Flow Rate (vi),pc/h |  | 6457 | 315 |  |
| Capacity (c), pc/h |  | 8400 | 1900 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.81 | 0.17 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway (No) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.358 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1937 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 50.3 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.178 | Outer Lanes Freeway Speed (SO), mi/h |  | 49.8 |
| Flow in Lanes 1 and 2 (vi2), $\mathrm{pc} / \mathrm{h}$ | 2583 | Ramp Junction Speed (S), mi/h |  | 50.0 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2898 | Average Density (D), pc/mi/ln |  | 33.9 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 24.5 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 14 | Segment Name | North of 13-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 320 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 6050 | Heavy Vehicle Adjustment Factor (fHV) | 0.950 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1694 |
| Total Trucks, \% | 5.30 | Capacity (c), p//h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.75 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 53.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 30.8 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |


| HCS7 Freeway Diverge Report |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Project Information |  |  |  |  |
| Segment Number 15 | 15 | Segment Name | 1-77 Off-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 5 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 45.0 |  |
| Segment Length (L) / Deceleration Length (LA),ft |  | 1180 | 960 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 6050 | 1500 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.30 | 6.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.950 | 0.943 |  |
| Flow Rate (vi), pc/h |  | 6775 | 1692 |  |
| Capacity (c), pc/h |  | 11250 | 4200 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.60 | 0.40 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on | ( No ) | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (Ds) |  | 0.450 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), p |  | 1505 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area | ( ${ }^{\text {a }}$, mi/h | 49.2 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Spe |  | 58.4 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2749 | Ramp Junction Speed (S) |  | 53.6 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/m |  | 25.3 |
| Level of Service (LOS) | B | Density in Ramp Influenc | R), pc/mi/ln | 19.3 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 16 | Segment Name | South of l-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 4000 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4550 | Heavy Vehicle Adjustment Factor (fHV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 1695 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.75 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), pc/mi/n | 30.8 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |
|  |  |  |  |


| LOS |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | c | C | D | E | D | c | c | c | c | D | D |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | D | c | D | B | D |  |  |  |  |  |  |
| Speed (mi/h) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 64.3 | 55.0 | 54.3 | 40.1 | 42.2 | 51.3 | 53.6 | 54.5 | 44.6 | 51.8 | 42.5 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 51.6 | 50.0 | 53.5 | 53.6 | 55.0 |  |  |  |  |  |  |
| Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 25.2 | 23.6 | 23.9 | 37.2 | 41.5 | 20.6 | 20.6 | 23.7 | 26.0 | 26.1 | 30.8 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 29.3 | 33.9 | 30.8 | 25.3 | 30.8 |  |  |  |  |  |  |
| Demand - Capacity Ratio (D/C) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 0.69 | 0.58 | 0.58 | 0.68 | 0.78 | 0.50 | 0.50 | 0.58 | 0.58 | 0.64 | 0.65 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.72 | 0.81 | 0.75 | 0.60 | 0.75 |  |  |  |  |  |  |
| Density (veh/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 23.8 | 22.3 | 22.6 | 34.6 | 38.6 | 19.3 | 19.4 | 22.3 | 23.0 | 24.6 | 27.3 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 27.8 | 32.2 | 29.3 | 24.0 | 29.3 |  |  |  |  |  |  |
| Ramp Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | 29.4 | - | 31.2 | 20.6 | 20.6 | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | 24.5 |  | 19.3 | - |  |  |  |  |  |  |
| Density-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | c | c | D | E | D | c | C | C | c | D | D |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | D | c | D | B | D |  |  |  |  |  |  |
| Demand-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - |  | - | - | - | - | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | - |  | - | - |  |  |  |  |  |  |
| Volume - Capacity Ratio (V/C) |  |  |  |  |  |  |  |  |  |  |  |


|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AP 1 | 0.69 | 0.58 | 0.58 | 0.68 | 0.78 | 0.50 | 0.50 | 0.58 | 0.58 | 0.64 | 0.65 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.72 | 0.81 | 0.75 | 0.60 | 0.75 |  |  |  |  |  |  |

## 2021 AM Peak <br> HSR West of SR 2 <br> Capacity Analysis



| 1 | 0.94 | 0.94 | 0.952 | 0.980 | 6730 | 3267 | 9000 | 4400 | 0.96 | 0.74 | 21.1 | 49.0 | 79.9 | 44.4 | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Segment 4: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.935 |  | 3408 |  | 4400 |  | 1.22 |  | 22.1 |  | 77.1 |  | F |
| Segment 5: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | $\begin{gathered} \text { Capacity } \\ (\mathrm{pc} / \mathrm{h}) \end{gathered}$ |  | $\underset{\text { d/c }}{\text { Ratio }}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.935 | 0.952 | 4190 | 782 | 4500 | 3800 | 0.93 | 0.21 | 39.1 | 43.3 | 48.4 | 37.9 | F |
| Segment 6: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.937 | 0.833 | 4228 | 38 | 9000 | 1800 | 0.47 | 0.02 | 50.5 | 51.6 | 20.5 | 20.5 | c |
| Segment 7: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.937 | 0.961 | 4228 | 819 | 9000 | 2000 | 0.47 | 0.41 | 53.2 | 53.2 | 19.9 | 19.9 | c |
| Segment 8: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.933 |  | 3409 |  | 6750 |  | 0.80 |  | 54.4 |  | 20.7 |  | c |
| Segment 9: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\mathrm{d} / \mathrm{c}$Ratio |  | Speed$(\mathrm{mi} / \mathrm{h})$ (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.929 |  | 3807 |  | 7980 |  | 0.72 |  | 45.5 |  | 20.9 |  | c |
| Segment 10: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.934 |  | 3340 |  | 6750 |  | 0.79 |  | 52.1 |  | 20.2 |  | c |
| Segment 11: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\underset{\text { Ratio }}{\mathrm{d} / \mathrm{c}}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.926 |  | 4011 |  | 7740 |  | 0.77 |  | 42.3 |  | 23.7 |  | c |
| Segment 12: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { ( } \mathrm{pc} / \mathrm{mi} / \mathrm{ln} \text { ) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.928 |  | 3110 |  | 6750 |  | 0.75 |  | 51.6 |  | 18.8 |  | c |
| Segment 13: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | d/cRatio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.928 | 0.943 | 3415 | 305 | 6300 | 1900 | 0.54 | 0.16 | 51.3 | 50.8 | 22.2 | 18.7 | B |
| Segment 14: Overlap |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | d/c Ratio |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | Los |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.94 |  | 0.929 |  | 3415 |  | 6750 |  | 0.80 |  | 53.9 |  | 32.6 |  | D |
| Segment 15: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{aligned} & \text { Capacity } \\ & (\mathrm{pc} / \mathrm{h}) \end{aligned}$ |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.929 | 0.917 | 3415 | 1903 | 9000 | 4200 | 0.38 | 0.45 | 52.1 | 48.9 | 16.4 | 15.4 | B |
| Segment 16: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathbf{d} / \mathbf{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/In) } \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.935 |  | 1512 |  | 6750 |  | 0.52 |  | 55.0 |  | 9.2 |  | A |
| Facility Analysis Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | Speed, mi/h |  |  |  | Density, pc/mi/ln |  | Density, veh/mi/ln |  |  | Travel Time, min |  |  | LOS |  |  |
| 1 | 28.8 |  |  |  | 43.6 |  | 41.2 |  |  | 8.20 |  |  | F |  |  |
| Facility Overall Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Space Mean Speed, mi/h |  |  |  |  | 28.8 |  |  | Density, veh/mi/ln |  |  |  |  | 41.2 |  |  |
| Average Travel Time, min |  |  |  |  | 8.20 |  |  | Density, pc/mi/ln |  |  |  |  | 43.6 |  |  |
| Messages |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| WARNING 1 |  |  |  |  | Oversaturated conditions currently exist in boundary analysis period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 2 |  |  |  |  | Oversaturated conditions currently exist on segment 7, which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 3 |  |  |  |  | Oversaturated conditions currently exist on segment 10 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 4 |  |  |  |  | Oversaturated conditions currently exist on segment 12, which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |  |  |  |  |  |  |  |  |
| WARNING 5 |  |  |  |  | Queue extends past the beginning of the facility on analysis period 1. Consider expanding the length of the facility to account for these vehicles performance and affect on upstream segments. |  |  |  |  |  |  |  |  |  |  |
| WARNING 6 |  |  |  |  | The merge segment 6 and diverge segment 7 could be potentially analyzed together as a weaving segment because of the presence of an added lane which could serve as an auxiliary lane. Consider combining these two segments into a weaving segment. |  |  |  |  |  |  |  |  |  |  |
| WARNING 7 |  |  |  |  | Weaving Segment (segment 9) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |
| WARNING 8 |  |  |  |  | Weaving Segment (segment 11) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |  |  |  |  |  |  |  |  |

Comments




HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Analyst | MEL | Date | 7/15/2021 |
| Agency | Burgess \& Niple, Inc. | Analysis Year | 2021 HSR West of SR 2 |
| Jurisdiction |  | Time Analyzed | AM Peak Westbound I-90 |
| Project Description | 1-90 HSR | Units | U.S. Customary |
| Segment Number | 1 | Segment Name | West of E. 55th On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 3400 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 65.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 7740 | Heavy Vehicle Adjustment Factor (fHV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 2162 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2350 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2350 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (fiw) | - | Average Speed (S), mi/h | 22.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), pc/mi/n | 78.9 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 65.0 |  |  |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 2 | Segment Name | East of WB SR 2 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 2300 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 7740 | Heavy Vehicle Adjustment Factor (ftV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 2162 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 23.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 74.9 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 3 | Segment Name | WB SR 2 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 55.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1500 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 7740 | 3010 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.00 | 2.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.952 | 0.980 |  |
| Flow Rate (vi),pc/h |  | 8649 | 3267 |  |
| Capacity (c), pc/h |  | 9000 | 4400 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.75 | 0.74 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.462 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1992 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 49.0 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (SO), mi/h |  | 56.5 |
| Flow in Lanes 1 and 2 (v12), pc/h | 4666 | Ramp Junction Speed (S), mi/h |  | 21.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/mi/ln |  | 79.9 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 44.4 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 4 | Segment Name | North of EB SR 2 OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 2 | Terrain Type | Level |
| Segment Length (L), ft | 1100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 45.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4730 | Heavy Vehicle Adjustment Factor (fHV) | 0.935 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 2691 |
| Total Trucks, \% | 6.90 | Capacity (c), pc/h/ln | 2200 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2200 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 22.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 77.1 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 45.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 5 | Segment Name | EB SR 2 On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 2 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 45.0 | 25.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 575 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4730 | 700 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.90 | 5.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.935 | 0.952 |  |
| Flow Rate (vi),pc/h |  | 5382 | 782 |  |
| Capacity (c), pc/h |  | 4500 | 3800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.93 | 0.21 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 0 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.578 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (VOA), pc/h/ln |  |  |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 43.3 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 1.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 45.0 |
| Flow in Lanes 1 and 2 (vi2), pc/h | 3408 | Ramp Junction Speed (S), mi/h |  | 39.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 4190 | Average Density (D), pc/mi/n |  | 48.4 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 37.9 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 6 | 6 | Segment Name |  | 26th Street On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period |  | 08:00-08:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 10.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 970 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5430 | 30 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.70 | 20.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.937 | 0.833 |  |
| Flow Rate (vi), pc/h |  | 6165 | 38 |  |
| Capacity (c), pc/h |  | 9000 | 1800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.47 | 0.02 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (Ms) |  | 0.343 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1257 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 51.6 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 52.3 |
| Flow in Lanes 1 and 2 (v12), pc/h | 1676 | Ramp Junction Speed (S), mi/h |  | 50.5 |
| Flow Entering Ramp-lnfl. Area (vR12), pc/h | 1714 | Average Density ( D , $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ |  | 20.5 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 20.5 |

HCS7 Basic Freeway Report


HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 8 | Segment Name | North of Superior Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 1075 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4720 | Heavy Vehicle Adjustment Factor (fHV) | 0.933 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1136 |
| Total Trucks, \% | 7.20 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% |  | Volume-to-Capacity Ratio (v/c) | 0.51 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 54.4 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 20.7 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 9 | Segment Name | Superior On to Chester Off |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N ), In | 4 | Segment Type | Freeway |
| Segment Length (Ls), ft | 620 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR) , Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF RR | FR |
| Demand Volume (Vi), veh/h | 4310 | 350 20 | 410 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 7.60 | 1.00 1.00 | 2.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.929 | 1.990 0.990 | 0.980 |
| Flow Rate (vi), pc/h | 3127 | 377 | 282 |
| Weaving Flow Rate (vw), pc/h | 659 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 3148 | Density-Based Capacity (ciwl), pc/h/ln | 1995 |
| Total Flow Rate (v), pc/h | 3807 | Demand Flow-Based Capacity (ciw), pc/h | 16901 |
| Volume Ratio (VR) | 0.142 | Weaving Segment Capacity (cw), veh/h | 7478 |
| Minimum Lane Change Rate (LCMIN), IC/h | 659 | Adjusted Weaving Area Capacity, pc/h | 7980 |
| Maximum Weaving Length (LMAX), ft | 3952 | Volume-to-Capacity Ratio (v/c) | 0.48 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 325 | Average Weaving Speed (SW), mi/h | 44.4 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 214 | Average Non-Weaving Speed (SNw), mi/h | 45.7 |
| Weaving Lane Change Rate (LCW), IC/h | 904 | Average Speed ( S ), mi/h | 45.5 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1118 | Density (D), pc/mi/ln | 20.9 |
| Weaving Intensity Factor (W) | 0.360 | Level of Service (LOS) | c |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 10 | Segment Name | North of Chester Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4660 | Heavy Vehicle Adjustment Factor (fHV) | 0.934 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1113 |
| Total Trucks, \% | 7.10 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% |  | Volume-to-Capacity Ratio (v/c) | 0.49 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 52.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 20.2 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 11 | Segment Name | Chester On to Prospect Off |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes ( N ), In | 4 | Segment Type | Freeway |
| Segment Length (Ls), ft | 960 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF $\quad$ RR | FR |
| Demand Volume (Vi), veh/h | 3860 | 570 | 800 |
| Peak Hour Factor (PHF) | 0.94 | 0.94 0.94 | 0.94 |
| Total Trucks, \% | 8.00 | 5.00 | 2.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.926 |   <br> 0.952 0.980 | 0.980 |
| Flow Rate (vi), pc/h | 2794 | 637 (33 | 547 |
| Weaving Flow Rate (vw), pc/h | 1184 | Freeway Max Capacity (cIFL), pc/h/ln | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 2827 | Density-Based Capacity (ciwl), pc/h/ln | 1935 |
| Total Flow Rate (v), pc/h | 4011 | Demand Flow-Based Capacity (ciw), pc/h | 9524 |
| Volume Ratio (VR) | 0.252 | Weaving Segment Capacity (cw), veh/h | 7252 |
| Minimum Lane Change Rate (LCMIN), Ic/h | 1184 | Adjusted Weaving Area Capacity, pc/h | 7740 |
| Maximum Weaving Length (LMAX), ft | 5075 | Volume-to-Capacity Ratio (v/c) | 0.52 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 452 | Average Weaving Speed (SW), mi/h | 43.9 |
| Non-Weaving Lane Change Rate (LCNW), Ic/h | 332 | Average Non-Weaving Speed (SNw), mi/h | 41.7 |
| Weaving Lane Change Rate (LCW), IC/h | 1535 | Average Speed ( S ), mi/h | 42.3 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1867 | Density (D), pc/mi/ln | 23.7 |
| Weaving Intensity Factor (W) | 0.382 | Level of Service (LOS) | c |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 12 | Segment Name | North of Prospect OnRamo |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h |  | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4430 | Heavy Vehicle Adjustment Factor (fHV) | 0.928 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/ln | 1037 |
| Total Trucks, \% | 7.80 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% |  | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.46 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 51.6 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ | 18.8 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | C |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 13 | 13 | Segment Name | Prospect Ave On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 3 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 30.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 1180 | 560 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Highway/CD Roadway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4430 | 270 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.80 | 6.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.928 | 0.943 |  |
| Flow Rate (vi),pc/h |  | 5078 | 305 |  |
| Capacity (c), pc/h |  | 6300 | 1900 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.54 | 0.16 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | 146.1 | Number of Outer Lanes on Freeway ( N ) |  | 1 |
| Distance to Upstream Ramp (LUP), ft | 4130 | Speed Index (MS) |  | 0.321 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1266 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 50.8 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.593 | Outer Lanes Freeway Speed (SO), mi/h |  | 52.2 |
| Flow in Lanes 1 and 2 (v12), pc/h | 1844 | Ramp Junction Speed (S), mi/h |  | 51.3 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2149 | Average Density (D), pc/mi/n |  | 22.2 |
| Level of Service (LOS) | B | Density in Ramp Influence Area (DR), pc/mi/ln |  | 18.7 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 14 | Segment Name | North of 13-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 320 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4700 | Heavy Vehicle Adjustment Factor (fHV) | 0.929 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1138 |
| Total Trucks, \% | 7.70 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.51 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 53.9 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 32.6 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Diverge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 15 | 15 | Segment Name | 1-77 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 45.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1180 | 960 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident |  |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4700 | 1640 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.70 | 9.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - |  |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.929 | 0.917 |  |
| Flow Rate (vi),pc/h |  | 5382 | 1903 |  |
| Capacity (c), pc/h |  | 9000 | 4200 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.38 | 0.45 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N O ) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.469 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 560 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area Speed (SR), mi/h |  | 48.9 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Speed (SO), mi/h |  | 60.3 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2296 | Ramp Junction Speed (S), mi/h |  | 52.1 |
| Flow Entering Ramp-lnfl. Area (vR12), pc/h | - | Average Density (D), pc/mi/n |  | 16.4 |
| Level of Service (LOS) | B | Density in Ramp Influence Area (DR), pc/mi/ln |  | 15.4 |


| HCS7 Basic Freeway Report |  |  |  |
| :---: | :---: | :---: | :---: |
| Project Information |  |  |  |
| Segment Number | 16 | Segment Name | South of 1-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 08:00-08:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 4000 | Percent Grade, \% |  |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 3060 | Heavy Vehicle Adjustment Factor (fHV) | 0.935 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 504 |
| Total Trucks, \% | 7.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/n | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.22 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S , mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 9.2 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | A |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |
|  |  |  |  |


| LOS |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | F | F | F | F | F | c | c | c | c | c | c |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | C | B | D | B | A |  |  |  |  |  |  |
| Speed (mi/h) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 22.8 | 23.1 | 21.1 | 22.1 | 39.1 | 50.5 | 53.2 | 54.4 | 45.5 | 52.1 | 42.3 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 51.6 | 51.3 | 53.9 | 52.1 | 55.0 |  |  |  |  |  |  |
| Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 78.9 | 74.9 | 79.9 | 77.1 | 48.4 | 20.5 | 19.9 | 20.7 | 20.9 | 20.2 | 23.7 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 18.8 | 22.2 | 32.6 | 16.4 | 9.2 |  |  |  |  |  |  |
| Demand - Capacity Ratio (D/C) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 0.92 | 0.96 | 0.96 | 1.22 | 0.93 | 0.47 | 0.47 | 0.80 | 0.72 | 0.79 | 0.77 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.75 | 0.54 | 0.80 | 0.38 | 0.52 |  |  |  |  |  |  |
| Density (veh/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 75.1 | 71.3 | 76.0 | 72.0 | 45.3 | 19.2 | 18.6 | 19.3 | 19.6 | 18.9 | 22.2 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 17.5 | 20.6 | 30.3 | 15.2 | 8.6 |  |  |  |  |  |  |
| Ramp Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | 44.4 | - | 37.9 | 20.5 | 19.9 | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | 18.7 | - | 15.4 | - |  |  |  |  |  |  |
| Density-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | F | F | F | F | F | c | c | c | c | c | c |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | c | B | D | B | A |  |  |  |  |  |  |
| Demand-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - |  | F | F |  |  | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 |  | - | - | - | - |  |  |  |  |  |  |
| Volume - Capacity Ratio (V/C) |  |  |  |  |  |  |  |  |  |  |  |

# 2021 PM Peak HSR West of SR 2 <br> Capacity Analysis 

HCS7 Freeway Facilities Report

## Project Information

| Analyst |  | MEL |  | Date |  | 7/15/2021 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Agency |  | Burgess \& Niple, Inc. |  | Analysis Year |  | 2021 HSR East of SR 2 |  |
| Jurisdiction |  |  |  | Time Analyzed |  | PM Peak Westbound l-90 |  |
| Project Description |  | $1-90 \text { HSR }$ |  | Units |  | U.S. Customary |  |
| Facility Global Input |  |  |  |  |  |  |  |
| Jam Density, pc/mi/ln |  | 190.0 |  | Density at Capacity, pc/mi/ln |  | 45.0 |  |
| Queue Discharge Capacity Drop, \% |  | 7 |  | Total Segments |  | 16 |  |
| Total Analysis Periods |  | 1 |  | Analysis Period Duration, min |  | 15 |  |
| Facility Length, mi |  | 3.95 |  |  |  |  |  |
| Facility Segment Data |  |  |  |  |  |  |  |
| No. | Coded | Analyzed |  | Name | Length, ft |  | Lanes |
| 1 | Basic | Basic | West of E. 55th On-Ramp |  | 3400 |  | 4 |
| 2 | Basic | Basic | East of WB SR 2 Off-Ramp |  | 2300 |  | 4 |
| 3 | Diverge | Diverge | WB SR 2 Off-Ramp |  | 1500 |  | 4 |
| 4 | Basic | Basic | North of EB SR 2 On-Ramp |  | 1100 |  | 2 |
| 5 | Merge | Merge | EB SR 2 On-Ramp |  | 575 |  | 2 |
| 6 | Merge | Basic | 26th Street On-Ramp |  | 970 |  | 4 |
| 7 | Diverge | Basic | Superior Ave Off-Ramp |  | 200 |  | 5 |
| 8 | Basic | Basic | North of Superior Ave On-Ramp |  | 1075 |  | 4 |
| 9 | Weaving | Weaving | Superior On to Chester Off |  | 1345 |  | 5 |
| 10 | Basic | Basic | North of Chester Ave On-Ramp |  | 100 |  | 4 |
| 11 | Weaving | Weaving |  | Chester On to Prospect Off | 1510 |  | 5 |
| 12 | Basic | Basic |  | North of Prospect On-Ramo | 100 |  | 4 |
| 13 | Merge | Merge |  | Prospect Ave On-Ramp | 1180 |  | 4 |
| 14 | Overlap | Basic |  | North of 13-77 Off-Ramp | 320 |  | 4 |
| 15 | Diverge | Diverge | 1-77 Off-Ramp |  | 1180 |  | 5 |
| 16 | Basic | Basic | South of I-77 Off-Ramp |  | 4000 |  | 3 |

## Facility Segment Data

| Segment 1: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{gathered}$ |  | Los |
| 1 | 0.94 |  | 0.945 |  | 6314 |  | 9400 |  | 0.69 |  | 64.5 |  | 24.5 |  | c |
| Segment 2: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
| 1 | 0.94 |  | 0.945 |  | 5803 |  | 9000 |  | 0.72 |  | 24.5 |  | 59.2 |  | F |
| Segment 3: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed(mi/h) |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |


| 1 | 0.94 | 0.94 | 0.945 | 0.980 | 5472 | 2008 | 9000 | 4400 | 0.72 | 0.46 | 15.5 | 50.5 | 88.1 | 31.5 | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Segment 4: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.929 |  | 3409 |  | 4400 |  | 1.02 |  | 22.1 |  | 77.0 |  | F |
| Segment 5: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.929 | 0.981 | 4190 | 781 | 4500 | 3800 | 0.93 | 0.21 | 39.1 | 43.3 | 48.4 | 37.9 | F |
| Segment 6: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.936 | 0.979 | 4603 | 413 | 9000 | 1800 | 0.51 | 0.23 | 50.5 | 51.4 | 22.4 | 22.4 | c |
| Segment 7: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | Speed (mi/h) |  | $\begin{gathered} \text { Density } \\ \text { (pc/mi/ln) } \end{gathered}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.940 | 0.935 | 4603 | 455 | 11250 | 2000 | 0.41 | 0.23 | 53.2 | 54.0 | 17.0 | 17.0 | B |
| Segment 8: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | d/c Ratio |  | Speed (mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.940 |  | 4148 |  | 9000 |  | 0.58 |  | 54.4 |  | 18.9 |  | c |
| Segment 9: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
| 1 | 0.94 |  | 0.940 |  | 4739 |  | 10090 |  | 0.58 |  | 45.6 |  | 20.8 |  | c |
| Segment 10: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $d / c$Ratio |  | Speed ( $\mathrm{mi} / \mathrm{h}$ ) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | Los |
| 1 | 0.94 |  | 0.944 |  | 4664 |  | 9000 |  | 0.64 |  | 52.1 |  | 21.2 |  | c |
| Segment 11: Weaving |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\underset{\text { Ratio }}{\mathrm{d} / \mathrm{c}}$ |  | Speed (mi/h) |  | Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  | LOS |
| 1 | 0.94 |  | 0.944 |  | 5478 |  | 10135 |  | 0.65 |  | 43.5 |  | 25.2 |  | c |
| Segment 12: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | Los |
| 1 | 0.94 |  | 0.949 |  | 5392 |  | 9000 |  | 0.72 |  | 51.9 |  | 24.5 |  | c |
| Segment 13: Merge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \text { d/c } \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | Los |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.949 | 0.979 | 5707 | 315 | 8400 | 1900 | 0.68 | 0.17 | 50.9 | 50.7 | 28.0 | 21.2 | c |
| Segment 14: Overlap |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | Capacity (pc/h) |  | $\mathrm{d} / \mathrm{c}$Ratio |  | Speed(mi/h) |  | $\begin{aligned} & \text { Density } \\ & (\mathrm{pc} / \mathrm{mi} / \mathrm{ln}) \end{aligned}$ |  | LOS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.94 |  | 0.950 |  | 5707 |  | 9000 |  | 0.75 |  | 53.8 |  | 30.8 |  | D |
| Segment 15: Diverge |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate ( $\mathrm{pc} / \mathrm{h}$ ) |  | Capacity ( $\mathrm{pc} / \mathrm{h}$ ) |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | $\begin{aligned} & \text { Density } \\ & \text { (pc/mi/ln) } \end{aligned}$ |  | LOS |
|  | F | R | F | R | Freeway | Ramp | Freeway | Ramp | F | R | F | R | Freeway | Ramp |  |
| 1 | 0.94 | 0.94 | 0.950 | 0.943 | 5707 | 1692 | 11250 | 4200 | 0.51 | 0.40 | 53.8 | 49.2 | 21.2 | 17.2 | B |
| Segment 16: Basic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | PHF |  | fHV |  | Flow Rate (pc/h) |  | $\begin{aligned} & \text { Capacity } \\ & (\mathrm{pc/h}) \end{aligned}$ |  | $\begin{gathered} \mathrm{d} / \mathrm{c} \\ \text { Ratio } \end{gathered}$ |  | $\begin{aligned} & \text { Speed } \\ & (\mathrm{mi} / \mathrm{h}) \end{aligned}$ |  | Density( $\mathrm{pc} / \mathrm{mi} / \mathrm{In}$ ) |  | LOS |
| 1 | 0.94 |  | 0.952 |  | 4015 |  | 6750 |  | 0.75 |  | 55.0 |  | 24.3 |  | c |
| Facility Analysis Results |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AP | Speed, mi/h |  |  |  | Density, pc/mi/ln |  | Density, veh/mi/ln |  |  | Travel Time, min |  |  | LOS |  |  |
| 1 | 38.5 |  |  |  | 34.3 |  | 32.4 |  |  | 6.20 |  |  | F |  |  |

## Facility Overall Results

| Space Mean Speed, mi/h | 38.5 | Density, veh/mi/n | 32.4 |
| :---: | :---: | :---: | :---: |
| Average Travel Time, min | 6.20 | Density, pc/mi/n | 34.3 |
| Messages |  |  |  |
| WARNING 1 | Oversaturated conditions currently exist in boundary analysis period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning. |  |  |
| WARNING 2 | Oversaturated conditions currently exist on segment 7 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |
| WARNING 3 | Oversaturated conditions currently exist on segment 10 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |
| WARNING 4 | Oversaturated conditions currently exist on segment 12 , which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning. |  |  |
| WARNING 5 | The merge segment 6 and diverge segment 7 could be potentially analyzed together as a weaving segment because of the presence of an added lane which could serve as an auxiliary lane. Consider combining these two segments into a weaving segment. |  |  |
| WARNING 6 | Weaving Segment (segment 9) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |
| WARNING 7 | Weaving Segment (segment 11) is shorter than the segment short length allows. Weaving segments include 500 feet upstream and downstream of gore point. Short length is at a maximum the gore to gore length, and is reduced for any barrier markings (solid white lines) that prohibit or discourage lane changing. Review the values set for Segment length on the Segments page and Short Length on the details page. |  |  |

## Comments





HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Analyst | MEL | Date | 7/15/2021 |
| Agency | Burgess \& Niple, Inc. | Analysis Year | 2021 HSR East of SR 2 |
| Jurisdiction |  | Time Analyzed | PM Peak Westbound I-90 |
| Project Description | I-90 HSR | Units | U.S. Customary |
| Segment Number | 1 | Segment Name | West of E. 55th On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 3400 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi |  |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft |  | Free-Flow Speed (FFS), mi/h | 65.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.945 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1579 |
| Total Trucks, \% | 5.80 | Capacity (c), pc/h/ln | 2350 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2350 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.67 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 64.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 24.5 |
| Total Ramp Density Adjustment |  | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 65.0 |  |  |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 2 | Segment Name | East of WB SR 2 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 2300 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.945 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1621 |
| Total Trucks, \% | 5.80 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.64 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ) , mi/h | 24.5 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 59.2 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |


| HCS7 Freeway Diverge Report |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Project Information |  |  |  |  |
| Segment Number 3 | 3 | Segment Name | WB SR 2 Off-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 4 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 55.0 |  |
| Segment Length (L) / Deceleration Length (LA),ft |  | 1500 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5760 | 1850 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.80 | 2.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.945 | 0.980 |  |
| Flow Rate (vi),pc/h |  | 6484 | 2008 |  |
| Capacity (c), pc/h |  | 9000 | 4400 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.61 | 0.46 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on | ( No ) | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (Ds) |  | 0.349 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (vOA), p |  | 1656 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area | ( ${ }^{\text {a }}$, mi/h | 50.5 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Spe |  | 57.8 |
| Flow in Lanes 1 and 2 (v12), pc/h | 3172 | Ramp Junction Speed (S) |  | 15.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/m |  | 88.1 |
| Level of Service (LOS) | F | Density in Ramp Influenc | R), pc/mi/ln | 31.5 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 4 | Segment Name | North of EB SR 2 OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 2 | Terrain Type | Level |
| Segment Length (L), ft | 1100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Base | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | 45.0 | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | 12 | Free-Flow Speed (FFS), mi/h | 40.1 |
| Right-Side Lateral Clearance, ft | 10 |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 3910 | Heavy Vehicle Adjustment Factor (fHV) | 0.929 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 2238 |
| Total Trucks, \% | 7.60 | Capacity (c), p//h/ln | 2200 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2200 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.77 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | 0.0 | Average Speed ( S ) $\mathrm{mi} / \mathrm{h}$ | 22.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | 0.0 | Density (D), pc/mi/ln | 77.0 |
| Total Ramp Density Adjustment | 4.9 | Level of Service (LOS) | F |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 40.1 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 5 | Segment Name | EB SR 2 On-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N , In |  | 2 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 45.0 | 25.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 575 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  |  |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 3910 | 720 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 7.60 | 1.90 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.929 | 0.981 |  |
| Flow Rate (vi), pc/h |  | 4477 | 781 |  |
| Capacity (c), pc/h |  | 4500 | 3800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.93 | 0.21 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway ( N ) |  | 0 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.578 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | - |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 43.3 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 1.000 | Outer Lanes Freeway Speed (So), mi/h |  | 45.0 |
| Flow in Lanes 1 and 2 (v12), pc/h | 3409 | Ramp Junction Speed (S), mi/h |  | 39.1 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 4190 | Average Density (D), pc/mi/ln |  | 48.4 |
| Level of Service (LOS) | F | Density in Ramp Influence Area (DR), pc/mi/ln |  | 37.9 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number | 6 | Segment Name |  | 26th Street On-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period |  | 17:00-17:15 |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 10.0 |  |
| Segment Length (L) / Acceleration Length (LA),ft |  | 970 | 0 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - |  |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 4630 | 380 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 6.80 | 2.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.936 | 0.979 |  |
| Flow Rate (vi),pc/h |  | 5262 | 413 |  |
| Capacity (c), pc/h |  | 9000 | 1800 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.51 | 0.23 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway (No) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.352 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (vOA), pc/h/ln |  | 1257 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 51.4 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.000 | Outer Lanes Freeway Speed (SO), mi/h |  | 52.3 |
| Flow in Lanes 1 and 2 (vi2), $\mathrm{pc} / \mathrm{h}$ | 1676 | Ramp Junction Speed ( S ), mi/h |  | 50.5 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2089 | Average Density (D), pc/mi/n |  | 22.4 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 22.4 |

HCS7 Basic Freeway Report


HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 8 | Segment Name | North of Superior Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 1075 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4610 | Heavy Vehicle Adjustment Factor (fHV) | 0.940 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1037 |
| Total Trucks, \% | 6.40 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.46 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 54.4 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 18.9 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | C |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 9 | Segment Name | Superior On to Chester Off |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes (N), In | 5 | Segment Type | Freeway |
| Segment Length (Ls), ft | 620 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF ${ }^{\text {R }}$ | FR |
| Demand Volume (Vi), veh/h | 4550 | 540 10 | 60 |
| Peak Hour Factor (PHF) | 0.94 |   <br> 0.94 0.94 | 0.94 |
| Total Trucks, \% | 6.40 | 1.00 1.00 | 1.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.940 | 0.990 0.990 | 0.990 |
| Flow Rate (vi), pc/h | 4097 | 580 | 51 |
| Weaving Flow Rate (vw), pc/h | 631 | Freeway Max Capacity (cIFL), pc/h/n | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 4108 | Density-Based Capacity (ciwl), pc/h/ln | 2018 |
| Total Flow Rate (v), pc/h | 4739 | Demand Flow-Based Capacity (ciw), pc/h | 21622 |
| Volume Ratio (VR) | 0.111 | Weaving Segment Capacity (cw), veh/h | 9542 |
| Minimum Lane Change Rate (LCMIN), IC/h | 631 | Adjusted Weaving Area Capacity, pc/h | 10090 |
| Maximum Weaving Length (LMAX), ft | 3647 | Volume-to-Capacity Ratio (v/c) | 0.47 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 425 | Average Weaving Speed (SW), mi/h | 43.8 |
| Non-Weaving Lane Change Rate (LCNW), IC/h | 219 | Average Non-Weaving Speed (SNW), mi/h | 45.9 |
| Weaving Lane Change Rate (LCW), Ic/h | 1013 | Average Speed ( 5 ) mi/h | 45.6 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1232 | Density ( D ), pc/mi/n | 20.8 |
| Weaving Intensity Factor (W) | 0.389 | Level of Service (LOS) | C |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 10 | Segment Name | North of Chester Ave OnRamp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5090 | Heavy Vehicle Adjustment Factor (fHV) | 0.944 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1166 |
| Total Trucks, \% | 5.90 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.52 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 52.1 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 21.2 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Weaving Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 11 | Segment Name | Chester On to Prospect Off |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes (N), In | 5 | Segment Type | Freeway |
| Segment Length (Ls), ft | 960 | Number of Maneuver Lanes (NWL), In | 2 |
| Weaving Configuration | One-Sided | Ramp-to-Freeway Lane Changes (LCRF), Ic | 1 |
| Terrain Type | Level | Freeway-to-Ramp Lane Changes (LCFR), Ic | 1 |
| Percent Grade, \% | - | Ramp-to-Ramp Lane Changes (LCRR), Ic | 0 |
| Interchange Density (ID), int/mi | 1.67 | Cross Weaving Managed Lane | No |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
|  | FF | RF $\quad$ RR | FR |
| Demand Volume (Vi), veh/h | 5020 | 740 | 70 |
| Peak Hour Factor (PHF) | 0.94 | 740  <br> 0.94 0.94 | 0.94 |
| Total Trucks, \% | 5.90 | 2.00 1.00 | 1.00 |
| Heavy Vehicle Adjustment Factor (fHV) | 0.944 | 0.980 0.990 | 0.990 |
| Flow Rate (vi), pc/h | 4603 | 803 (11 | 61 |
| Weaving Flow Rate (vw), pc/h | 864 | Freeway Max Capacity (cIFL), pc/h/n | 2250 |
| Non-Weaving Flow Rate (vNW), pc/h | 4614 | Density-Based Capacity (ciwl), pc/h/ln | 2027 |
| Total Flow Rate (v), pc/h | 5478 | Demand Flow-Based Capacity (ciw), pc/h | 17910 |
| Volume Ratio (VR) | 0.134 | Weaving Segment Capacity (cw), veh/h | 9618 |
| Minimum Lane Change Rate (LCMIN), IC/h | 864 | Adjusted Weaving Area Capacity, pc/h | 10135 |
| Maximum Weaving Length (LMAX), ft | 3873 | Volume-to-Capacity Ratio (v/c) | 0.54 |
| Speed and Density |  |  |  |
| Non-Weaving Vehicle Index (INW) | 738 | Average Weaving Speed (SW), mi/h | 43.8 |
| Non-Weaving Lane Change Rate (LCNW), IC/h | 508 | Average Non-Weaving Speed (SNW), mi/h | 43.5 |
| Weaving Lane Change Rate (LCW), Ic/h | 1413 | Average Speed ( 5 ) mi/h | 43.5 |
| Weaving Lane Change Rate (LCAll), Ic/h | 1921 | Density ( D ), pc/mi/n | 25.2 |
| Weaving Intensity Factor (W) | 0.391 | Level of Service (LOS) | C |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 12 | Segment Name | North of Prospect OnRamo |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length (L), ft | 100 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 5760 | Heavy Vehicle Adjustment Factor (fHV) | 0.949 |
| Peak Hour Factor | 0.94 | Flow Rate (Vp), pc/h/n | 1348 |
| Total Trucks, \% | 5.40 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.60 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( S ), mi/h | 51.9 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/n | 24.5 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | c |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |

HCS7 Freeway Merge Report

| Project Information |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Segment Number 13 | 13 | Segment Name | Prospect Ave On-Ramp |  |
| Analysis Period Number 1 | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ) , In |  | 4 | 1 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 30.0 |  |
| Segment Length (L) / Acceleration Length (LA), ft |  | 1180 | 560 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | - |  |
| Segment Type / Ramp Type |  | Highway/CD Roadway | Right-Sided One-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 5760 | 290 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.40 | 2.10 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.949 | 0.979 |  |
| Flow Rate (vi),pc/h |  | 6457 | 315 |  |
| Capacity (c), pc/h |  | 8400 | 1900 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.68 | 0.17 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes on Freeway (No) |  | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (MS) |  | 0.334 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), pc/h/ln |  | 1618 |
| Distance to Downstream Ramp (LDown), ft | - | On-Ramp Influence Area Speed (SR), mi/h |  | 50.7 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFM) | 0.178 | Outer Lanes Freeway Speed (SO), mi/h |  | 51.0 |
| Flow in Lanes 1 and 2 (vi2), $\mathrm{pc} / \mathrm{h}$ | 2157 | Ramp Junction Speed (S), mi/h |  | 50.9 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | 2472 | Average Density (D), pc/mi/ln |  | 28.0 |
| Level of Service (LOS) | c | Density in Ramp Influence Area (DR), pc/mi/ln |  | 21.2 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 14 | Segment Name | North of 13-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 4 | Terrain Type | Level |
| Segment Length ( $L$, ft | 320 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 6050 | Heavy Vehicle Adjustment Factor (fHV) | 0.950 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$, $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1427 |
| Total Trucks, \% | 5.30 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.63 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed ( 5 ) mi/h | 53.8 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density (D), pc/mi/ln | 30.8 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | D |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |


| HCS7 Freeway Diverge Report |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Project Information |  |  |  |  |
| Segment Number 15 | 15 | Segment Name | 1-77 Off-Ramp |  |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |  |
| Geometric Data |  |  |  |  |
|  |  | Freeway | Ramp |  |
| Number of Lanes ( N ), In |  | 5 | 2 |  |
| Free-Flow Speed (FFS), mi/h |  | 55.0 | 45.0 |  |
| Segment Length (L) / Deceleration Length (LA), ft |  | 1180 | 960 |  |
| Terrain Type |  | Level | Level |  |
| Percent Grade, \% |  | - | $-$ |  |
| Segment Type / Ramp Type |  | Freeway | Right-Sided Two-Lane |  |
| Adjustment Factors |  |  |  |  |
| Driver Population |  | All Familiar | All Familiar |  |
| Weather Type |  | Non-Severe Weather | Non-Severe Weather |  |
| Incident Type |  | No Incident | - |  |
| Final Speed Adjustment Factor (SAF) |  | 1.000 | 1.000 |  |
| Final Capacity Adjustment Factor (CAF) |  | 1.000 | 1.000 |  |
| Demand Adjustment Factor (DAF) |  | 1.000 | 1.000 |  |
| Demand and Capacity |  |  |  |  |
| Demand Volume (Vi) |  | 6050 | 1500 |  |
| Peak Hour Factor (PHF) |  | 0.94 | 0.94 |  |
| Total Trucks, \% |  | 5.30 | 6.00 |  |
| Single-Unit Trucks (SUT), \% |  | - | - |  |
| Tractor-Trailers (TT), \% |  | - | - |  |
| Heavy Vehicle Adjustment Factor (fHV) |  | 0.950 | 0.943 |  |
| Flow Rate (vi),p/h |  | 6775 | 1692 |  |
| Capacity (c), pc/h |  | 11250 | 4200 |  |
| Volume-to-Capacity Ratio (v/c) |  | 0.51 | 0.40 |  |
| Speed and Density |  |  |  |  |
| Upstream Equilibrium Distance (LEQ), ft | - | Number of Outer Lanes | ( No ) | 2 |
| Distance to Upstream Ramp (LUP), ft | - | Speed Index (DS) |  | 0.450 |
| Downstream Equilibrium Distance (LEQ), ft | - | Flow Outer Lanes (voA), |  | 1169 |
| Distance to Downstream Ramp (LDown), ft | - | Off-Ramp Influence Area | (S), mi/h | 49.2 |
| Prop. Freeway Vehicles in Lane 1 and 2 (PFD) | 0.260 | Outer Lanes Freeway Sp |  | 59.7 |
| Flow in Lanes 1 and 2 (v12), pc/h | 2513 | Ramp Junction Speed (S) |  | 53.8 |
| Flow Entering Ramp-Infl. Area (vR12), pc/h | - | Average Density (D), pc/ |  | 21.2 |
| Level of Service (LOS) | B | Density in Ramp Influenc | R), pc/mi/ln | 17.2 |

HCS7 Basic Freeway Report

| Project Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Segment Number | 16 | Segment Name | South of l-77 Off-Ramp |
| Analysis Period Number | 1 | Segment Analysis Period | 17:00-17:15 |
| Geometric Data |  |  |  |
| Number of Lanes, In | 3 | Terrain Type | Level |
| Segment Length (L), ft | 4000 | Percent Grade, \% | - |
| Measured or Base Free-Flow Speed | Measured | Grade Length, mi | - |
| Base Free-Flow Speed (BFFS), mi/h | - | Total Ramp Density (TRD), ramps/mi | 1.67 |
| Lane Width, ft | - | Free-Flow Speed (FFS), mi/h | 55.0 |
| Right-Side Lateral Clearance, ft | - |  |  |
| Adjustment Factors |  |  |  |
| Driver Population | All Familiar | Final Speed Adjustment Factor (SAF) | 1.000 |
| Weather Type | Non-Severe Weather | Final Capacity Adjustment Factor (CAF) | 1.000 |
| Incident Type | No Incident | Demand Adjustment Factor (DAF) | 1.000 |
| Demand and Capacity |  |  |  |
| Demand Volume veh/h | 4550 | Heavy Vehicle Adjustment Factor (fHV) | 0.952 |
| Peak Hour Factor | 0.94 | Flow Rate ( $\mathrm{V}_{\mathrm{p}}$ ), $\mathrm{pc} / \mathrm{h} / \mathrm{ln}$ | 1338 |
| Total Trucks, \% | 5.00 | Capacity (c), pc/h/ln | 2250 |
| Single-Unit Trucks (SUT), \% | - | Adjusted Capacity (cadj), pc/h/ln | 2250 |
| Tractor-Trailers (TT), \% | - | Volume-to-Capacity Ratio (v/c) | 0.59 |
| Passenger Car Equivalent (ET) | 2.00 |  |  |
| Speed and Density |  |  |  |
| Lane Width Adjustment (flw) | - | Average Speed (S), mi/h | 55.0 |
| Right-Side Lateral Clearance Adj. (fRLC) | - | Density ( D ), pc/mi/l | 24.3 |
| Total Ramp Density Adjustment | - | Level of Service (LOS) | C |
| Adjusted Free-Flow Speed (FFSadj), mi/h | 55.0 |  |  |
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| LOS |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | c | F | F | F | F | c | B | c | c | c | c |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | c | c | D | B | c |  |  |  |  |  |  |
| Speed (mi/h) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 64.5 | 24.5 | 15.5 | 22.1 | 39.1 | 50.5 | 53.2 | 54.4 | 45.6 | 52.1 | 43.5 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 51.9 | 50.9 | 53.8 | 53.8 | 55.0 |  |  |  |  |  |  |
| Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 24.5 | 59.2 | 88.1 | 77.0 | 48.4 | 22.4 | 17.0 | 18.9 | 20.8 | 21.2 | 25.2 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 24.5 | 28.0 | 30.8 | 21.2 | 24.3 |  |  |  |  |  |  |
| Demand - Capacity Ratio (D/C) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 0.69 | 0.72 | 0.72 | 1.02 | 0.93 | 0.51 | 0.41 | 0.58 | 0.58 | 0.64 | 0.65 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.72 | 0.68 | 0.75 | 0.51 | 0.75 |  |  |  |  |  |  |
| Density (veh/mi/ln) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | 23.1 | 56.0 | 83.3 | 71.6 | 45.0 | 21.0 | 16.0 | 17.7 | 19.7 | 20.0 | 23.9 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 23.3 | 26.6 | 29.3 | 20.1 | 23.2 |  |  |  |  |  |  |
| Ramp Density ( $\mathrm{pc} / \mathrm{mi} / \mathrm{ln}$ ) |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - |  | 31.5 | - | 37.9 | 22.4 | 17.0 | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | 21.2 | - | 17.2 | - |  |  |  |  |  |  |
| Density-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | c | F | F | F | F | c | B | c | c | c | c |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | c | c | D | B | c |  |  |  |  |  |  |
| Demand-Based LOS |  |  |  |  |  |  |  |  |  |  |  |
|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| AP 1 | - | - | - | F | F | - | - | - | - | - | - |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | - | - | - | - | - |  |  |  |  |  |  |
| Volume - Capacity Ratio (V/C) |  |  |  |  |  |  |  |  |  |  |  |


|  | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AP 1 | 0.67 | 0.64 | 0.61 | 0.77 | 0.93 | 0.51 | 0.41 | 0.46 | 0.47 | 0.52 | 0.54 |
|  | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 |  |  |  |  |  |  |
| AP 1 | 0.60 | 0.68 | 0.63 | 0.51 | 0.59 |  |  |  |  |  |  |



| Ramp Name | Condition | Gore Length (feet) |  | Back of Gore Width (feet) |  | First Curve |  | Horizontal SSD (feet) ${ }^{* *}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| Prospect Entrance | Merge | 75 | 64 | 12 | 24 | 125-220 feet | 140 feet | 195 | 170 |
| Prospect Exit | Drop* | 90 | 63 | 24 | 24 | 302-170 feet | 180 feet | 200 | 165 |
| Chester <br> Entrance | Add* | 90 | 110 | 18 | 24 | 190-350 feet | $200 \mathrm{ft}+$ spiral | 270 | 220 |
| Chester Exit | Drop* | 150 | 150 | 25 | 24 | 1012-250 feet | 1145-250 feet | N/A | N/A |
| Superior Entrance | Add* | 140 | 147 | 17 | 23 | 6 deg | 5 deg | N/A | N/A |
| Superior Exit | Drop | 127 | 137 | 27 | 24 | 14 deg | 6 deg | 370 | 300 |
| Lakeside Entrance | Merge (Stop) | 63 | 58 | 15 | 24 | 240 feet | 240 feet | 280 | 260 |
| SR-2 Entrance | Dual Add | 110 | 68 | 25 | 24 | 150 feet | 150 feet | 170 | 150 |
| SR-2 Entrance (re-aligned) | Dual Add | 110 | 82 | 25 | 24 | 150 feet | 230 feet | 170 | 175 |

Part of auxiliary lane
** Based on structures and barrier. Assumes guardrail and vegeatation do not impede driver's line of sight.

| Mainline Curve Name | Mainline Curve Radius (feet) | Lane CL (ft) |  | Barrier Offset From CL (ft) |  | Horizontal SSD |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| SR 2 Curve | 478-feet (11.98 degrees) | 472 | 460 | 10 | 7 | 195 ft (29 MPH) | $160 \mathrm{ft} *$ ( 25 MPH ) |
|  |  |  | 471 |  | 18 |  | $261 \mathrm{ft} * *$ ( 32 MPH ) |
| Superior Curve | 3724-feet (1.75 degrees) | 3213 | 3209 | 15 | 10 | 621 ft ( 63 MPH ) | $506 \mathrm{ft}{ }^{\#}$ ( 55 MPH ) |
| Carnegie Curve | 1648-feet (3.48 degrees) | 1615 | 1603 | 33 | 21.5 | 654 ft (65 MPH) | $525 \mathrm{ft}{ }^{\text {\#\# }}$ ( 57 MPH ) |

* Proposed is for inside SmartLane
** Proposed is for inside general-purpose lane
\# Proposed is outside general-purpose lane between Lakeside and St. Clair
\#\# Proposed is outside general-purpose lane between Chester and Carnegie





## Google Maps Cleveland






## Alternatives Evaluation - I-90 WB HSR Corridor Study




I-90 WB HSR Study
Project Check-In Meeting with ODOT District 12

Location: Conference Call
Date: January 19, 2021 @ 12:30 pm

## Attendees:

Dave Lastovka ODOT District 12

Keith Hamilton
Mike Herceg
Eric Kallio
Tony Toth
Keri Welch
Ben Kruse
Troy Onesti
Brian Toombs
Danny Soroka
Randy Kill Kendra Schenk Waleed Al-Sharkaw ODOT District 12 ODOT District 12 ODOT District 12 ODOT District 12 ODOT District 12 DOT District 12 ODOT District 12 Burgess \& Niple, Inc.
Burgess \& Niple, Inc. Burgess \& Niple, Inc. Burgess \& Niple, Inc. Burgess \& Niple, Inc.
dave.lastovka@dot.ohio.gov keith.hamilton@dot.ohio.gov michael.herceg@dot.ohio.gov eric.kallio@dot.ohio.gov anthony.toth@dot.ohio.gov keri.welch@dot.ohio.gov ben.kruse@dot.ohio.gov troy.onesti@dot.ohio.gov brian.toombs@burgessniple.com daniel.soroka@burgessniple.com randy.kill@burgessniple.com kendra.schenk@burgessniple.com waleed.al-sharkawi@burgessniple.com

## Purpose:

- To discuss the status of the project with District 12 , including early findings, prior to finishing the analysis and technical memorandum.


## Decisions made during the meeting:

- Eliminate the Right Side (outside) HSR option from further advancement

Action items to do after the meeting:

- Add a note to the typical section sheet indicating that the lateral widths came from record plans and what set of record plans the lateral width information came from [Soroka]
- Determine the existing and proposed HSSD being provided through the Innerbelt Curve [Al-Sharkawi]
- Evaluate strategies for optimizing typical section (lane widths, shoulder widths) through the Innerbelt Curve to improve HSSD and reduce truck off-tracking [Toombs]
- Compare two options: Evaluate Left Side (inside) HSR option that starts in a more appropriate location, perhaps closer to East $55^{\text {th }}$ Street) vs. Evaluate Left Side (inside) HSR that starts west of the SR 2 bridge; Compare the cost benefit of these two options [B\&N]
- Update Safety Analysis to reflect the mitigation strategies [Schenk]
- Update the Left Side (inside) HSR schematic view to modify the interchange ramps to interact with I-90 WB in the appropriate location [Toombs]
- Develop construction cost estimates for the Left Side (inside) HSR [Soroka]
- Identify what it would take to reduce the SR 2 EB entrance ramp to I-90 WB to a single lane [Toombs]
- Evaluate options for Lakeside entrance ramp (add vs elimination) [Toombs]


## I-90 WB HSR Study

 Project Check-In Meeting with ODOT District 12
## Discussion

## Project Overview

- This study is to evaluate potential of implementing Hard Shoulder Running along I-90 WB through the Innerbelt Trench (SR 2 to I-77). This study is to evaluate options (left vs right side), capacity benefits, safety concerns, geometric concerns, signing and striping strategies, and potential construction costs for implementation
- This meeting is a checkpoint in the evaluation process to coordinate with ODOT with early results without finalizing anything until ODOT can review what has been developed to date and decide on whether to proceed further
- Project Background \& Scope
- B\&N is to investigate inside (left side) and outside (right side) HSR implementation
- B\&N is using the mapping that was available from the Cleveland Innerbelt Corridor Study with some supplemental information that was made available by ODOT (via the Michael Baker project to evaluate a permanent add-lane using PBPD between Superior and I-77)
- The southern tie-in is assumed to be CCG3's proposed improvement in the Central Interchange
- Discipline Updates
- Traffic Analysis
- Traffic volumes used were from the Michael Baker analysis performed for the permanent add-lane between Superior and I-77. These were 2015 counts.
- These volumes were then increased by $5 \%$ to better represent 2021/2022 implementation numbers
- Focused on PM peak since the AM peak did not show the same issues in the WB direction
- Existing conditions analysis assumes tying into the CCG3 proposed project and does not include the temporary auxiliary lane between Chester and I-77.
- Alternative 1
- Begins HSR lane east of the SR 2 interchange and drops to I-77 SB
- Results: LOS C and LOS D everywhere except between Chester and I-77, where it is a LOS E
- Alternative 2
- Begins HSR lane west of the SR 2 interchange and drops to $1-77$ SB; models very similar to the permanent auxiliary lane option between Chester and I-77
- Results: LOS C and LOS D everywhere except between Chester and I-77 and east of SR 2 interchange (LOSE)
- Traffic Analysis doesn't distinguish between HSR left side and HSR right side as it provides an additional lane of capacity through the segment.

BURGESSS RE NIPLEE

## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

## Geometrics

- Typical Section
- Used existing plans to determine existing lateral clearances
- ODOT requested a note added to the typical section sheet indicating that the lateral widths came from record plans and what set of record plans the lateral width information came from
- Maintained consistent inside shoulder width underneath the bridges and throughout the corridor to prevent travel lanes shifting in and out toward and away from the barrier
- Left Side (median) HSR
- Left shoulder: 3 feet
- HSR lane: 11 feet
- Mainline General Purpose Lanes: one 12 -foot wide lane with others being 11 feet
- Right shoulder: 4.25 feet (minimum under bridges in the 5 -lane wide section); 5.25 feet (minimum under bridges in the 4 -lane wide section)
- Right Side (outside) HSR
- Left shoulder: 4 feet
- HSR lane: 11 feet
- Mainline General Purpose Lanes: one 12 -foot wide lane with others being 11 feet
- Right shoulder: 3.25 feet (minimum under bridges in the 5 -lane wide section); 4.25 feet (minimum under bridges in the 4 -lane wide section)
- Outside of the bridge areas, right side shoulder width could be increased to provide vehicle pull offs and breakdown shoulders


## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

## - Schematic Plan View

- Left Side (median) HS
- HSR start - Traveled lanes shifts to the right (outside) to allow room for the HSR lane to develop
- Results in a 5 -lane mainline section east of the diverge to SR 2 WB
- Lateral pinch point is the 3-lane section under the SR 2 bridge; in this section, a proposed 3.25 foot outside shoulder is provided
- Horizontal Stopping Sight Distance (HSSD) is a concern through the horizontal curve through the SR 2 interchange. $B \& N$ to evaluate and determine the proposed HSSD being provided through this curve and compare to the existing HSSD.
- HSR end - matches into the proposed CCG3 4-lane I-90 WB section jus south of the Carnegie Avenue bridge; traveled lanes shift to the right (outside) to align with the proposed lanes from the CCG3 contract
- Right Side (outside) HSR
- HSR start - HSR lane opens on the outside after the diverge to SR 2 WB
- Like the Left Side HSR, lateral pinch point is the 3-lane section under the SR 2 bridge
- West of the SR 2 interchange, the HSR lane is situated between the mainline traveled lanes and the two-lane entrance ramp from SR 2 EB
- One of the 2-lane entrance ramp lanes drops to Superior Avenue, leaving a single lane on the outside of the HSR lane if the SR 2 EB to I-90 WB remains a 2-lane entrance ramp. To improve this, the SR 2 EB to I-90 WB ramp would need to be reduced to a single lane by the time it enters I-90 WB.
- Auxiliary lanes present between Superior and Chester and between Chester and Carnegie would be located outside of the HSR lane.
- HSR end - matches into the proposed CCG3 4-lane I-90 WB section jus south of the Carnegie Avenue bridge; HSR lane becomes the fourth (outside) lane that drops to I-77 SB.
- Safety Analysis
- To analyze the safety performance and overcome the challenge of the HSR lane only being open during short periods of the day, we ran the analysis twice with the two different shoulder width scenarios (HSR open and HSR closed) and did a weighted average based on volumes during each of those two scenarios
- When considering safety performance, Left Side (inside) HSR outperforms Right Side (outside) HSR
- Typical safety countermeasures for HSR are wider edge lines, rumble strips, and barrie reflectors. These would likely be needed to offset reduction in the offset to barrier
- Safety analysis completed to date did not assume gore location changes; this would be considered when moving forward once geometry is established for each condition


## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

## Critical Issue

- Truck Tracking
- Carnegie Curve - no truck tracking issues with the proposed condition assuming operating speeds of 35 mph for the trucks
- Existing analysis - not analyzed for this curve since the proposed condition with narrower lanes didn't show a problem
- Innerbelt Curve - shows off-tracking by trucks outside of the lanes for the HSR lane width configuration; this analysis assumed three trucks running side by side.
- Existing analysis - only two lanes under the SR 2 bridge; two trucks side by side do not off-track into adjacent lanes but narrowly miss the adjacent truck by about 6 inches per the autoturn analysis.
- One option would be to balance shoulder and lane width by re-allocating some proposed shoulder width to increase the width of the lanes
- Another option might be to add signage to "force" trucks to use specific lanes
- Auxiliary Lanes in the Corridor
- HSR lane inside of auxiliary lanes becomes a challenge when the HSR is not open to traffic
- Issue is how to sign and maintain the lane being closed with traffic entering and exiting the freeway on the outside of the HSR lane.
- Placing the HSR on the outside but inside the auxiliary lanes will create a significantly shorter length of weave between the entrance and exit locations along I-90 when the HSR is closed as traffic moves across the closed HSR lane to merge into the l-90 through lanes.
- Signing
- Not evaluated yet
- SR 2 EB to I-90 WB entrance ramp
- Could this ramp be reduced to a single lane when it enters I-90 WB to improve the width under the railroad bridge, where there is a lateral pinch now.
- Traffic operations show that reducing this to a single lane is a viable option, but nothing was done to evaluate the weave along SR 2 EB approaching the I-90 interchange or how the lan utilization change on the ramp would ripple back to the west along SR 2 and the adjacent access points
- To get the mainline benefit of reducing this ramp to a single lane, the entrance ramp from Lakeside Avenue would need to enter I-90 WB as an add-lane (currently it is a merge condition; this ramp is scheduled to be eliminated as part of the CCG4 design project).
- If the SR 2 EB entrance ramp remained a two-lane entrance ramp, then it might be worth evaluating options to close the Lakeside Avenue ramp since the entrance geometry of this ramp would likely be inadequate for acceleration length due to the lateral constraint of the existing railroad bridge.
- To remove Lakeside ramp or revise Lakeside entrance, would need to show the benefit and discuss with the City.


## I-90 WB HSR Study

 Project Check-In Meeting with ODOT District 12Next Steps

- Eliminate the Right Side (outside) HSR concept. No need to complete further analysis
- Compare two options
- Evaluate Left Side (inside) HSR option that starts in a more appropriate location, perhaps closer to East 55 ${ }^{\text {th }}$ Street)
- Evaluate Left Side (inside) HSR that starts west of the SR 2 bridge
- Compare the cost benefit of these two options
- Evaluate HSSD for existing and Left Side (inside) HSR through the horizontal curves along I-90 WB
- Update Safety Analysis to reflect the mitigation strategies
- Update the Left Side (inside) HSR schematic view to modify the interchange ramps to interact with I 90 WB in the appropriate location
- Do this to determine if the weave/merge length changes impact capacity or safety
- Develop construction cost estimates for the Left Side (inside) HSR
- Evaluate strategies for optimizing typical section (lane widths, shoulder widths) through the Innerbelt Curve to improve HSSD and reduce truck off-tracking
- SR 2 entrance ramp and Lakeside entrance ramp
- Identify what it would take to reduce the SR 2 entrance ramp to a single lane
- This would likely impact muni lot ramp access along SR 2 EB
- Evaluate options for Lakeside entrance ramp (add vs elimination)
- Document strategies but don't do a lot of detailing at this time; coordination with the City would be required to further any discussion on these two ramp modifications


## I-90 WB HSR Study

## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

Conference Cal
Microsoft Teams Meeting
Tuesday, January 19, 2021
12:30 PM - 2:30 PM
AGENDA

1. Project Overview
2. Discipline Updates
a. Traffic Analysis
i. Origination
ii. Termination
b. Geometrics
i. Typical Section
ii. Schematic Plan View
c. Safety Analysis
3. Critical Issues
a. Truck Tracking
b. Auxiliary Lanes in the Corridor
c. Signing - not evaluated yet
4. Variations/Alternatives to HSR
a. Start HSR at Superior
b. Auxiliary Lane between Prospect and I-77
5. Next Steps
6. Adjourn

Westbound I-90 HSR Study HCS Results

|  | $\mathbf{2 0 2 0}$ No-Build |  | $\mathbf{2 0 2 0}$ PM Build |  |
| :--- | :---: | :---: | :---: | :---: |
| Segment | AM Peak | PM Peak | ALT 1 | ALT 2 |
| WB I-90, East of EB SR 2 On-Ramp | $\mathrm{F}(48.9)$ | $\mathrm{F}(48.9)$ | $\mathrm{D}(33.2)$ | $\mathrm{F}(48.9)$ |
| EB SR 2 On-Ramp | $\mathrm{D}(30.2)$ | $\mathrm{C}(30.2)$ | $\mathrm{C}(24.2)$ | $\mathrm{C}(30.2)$ |
| 26th Street On-Ramp | $\mathrm{C}(25.6)$ | $\mathrm{C}(26.7)$ | $\mathrm{C}(22.0)$ | $\mathrm{C}(27.5)$ |
| Superior Ave Off-Ramp | $\mathrm{C}(24.6)$ | $\mathrm{C}(25.2)$ | $\mathrm{C}(20.6)$ | $\mathrm{C}(26.1)$ |
| WB I-90, East of Superior Ave On-Ramp | $\mathrm{D}(26.7)$ | $\mathrm{F}(48.8)$ | $\mathrm{C}(23.7)$ | $\mathrm{D}(31.2)$ |
| WB I-90, Between Superior On and Chester Off | $\mathrm{C}(27.7)$ | $\mathrm{F}(71.8)$ | $\mathrm{C}(26.0)$ | $\mathrm{D}(33.4)$ |
| WB I-90, East of Chester Ave On-Ramp | $\mathrm{D}(26.3)$ | $\mathrm{F}(68.3)$ | $\mathrm{D}(26.1)$ | $\mathrm{D}(34.6)$ |
| WB I-90. Between Chester On and Prospect Off | $\mathrm{D}(31.3)$ | $\mathrm{F}(82.0)$ | $\mathrm{D}(30.8)$ | $\mathrm{E}(39.9)$ |
| WB I-90, East of Prospect Ave On-Ramp | $\mathrm{C}(24.7)$ | $\mathrm{F}(70.6)$ | $\mathrm{D}(29.3)$ | $\mathrm{E}(41.3)$ |
| Prospect Ave On-Ramp | $\mathrm{C}(28.8)$ | $\mathrm{F}(39.8)$ |  |  |
| WB I-90, East of I-77 Off-Ramp | $\mathrm{D}(32.6)$ | $\mathrm{F}(45.0)$ | $\mathrm{E}(37.7)$ | $\mathrm{E}(37.2)$ |
| I-77 Off-Ramp | $\mathrm{B}(20.6)$ | $\mathrm{D}(27.4)$ |  |  |
| WB I-90, East of I-77 Off-Ramp | $\mathrm{B}(15.0)$ | $\mathrm{C}(25.3)$ | $\mathrm{D}(30.8)$ | $\mathrm{D}(30.8)$ |

No-Build Alternative assumes CCG3 has been constructed
Alternative 1 adds HSR lane beginning at WB SR 2 diverge and dropping to I-77 SB
Alternative 2 adds a permanent auxiliary lane between the Prospect Avenue on-ramp and the I-77 off-ramp


Predicted Crash Frequency

|  | Fatal and Serious Injury | Minor Injury | Possible Injury | No Injury | Total |
| :--- | :---: | :---: | :---: | :---: | :---: |
| No-Build | 1.50 | 5.00 | 5.60 | 33.50 | 45.60 |
| HSR Outside | 1.83 | 5.70 | 6.18 | 33.44 | 47.14 |
| HSR Inside | 1.63 | 5.02 | 5.42 | 28.57 | 40.64 |

I-90 WB HSR Study
Project Check-In Meeting with ODOT District 12

Location: Conference Call
Date: May 6, 2021 @ 8:30 am

## Attendees:

| Dave Lastovka | ODOT District 12 | (216) 584-2115 | dave.lastovka@dot.ohio.gov |
| :---: | :---: | :---: | :---: |
| Keith Hamilton | ODOT District 12 | (216) 584-2220 | keith.hamilton@dot.ohio.gov |
| Mike Herceg | ODOT District 12 | (216) 584-2088 | michael.herceg@dot.ohio.gov |
| Eric Kallio | ODOT District 12 | (216) 584-2121 | eric.kallio@dot.ohio.gov |
| Tony Toth | ODOT District 12 | (216) 584-2198 | anthony.toth@dot.ohio.gov |
| Keri Welch | ODOT District 12 | (216) 584-2166 | keri.welch@dot.ohio.gov |
| Ben Kruse | ODOT District 12 | (216) 584-2111 | ben.kruse@dot.ohio.gov |
| Troy Onesti | ODOT District 12 |  | trov.onesti@dot.ohio.gov |
| Brian Toombs | Burgess \& Niple, Inc. | (614) 459-2050 | brian.toombs@burgessniple.com |
| Danny Soroka | Burgess \& Niple, Inc. | (614) 459-2050 | daniel.soroka@burgessniple.com |
| Randy Kill | Burgess \& Niple, Inc. | (614) 459-2050 | randy.kill @burgessniple.com |
| Kendra Schenk | Burgess \& Niple, Inc. | (614) 459-2050 | kendra.schenk@burgessniple.com |
| Waleed Al-Sharkawi | Burgess \& Niple, Inc. | (614) 459-2050 | waleed.al-sharkawi@burgessniple.co |

## Purpose:

- To discuss the status of the project with District 12, specifically the interchange ramp geometry, prior to finishing the analysis and technical memorandum


## Decisions made during the meeting:

- For the option that begins the HSR lane west of the SR 2 EB entrance ramp, start the transition to shift the mainline lanes to the outside about 100-200 feet after the SR 2 EB entrance ramp enters, then open the HSR lane


## Action items to do after the meeting

- Quantify the available HSSD for the inside (left-hand) General-Purpose lane adjacent to the HSR to compare to the available HSSD along the existing inside lane [Soroka]
- Evaluate HSSD through the Carnegie Curve [Soroka]
- Send D12 availability for a meeting with ORE next week [Toombs]


## I-90 WB HSR Study

 Project Check-In Meeting with ODOT District 12
## Discussion:

## - Project Overview

- This study is to evaluate potential of implementing Hard Shoulder Running along I-90 WB throug the Innerbelt Trench (SR 2 to I-77). This study is to evaluate options (left vs right side), capacity benefits, safety concerns, geometric concerns, signing and striping strategies, and potential construction costs for implementation
- This meeting is a checkpoint in the evaluation process to coordinate with ODOT with early ramp geometric concerns without finalizing anything until ODOT can review what has been developed to date and decide on whether to proceed further
- Project Background \& Scope
- B\&N is to investigate inside (left side) and outside (right side) HSR implementation
- B\&N is using the mapping that was available from the Cleveland Innerbelt Corridor Study with some supplemental information that was made available by ODOT (via the Michael Baker project to evaluate a permanent add-lane using PBPD between Superior and I-77)
- The southern tie-in is assumed to be CCG3's proposed improvement in the Central Interchange
- HSSD Evaluation
- B\&N evaluated the proposed HSSD along I-90 through the two northern horizontal curves: - SR 2 curve
- HSSD is reduced in the HSR lane (adjacent to the median barrier) from 195 feet (29 mph - existing) to 160 feet ( 25 mph - proposed).
- It should be noted that this is for the HSR lane; when the HSR lane is closed, this reduction in HSSD isn't present.
- B\&N to quantify the available HSSD for the inside (left-hand) General-Purpose lane adjacent to the HSR to compare to the available HSSD along the existing inside lane - Curve north of Superior
- HSSD is reduced in the outside lane (permanent lane) from 621 feet ( 63 mph existing) to 506 feet ( 55 mph - proposed)
- B\&N to evaluate HSSD through the Carnegie Curve


## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

## Ramp Geometrics

- Could the SR 2 EB entrance ramp be a dynamic ramp that would trigger a single lane when the HSR lane is open? Might add a lot of confusion though for signing. Likely not an option to evaluate at this time.
- If the HSR begins south of the SR 2 EB entrance ramp, start the transition to shift the mainline lanes to the outside about 100-200 feet after the SR 2 EB entrance ramp enters, then open the HSR lane
- SR 2 EB Entrance Ramp
- Add lanes
- Shorter proposed gore length than the existing
- HSSD is reduced from 170 feet to 150 feet due to the South Marginal Road bridge abutment
- SR 2 EB Entrance Ramp (B\&N's modified alignment)
- Introduce a gradual reverse-curve configuration prior to the merge into I-90 WB to better align the ramp into the mainline
- Add lanes
- Shorter proposed gore length than the existing
- HSSD is slightly increased from 170 feet to 175 fee
- Would likely require a retaining wall between the ramp and SR 2 mainline
- Lakeside Entrance Ramp
- Merge condition
- Shorter proposed gore length than the existing
- HSSD is reduced from 280 feet to 260 feet due to the Lakeside Avenue bridge abutment
- Could this ramp be removed? Peak hour is about 260 vehicles which would likely shift to Superior that already has about 600 vehicles in the peak hour, which is likely a constrained number
- Superior Exit Ramp
- Drop Lane
- Slightly longer proposed gore length than the existing
- HSSD is reduced from 370 feet to 300 feet due to the Railroad bridge abutment
- Superior Entrance Ramp
- Add lane
- Slightly longer proposed gore length than the existing
- HSSD is not an issue due to a structure but vegetation would need to be evaluated and likely cut back
- Chester Exit Ramp
- Drop lane
- Same proposed gore length as the existing
- HSSD is not an issue due to a structure but vegetation would need to be cut back and the slope could be an issue - evaluate HSSD due to the slope
Chester Entrance Ramp
- Add lane
- Slightly longer proposed gore length than the existing
- HSSD is reduced from 270 feet to 220 feet due to Chester Avenue bridge abutment


## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

Prospect Exit Ram

- Drop Lane
- Shorter proposed gore length than the existing
- HSSD is reduced from 200 feet to 165 feet due to the Euclid Avenue bridge abutment - Prospect Entrance Ramp
- Merge condition
- Shorter proposed gore length than the existing
- HSSD is reduced from 195 feet to 170 feet due to the Prospect Avenue bridge abutment
- Next Steps
- Meet with ORE ASAP to flesh out these challenges and ensure there are no critical issues
- B\&N to send D12 availability for a meeting with ORE next week
- After meeting with ORE, if no critical issues are identified, the following activities are likely the next steps to complete on this study:
- Compare two HSR options that alter the starting point of the new lane
- Evaluate Left Side (inside) HSR option that starts in a more appropriate location, perhaps closer to East $55^{\text {th }}$ Street).
- Evaluate Left Side (inside) HSR that starts west of the SR 2 bridge
- Compare the cost benefit of these two options
- Update Safety Analysis to reflect the mitigation strategies
- Update Traffic Analysis to reflect the revised gore locations and weave length changes
- Develop construction cost estimates for the Left Side (inside) HSR
- Include potential retaining walls, overhead signing, interchange ramp reconstruction, etc. as needed
- Assume widening the outside shoulders to 10 -feet wide where possible between the physical constraints

I-90 WB HSR Lane (PID 77510/106236)
Inside HSR Lane - Ramp Geometry Summary

## 05/05/2021

| Ramp Name | Condition | Gore Length (feet) |  | Back of Gore Width (feet) |  | First Curve |  | Horizontal SSD (feet) ${ }^{* *}$ |  | Notes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |  |
| Prospect Entrance | Merge | 75 | 64 | 12 | 24 | 125-220 feet | 140 feet | 195 | 170 | Lane width narrowing at entrance <br> Need to check HSSD for grading |
| Prospect Exit | Drop* | 90 | 63 | 24 | 24 | 302-170 feet | 180 feet | 200 | 165 |  |
| Chester Entrance | Add* | 90 | 110 | 18 | 24 | 190-350 feet | $200 \mathrm{ft}+$ spiral | 270 | 220 |  |
| Chester Exit | Drop* | 150 | 150 | 25 | 24 | 1012-250 feet | 1145-250 feet | N/A | N/A |  |
| Superior Entrance | Add* | 140 | 147 | 17 | 23 | 6 deg | 5 deg | N/A | N/A | Possible to remove this ramp? |
| Superior Exit | Drop | 127 | 137 | 27 | 24 | 14 deg | 6 deg | 370 | 300 |  |
| Lakeside/26th Entrance | Merge (Stop) | 63 | 58 | 15 | 24 | 240 feet | 240 feet | 280 | 260 |  |
| SR-2 Entrance | Dual Add | 110 | 68 | 25 | 24 | 150 feet | 150 feet | 170 | 150 |  |
| SR-2 Entrance Alt | Dual Add | 110 | 82 | 25 | 24 | 150 feet | 230 feet | 170 | 175 |  |

* Part of auxiliary lane

| Mainline Curve <br> Radius (feet) | Lane CL (ft) |  | Barrier Offset From CL (ft) |  | Horizontal SSD |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Existing | Proposed | Existing | Proposed | Existing | Proposed |  |
| 478 -feet (11.98 degrees) | 472 | 460 | 10 | 7 | $195 \mathrm{ft}(29 \mathrm{MPH})$ | $160 \mathrm{ft}(25 \mathrm{MPH})$ | Proposed is for inside HSR lane |
| 3724 -feet (1.75 degrees) | 3213 | 3209 | 15 | 10 | $621 \mathrm{ft}(63 \mathrm{MPH})$ | $506 \mathrm{ft}(55 \mathrm{MPH})$ | Outside lane |

## I-90 WB HSR Study

## I-90 WB HSR Study

## Project Check-In Meeting with ODOT District 12

Conference Cal
Microsoft Teams Meeting
Thursday, May 6, 2021
8:30 AM - 9:30 AM
AGENDA

1. Project Overview
2. HSSD Evaluation
3. Entrance Ramp Geometrics
4. Next Steps
a. Start of HSR (East 55 ${ }^{\text {th }}$ Street vs West of SR 2 Bridge)
b. Additional PBPD Strategies
c. Cost Estimates
d. Safety Analysis
e. SR 2 EB Entrance Ramp Options
f. Lakeside Entrance Ramp Options
g. Technical Memorandum
5. Adjourn

## I-90 WB HSR Study

## Project Check-In Meeting with ODOT ORE

Location: Conference Call
Date: May 12, 2021 @ 9:00 am

## Attendees:

Adam Koenig
Michael Cronebach
Dave Lastovka
Keith Hamilton
Mike Herceg
Eric Kallio
Tony Toth
Keri Welch
Ben Kruse
Troy Onesti
Brian Toombs
Danny Soroka
Randy Kill
Waleed Al-Sharkaw

ODOT ORE
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(216) $584-2088$ (216) 584-2121 (216) 584-2198 (216) 584-2166 (216) 584-2111
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adam.koenig@dot.ohio.gov mike.cronebach@dot.ohio.gov dave.lastovka@dot.ohio.gov keith.hamilton@dot.ohio.gov michael.herceg@dot.ohio.gov eric.kallio@dot.ohio.gov anthony.toth@dot.ohio.gov keri.welch@dot.ohio.gov ben.kruse@dot.ohio.gov trov.onesti@dot.ohio.gov brian.toombs@burgessniple.com daniel.soroka@burgessniple.com randy.kill@burgessniple.com waleed.al-sharkawi@burgessniple.com

Purpose:
To discuss the status of the project with ORE, specifically the interchange ramp geometry, prior to finishing the analysis and technical memorandum.

## Decisions made during the meeting:

For the option that begins the HSR lane west of the SR 2 EB entrance ramp, start the transition to shift the mainline lanes to the outside about 100-200 feet after the SR 2 EB entrance ramp enters, then open the HSR lane.
Action items to do after the meeting:
Provide existing vertical clearance information under the SR 2 bridge [Lastovka]
Check with Dave Lastovka on whether noise analysis would be required if the HSR lane was implemented [Toombs]

## I-90 WB HSR Study

## Project Check-In Meeting with ODOT ORE

## Discussion:

## Project Overview

- This study is to evaluate potential of implementing Hard Shoulder Running along I-90 WB through the Innerbelt Trench (SR 2 to I-77). This study is to evaluate options (left vs right side), capacity benefits, safety concerns, geometric concerns, signing and striping strategies, and potential construction costs for implementation.
- This meeting is a checkpoint in the evaluation process to coordinate with ODOT with early ramp geometric concerns without finalizing anything until ODOT can review what has been developed to date and decide on whether to proceed further.
- Project Background \& Scope
- B\&N is to investigate inside (left side) and outside (right side) HSR implementation
- B\&N is using the mapping that was available from the Cleveland Innerbelt Corridor Study with some supplemental information that was made available by ODOT (via the Michael Baker project to evaluate a permanent add-lane using PBPD between Superior and I-77)
- The southern tie-in is assumed to be CCG3's proposed improvement in the Central Interchange

ORE favors the HSR Inside option for this corridor over the HSR Outside option due to the number of entrance/exit ramps

## HSSD Evaluation

- B\&N evaluated the proposed HSSD along I-90 through the two northern horizontal curves:
- SR 2 curve

HSSD is reduced in the HSR lane (adjacent to the median barrier) from 195 feet (29 mph - existing) to 160 feet ( 25 mph - proposed).
It should be noted that this is for the HSR lane; when the HSR lane is closed, this reduction in HSSD isn't present.
The HSSD available in the inside (left-hand) General-Purpose lane adjacent to the
HSR is increased from 195 feet ( 29 mph - existing) to 261 feet ( 32 mph - proposed)

- Curve north of Superior

HSSD is reduced in the outside lane (permanent lane) from 621 feet ( $63 \mathrm{mph}-$
existing) to 506 feet ( 55 mph - proposed)

- Carnegie Curve

HSSD is reduced in the outside (right-hand) lane from 654 feet ( 65 mph - existing) to 506 feet ( 55 mph - proposed)

## I-90 WB HSR Study

## Project Check-In Meeting with ODOT ORE

Ramp Geometrics

- If the HSR begins west of the SR 2 EB entrance ramp, start the transition to shift the mainline lane
to the outside about 100-200 feet after the SR 2 EB entrance ramp enters, then open the HSR lane
- SR 2 EB Entrance Ramp
- Add lanes
- Shorter proposed gore length than the existing
- HSSD is reduced from 170 feet to 150 feet due to the South Marginal Road bridge abutment - SR 2 EB Entrance Ramp ( $B \& N$ 's modified alignment)
- Introduce a gradual reverse-curve configuration prior to the merge into I-90 WB to better align the ramp into the mainline
- Add lanes
- Shorter proposed gore length than the existing
- HSSD is slightly increased from 170 feet to 175 feet
- Would likely require a retaining wall between the ramp and SR 2 mainline
- Lakeside Entrance Ramp
- Merge condition
- Shorter proposed gore length than the existing
- HSSD is reduced from 280 feet to 260 feet due to the Lakeside Avenue bridge abutment
- Could this ramp be removed? Peak hour is about 260 vehicles which would likely shift to Superior that already has about 600 vehicles in the peak hour, which is likely a constrained number
- Superior Exit Ramp
- Drop Lane
- Slightly longer proposed gore length than the existing
- HSSD is reduced from 370 feet to 300 feet due to the Railroad bridge abutment
- Superior Entrance Ramp
- Add lane
- Slightly longer proposed gore length than the existing
- HSSD is not an issue due to a structure but vegetation would need to be evaluated and likely cut back
- Chester Exit Ramp
- Drop lane
- Same proposed gore length as the existing
- HSSD is not an issue due to a structure but vegetation would need to be cut back and the slope could be an issue - evaluate HSSD due to the slope
- Chester Entrance Ramp
- Add lane
- Slightly longer proposed gore length than the existing
- HSSD is reduced from 270 feet to 220 feet due to Chester Avenue bridge abutment


## I-90 WB HSR Study

## Project Check-In Meeting with ODOT ORE

## - Prospect Exit Ram

- Drop Lane
- Shorter proposed gore length than the existing
- HSSD is reduced from 200 feet to 165 feet due to the Euclid Avenue bridge abutment - Prospect Entrance Ramp
- Merge condition
- Shorter proposed gore length than the existing
- HSSD is reduced from 195 feet to 170 feet due to the Prospect Avenue bridge abutment


## Next Step

- After this meeting with ORE, the following activities are likely the next steps to complete on this study:
- Compare two HSR options that alter the starting point of the new lane

Evaluate Left Side (inside) HSR option that starts in a more appropriate location, perhaps closer to East $55^{\text {th }}$ Street)
Evaluate Left Side (inside) HSR that starts west of the SR 2 bridge; this would be in part mitigation for the concerns under the SR 2 bridge (vertical clearance, lateral offset to the outside bridge pier)
Compare the cost benefit of these two options

- Identify countermeasures for traffic getting closer to the outside bridge pier High-friction pavement surface course; warning signs
- Confirm vertical clearance under the SR 2 bridge

Dave Lastovka to provide existing vertical clearance information under the SR 2 bridge
ORE indicated that a reduction from the existing vertical clearance under this bridge
is a big concern and likely a show-stopper due to the already-substandard clearance being provided

- Check with Dave Lastovka on whether noise analysis would be required if the HSR lane was implemented; Mike Cronebach believed Michael Baker may have already evaluated this?
- Update Safety Analysis to reflect the mitigation strategies
- Update Traffic Analysis to reflect the revised gore locations and weave length changes
- Develop construction cost estimates for the Left Side (inside) HSR

Include potential retaining walls, overhead signing, interchange ramp reconstruction, etc. as needed
Assume widening the outside shoulders to 10 -feet wide where possible between the physical constraints; assume drainage revisions that would be needed (existing structures, etc.)

- Draft Technical Memorandum

> Summarize the study findings, assumptions, and meetings

Dedicate some text in the technical memorandum narrative to the vertical clearance issue and the anticipated Design Exceptions
Identify next steps that would be needed in the process to advance this project

I-90 WB HSR Lane (PID 77510/106236)
Inside HSR Lane - Ramp Geometry Summary

Existing Posted Speed = 50 MPH
Assumed Posted Speed with HSR =
$40-45 \mathrm{MPH}$

## 05/12/2021

| Ramp Name | Condition | Gore Length (feet) |  | Back of Gore Width (feet) |  | First Curve |  | Horizontal SSD (feet) ${ }^{* *}$ |  | Notes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |  |
| Prospect Entrance | Merge | 75 | 64 | 12 | 24 | 125-220 feet | 140 feet | 195 | 170 | Lane width narrowing at entrance Need to check HSSD for grading |
| Prospect Exit | Drop* | 90 | 63 | 24 | 24 | 302-170 feet | 180 feet | 200 | 165 |  |
| Chester Entrance | Add* | 90 | 110 | 18 | 24 | 190-350 feet | $200 \mathrm{ft}+$ spiral | 270 | 220 |  |
| Chester Exit | Drop* | 150 | 150 | 25 | 24 | 1012-250 feet | 1145-250 feet | N/A | N/A |  |
| Superior Entrance | Add* | 140 | 147 | 17 | 23 | 6 deg | 5 deg | N/A | N/A | Possible to remove this ramp? |
| Superior Exit | Drop | 127 | 137 | 27 | 24 | 14 deg | 6 deg | 370 | 300 |  |
| Lakeside/26th Entrance | Merge (Stop) | 63 | 58 | 15 | 24 | 240 feet | 240 feet | 280 | 260 |  |
| SR-2 Entrance | Dual Add | 110 | 68 | 25 | 24 | 150 feet | 150 feet | 170 | 150 |  |
| SR-2 Entrance Alt | Dual Add | 110 | 82 | 25 | 24 | 150 feet | 230 feet | 170 | 175 |  |

* Part of auxiliary lane

| Mainline Curve <br> Radius (feet) | Lane CL (ft) |  | Barrier Offset From CL (ft) |  | Horizontal SSD |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Existing | Proposed | Existing | Proposed | Existing | Proposed |  |
| 478-feet (11.98 degrees) | 472 | 460 | 10 | 7 | 195 ft (29 MPH) | 160 ft (25 MPH) | Proposed is for inside HSR lane |
|  |  | 471 |  | 18 |  | 261 ft ( 32 MPH ) | Proposed is for inside general-purpose lane |
| 3724-feet (1.75 degrees) | 3213 | 3209 | 15 | 10 | 621 ft ( 63 MPH ) | 506 ft ( 55 MPH ) | Outside lane between Lakeside and St Claire |
| 1648-feet (3.48 degrees) | 1615 | 1603 | 33 | 21.5 | $654 \mathrm{ft}(65 \mathrm{MPH})$ | 525 ft ( 57 MPH ) | Outside through lane between Chester and Carneige |

## I-90 WB HSR Study

I-90 WB HSR Study
Project Check-In Meeting with ODOT Office of Roadway Engineering
Conference Call
Microsoft Teams Meeting
Wednesday, May 12, 2021
9:00 AM - 10:00 AM
AGENDA

1. Project Overview
2. HSSD Evaluation
3. Entrance Ramp Geometrics
4. Next Steps
5. Adjourn


| 隹: 08/09/2021 Drawing Submission REVIEWER |  |  |  |  |  |  |  | RESPONDER |  |  |  | REVIEWER |  |  | comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Comment |  |  | Drawing or Page Number | Reviewer Comment | Reviewer Comment (ODOT Follow-up Comment) | $\begin{gathered} \text { Review } \\ \text { Agency } \end{gathered}$ | Last Name of <br> Reviewer | Resolution Code | Response (not needed for code $A$ ) | Last Name of Responder | $\begin{array}{\|c\|} \text { Status } \\ \text { (open/closed) } \end{array}$ | $\begin{array}{\|c\|} \text { Status } \\ \text { (open/closed) } \end{array}$ | $\begin{aligned} & \text { Closed by } \\ & \text { (last name) } \end{aligned}$ | Date Closed |  |
| Drawing Summittal -08.00-2021 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 |  |  | General | Notes about design speed - should use posted speed limit, not assume HSR will be used only in times of congestion. |  | ооот | Toth |  | Agree. The eesig S Speed asumed fort his study ( 55 mph ) 55 mph above the posted speed linit ( 50 mph . | Toombs | Closed | Closed | Toth | 12/02/21 |  |
| 2 |  |  | 6096 | I like starting the HSR at E. 55th area. The curve is a pinch point with only two lanes going through to the south. |  | ооот | Toth |  | Agree, that the two-lane curve is a bottleneck. An additional lane south of the curve provides little benefit without a third lane through the curve. | kill | Closed | Closed | Toth | 12/02/21 |  |
| 3 |  |  | 4066 | ew cure fom ES SR-2 | OR: 0 oor dad cose thestclar | 000T | Toth |  | Eetere entry angle into 1.90 WB | Toombs | Closed | closed | Toth | 12/02/21 |  |
| ${ }^{4}$ |  |  | 4066 | Should we close Lakeside? If the future is to close it, why not begin now? This entrance contributes to an already tight weaving and entrance/exit area |  | ооот | Toth |  | Closing as part of an HSR implementation would be a good idea. Suggest including additional analysis to support this decision in the next phase of the HSR project should it move forward past the Feasibility study. | kill | Open | open | Toth | 12/02/21 | Still pene for discusion as we progess |
| 5 |  |  | 6eneral | Pages 3 - are out of order. |  | O00т | Toth |  | This has been corecteded as parto fthe final Deliverable | Toombs | cosed | cosed | Toth | ${ }^{121027 / 2}$ |  |
| 6 |  |  | 2066 | While the curve radius at Chester exit is being improved, it does cut back into the landscape. Will a retaining wall be does cut back into the landscape. Will a re needed? Can the original curve be kept? eeded: Can the orighal curve be kept? | DRL: what would the geometric deficiencies be if we tried to leave existing curve? | ооот | Toth |  |  | Soroka | Closed | Closed | Toth | 12/02/21 |  |
| 7 |  |  | General |  |  | ооот | Cronebach |  | The typical section in the report has been update to show this information. The intent is to hold the inside houlder and lane widths constant so that traffic does not have to shift multple times throughout the corridor. Outside of existing bridges, the shoulder is widened to the standard width and under existing shoulder and lanes. Detailed survey was only available for some of the bridges, so existing plans were used o determine approximate lateral clearances. Additional field survey would need to be collected to confirm these outside shoulder widths. | Soroka | Closed |  |  |  |  |
| 8 |  |  | General |  |  | ооот | Cronebach |  | This has been noted in the final Report. | Toombs | Closed |  |  |  |  |
| 9 |  |  | $10 \mathrm{f6}$ |  | implement this HSR after PID 82382 (CCG3A) is built. We proposed geometry is of this merge condition, in this interim condition of I90WB. dition of 190WB | ооот | Cronebach |  |  | Toombs | open |  |  |  |  |
| ${ }^{10}$ |  |  | 1 10f 6 | The exit ramp to Prospect Avenue appears to narrow as it goes under the Euclid Avenue overpass. What is the proposed ramp and shoulder widths at this location? |  | ооот | Cronebach |  | Under the Euclid Ave bridge, the lane width is 11-feet to match the proposed mainline typical section, then widens to 16 -feet through the gore. After the gore it transitions to a 24 -foot 2 lane ramp. The proposed shoulder width under the bridge is approximately 4.25 -feet and then widens to 8 -feet after the bridge. | Soroka | Closed |  |  |  |  |
| ${ }^{11}$ |  |  | 2066 | The entrance ramp from Chester Avenue appears to narrow as it goes under the Chester Avenue overpass. What is the proposed ramp and shoulder widths at this <br> location? |  | ооот | Cronebach |  | This entrance transitios the ramp width from 19-feet to 11-fee as it enters the mainline to match the 11foot lane width in the proposed mainline typical section. The proposed shoulder narrows to approximately 5 -feet wide under the bridge and then widens to 10 -feet after the bridge. | Soroka | Closed |  |  |  |  |
| ${ }^{12}$ |  |  | 2066 | The exit ramp to. E .2 24th Street appears to narrow as it goes <br> under the Payne Avenue overpass. What is the proposed ramp and shoulder widths at this location? |  | ооот | Cronebach |  | The auxiliary lane width between Superior Ave and Chester/E. 24th is 11 -feet wide to match the mainline $\left\lvert\, \begin{aligned} & \text { proposed typical section. The proposed outside shoulder width narrows to a } \\ & \text { the Payne Ave overpass and widens to } 8 \text { to } 10 \text {-feet outside the bridge limits. }\end{aligned}\right.$ | Soroka | Closed |  |  |  |  |
| ${ }^{13}$ |  |  | 2066 | The outside shoulder narrows as it goes under the US-6 (Superior Avenue), Hamilton Avenue, RR structure \& Lakeside Avenue overpasses. What are the proposed shoulder widths at these locations? |  | ооот | Cronebach |  | Typical section has been updated with a table showing these widths based on the best available information at this time (survey or record plans). Some will need to be confirmed with detailed field survey. | Soroka | Closed |  |  |  |  |
| ${ }^{14}$ |  |  | 4066 |  |  | ооот | Cronebach |  | The cost estimate assumed the median barriers would be added throughout the corridor to reduce spread <br> and remove any grated that might be within the potential wheel paths. | Soroka | Closed |  |  |  |  |
| 15 |  |  | 3066 | The exit ramp to E. 26th Street narrows as it goes under the St. Clair Avenue overpass. What is the proposed ramp and shoulder widths at this location? |  | ооот | Cronebach |  | Under the St. Claire Ave bridge, the lane width is 11-feet to match the proposed mainline typical section,解 proposed shoulder width under the bridge is approximately 4.25 -feet and then widens to 8 -feet after the bridge. | Soroka | Closed |  |  |  |  |
| ${ }^{16}$ |  |  | $40 f 6$ |  | DRL: can we note vertical <br> clearance here? | ооот | Cronebach |  | A separate vertical clearance narrative has been developed summarizing the existing and proposed information regarding vertical clearance at this location and throughout the corridor. Refer to that document for details. | Soroka | Closed |  |  |  |  |
| ${ }^{17}$ |  |  | 4066 |  | $\begin{aligned} & \text { DRL: Can rough estimates be split } \\ & \text { out for the retaining wall } \\ & \text { locations? } \end{aligned}$ | ооот | Cronebach |  | It is assumed that a retaining wall will be required at this location. Retaining walls may be needed <br> throughout the rest of the corridor, but a more detailed grading analysis will need to be done to confirm was done for the purpose of this study. | Soroka | open |  |  |  |  |



Cleveland Innerbelt; 190WB Hard Shoulder Running Concept PID 106263




























