I-205 Reconnaissance Study

Traffic Analysis

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Chapter 1: Executive Summary

The purpose of the I-205 Reconnaissance Study is to gather technical information describing the corridor from Interstate 5 to the Columbia River and to obtain a better understanding of physical constraints to support decisions about future improvements and funding priorities. The traffic analysis for this study, which will be a key element in the identification of future needs and will guide the preliminary design of potential improvement alternatives, examines past, present, and future conditions on I-205 to provide insight into how traffic characteristics have changed over time and where they will go over the next 20 years.

While freeway operations can be very complex in nature, the analysis included in this report is fairly basic and consistent with a "reconnaissance-level" analysis. This type of analysis is capable of evaluating system performance and identifying problem areas, but may not adequately assess the effectiveness of proposed improvements, as it does not account for interactions between adjacent points of congestion. Therefore, additional analysis may be necessary for future efforts considering improvement alternatives.

The following report contains separate discussions on mainline freeway operations and ramp/surface street operations, where mainline freeway operations describe the elements of the system along the mainline of I-205 and ramp/surface street operations describe the freeway ramp interactions with the connecting surface streets. The report has been arranged such that a majority of the information describing traffic conditions in the I-205 corridor is included in a series of figures with supporting text to aid interpretation and highlight the key findings. These key findings are listed below.

Mainline Freeway Operation

Historical Traffic Growth

- Historical growth in traffic volumes on I-205 has been significantly greater at the north and south ends of the corridor than experienced towards the middle, with the greatest rate of growth occurring at the Glenn Jackson Bridge (approximately 10% per year on average).
- Average daily traffic volumes on I-205 have been growing faster than peak hour volumes. This indicates that while traffic volumes have been steadily growing on I-205, the growth has not been proportional throughout the day, but has been occurring more during off-peak times. This type of growth results in higher midday traffic volumes and can lead to multi-hour peaks (currently experienced at some locations in the corridor). It could also be an indication that this corridor is at or near capacity, forcing the demand to spread out over a greater length of time.

Crash History

- Rear-end crashes are the most common crash type, making up almost 64% of all crashes experienced.

- The section of freeway encompassing Washington Street through I-84 West has experienced a crash rate much higher than any other section and well above the statewide average rate.
- A cluster of adjacent sections from Highway 212/224 to Sunnyside Road all maintain crash rates higher than the statewide average.
- Most top 10% SPIS sites are in the vicinity of interchanges.
- Crash rates and number of SPIS sites appear to be lower west of the Willamette River where interchange density is lower.

Oversaturated Conditions & Predictability of Travel

- Data recovered from loop detectors on I-205 suggests that areas of the freeway may be operating close to capacity. Under this condition, travel speeds through the corridor can be unpredictable and inconsistent from day to day, as even minor disturbances in vehicular flow (e.g. abrupt lane changes, sudden braking, small variations in demand) can cause a dramatic reduction in speeds.
- As traffic volume grows in the I-205 corridor and volume-to-capacity ratios for segments approach 1.0, the freeway has less and less ability to recover from minor disturbances without extensive delay and substantial extension of the length of the peak period. This problem propagates into multiple hours as the volume-to-capacity ratios of shoulder hours of the peak or midday hours increase, leaving less and less recovery potential, which may result in longer periods of congestion (beyond 2 and 3 hours).

24-Hour Traffic Volume Variations

- The highest northbound and southbound traffic volumes measured in the entire corridor are both experienced on the Glenn Jackson Bridge, where the northbound peak volume occurs during the p.m. peak hour and the southbound peak volume occurs during the a.m. peak hour.
- Traffic volumes throughout the day at the Glenn Jackson Bridge are very directional, with traffic volumes on northbound I-205 being significantly higher in the p.m. peak period (7,400 vph) than in the a.m. peak period (3,400 vph) and traffic volumes on southbound I-205 being significantly higher in the a.m. peak period (7,600 vph) than in the p.m. peak period (4,400 vph).
- During the p.m. peak period, two consecutive peak hours (4 & 5 p.m.) of nearly identical volume are maintained on the Glenn Jackson Bridge.
- The Stafford area experiences the lowest traffic volumes throughout the corridor (northbound and southbound), but like the Glenn Jackson Bridge, sees a northbound peak in the p.m. period and a southbound peak in the a.m. peak period.
- Midday traffic volumes experienced in the central area of the corridor (Stark – Foster) remain higher than at either the Glenn Jackson or Stafford areas. Also, the p.m. peak period volumes are generally higher than the a.m. peak period volumes at these

locations and, as seen at the Glenn Jackson Bridge, the p.m. maintains a longer, multi-hour peak, while the a.m. peak is mainly contained in a single hour.

24-Hour Truck Volume Variations

- At most locations in the corridor, truck traffic increases significantly around 5-6 a.m. and decreases significantly around 6 p.m., which is similar to passenger car traffic in the a.m., but very different than passenger car traffic in the p.m.
- At all locations in the corridor, the percent trucks in freeway traffic is at its highest between 11 p.m. and 4 a.m.
- In comparison to auto volumes, truck volumes do not appear to peak as dramatically and a.m. peak hours are generally a little later than the auto a.m. peak, but p.m. peak hours are generally a little earlier.

Existing (2005) Peak Hour Traffic Volumes

- The weekday p.m. peak hours in June were found to closely resemble the 30th highest hour of traffic throughout the year, which is the basis of ODOT's performance standards and is often the preferred time period for design purposes.
- During the weekday p.m. peak hour, the traffic volumes around the Stafford area are much lower than the rest of the corridor, with volumes increasing significantly north of Oregon City (around the transition from 2 to 3 lanes on the freeway).
- The maximum northbound volume during the weekday p.m. peak hour occurs at the Glenn Jackson Bridge, with the maximum southbound volume occurring at the Milwaukie Expressway.

Origins and Destinations of Travel

- A select link analysis using the 2000 Metro Regional Travel Demand Model showed that during the weekday p.m. peak hour the trips that are crossing the Glenn Jackson Bridge are predominately destined to, or originating from, I-84 and other areas to the north. Less than 10% of the trips that utilize the Glenn Jackson Bridge are coming from, or destined to, I-5 to the south.
- At the opposite end of the corridor near I-5, the majority of trips in this area are coming to/from areas to the west of Oregon City, with less than 20% traveling all the way to/from the Glenn Jackson Bridge.
- These results indicate that most of the drivers on I-205 will travel on less than half of the entire corridor during any single trip.

Existing Interchange Spacing

- Under current conditions, there are very few areas where the 3-mile interchange spacing standard is being met, indicating the interchange density through the corridor is very high and that opportunities for the addition of new interchanges are limited.

Existing (2005) Weekday A.M. Peak Hour Operations

- While there are many failing movements scattered throughout the corridor in the weekday a.m. peak hour, noticeable clusters are present that form nearly continuous segments of failing operations. In the northbound direction, these include segments from Hwy 99E/McLoughlin Boulevard to Gladstone/82nd Drive and from Foster/Woodstock to Airport Way. In the southbound direction, there are segments from Airport Way to the Milwaukie Expressway and from Hwy 99E/McLoughlin Boulevard to I-5.

Existing (2005) Weekday P.M. Peak Hour Operations

- While there are many failing movements scattered throughout the corridor in the weekday p.m. peak hour, there are noticeable clusters of failing movements creating nearly continuous segments on I-205 northbound from 10th Street/West Linn to Gladstone/82nd Drive and from Columbia Boulevard to the Glenn Jackson Bridge. In the southbound direction, more clusters of failing movements form segments from Division Street to Sunnyside Road and from 82nd Avenue to the Highway 213/Oregon City interchange.

Future (2025) Freeway Improvement Assumptions and Traffic Volume Forecasting

- The assumed lane configurations for 2025 were taken from planned improvements listed in ODOT's Statewide Transportation Improvement Program (STIP) and the Financially Constrained System in Metro's 2004 Regional Transportation Plan (RTP). Compared to the lane configurations present under existing conditions, the only modifications made were between Stafford Road and I-5, where a third lane was added, and between Johnson Creek Boulevard and 82nd Drive/Gladstone, where ramp connections were significantly modified.
- Future traffic volumes for the year 2025 were forecasted by applying an increment of the growth shown between the Metro Regional Travel Demand Models for the base year 2000 and future year 2025 to actual counts collected in 2005. The network assumptions included in the 2025 model were compared to the assumptions for future improvements described above to ensure that there was reasonable similarity prior to use.

Traffic Volume Growth from 2005 to 2025

- For many areas, the growth in traffic volumes was fairly low (1 to 5%). However, at other locations, such as around the Glenn Jackson Bridge, Milwaukie Expressway, and Oregon City, higher growth was experienced, ranging from 7 to 13%.
- In general, the distribution of traffic throughout the corridor remains as it is under existing conditions, with much lower traffic volumes around the Stafford area than experienced in the rest of the corridor and volumes increasing significantly north of Oregon City (around the transition from 2 to 3 lanes on the freeway). The maximum northbound volume continues to occur at the Glenn Jackson Bridge, but the maximum southbound volume shifts from the Milwaukie Expressway to the Highway 213/Oregon City interchange.

Future (2025) Weekday P.M. Peak Hour Operations

- Compared to the operating conditions experienced under existing conditions, most of the movements failing in 2005 will worsen by 2025, with about eleven new failing movements created around the corridor. The operations of some movements do improve, but these are limited to the areas where transportation improvements were assumed to have occurred (Stafford to I-5 and Johnson Creek Boulevard to Gladstone).
- Much like the operating conditions results for 2005, there are noticeable clusters of failing movements creating nearly continuous segments on I-205. In the northbound direction, the same clusters that were present under existing conditions are shown again, but have been extended to cover the areas from Stafford Road (previously began at 10th Street) to Gladstone/82nd Drive and from I-84 East (previously began at Columbia Boulevard) to the Glenn Jackson Bridge. In the southbound direction, the clusters of failing movements are very similar to those seen under existing conditions, forming from Division Street to Sunnyside Road and from 82nd Avenue to the Highway 213/Oregon City interchange.

Summary of System Deficiencies

- Approximately 75% of the failing movements projected to occur in the year 2025 are already failing under existing condition in 2005.
- Two segments along the I-205 northbound corridor were found to fail in both the a.m. and p.m. peak hours. These included segments from Hwy 99E/McLoughlin Boulevard to Gladstone/82nd Drive and from I-84 East to Airport Way.
- There may be relationships between areas experiencing high crash rates and areas of failing operations.
- Given the high number of failing locations on I-205, improvements to individual interchanges throughout the corridor spread out over time may have less benefit compared to improvements that include several adjacent interchanges or several miles of freeway that are undertaken concurrently or in succession. Areas for such improvements should include those identified in the graphics of Figure 21, with a priority placed on those segments failing in both the a.m. and p.m. peak hours.
- It may also be beneficial to select segments of the freeway that are in close proximity to local street improvements that are planned in the vicinity to maximize the total area of transportation improvements and consolidate the time period of construction to minimize public inconvenience.

Ramp/Surface Street Operation

Existing (2005) Weekday AM & PM Peak Hour Interchange Crossroad Volumes

- The peak hours of total entering intersection volume at an interchange ramp terminal may differ from the peak hour of the ramp or freeway served. This occurs frequently when the surface street traffic (not freeway-destined) peaks at times different than

when the overall freeway system peaks. To best understand the system operational performance, the peak traffic of the freeway system is investigated independently from the surface street system peak hour capacity analysis. To understand the influence of varying traffic levels over the entire peak period (two or three hours), simulation of traffic operations would be recommended.

Existing (2005) Weekday AM & PM Peak Hour Interchange Crossroad Operation

- In the a.m. peak hour, only 8 of the 69 ramp terminal and adjacent intersections analyzed fail to meet adopted performance standards.
- In the p.m. peak hour, the number of failing intersections increases to 15.
- All intersections failing during the a.m. peak hour also fail during the p.m. peak hour (5 of these intersections are currently unsignalized with stop-control).
- Under existing conditions, there are 7 different occurrences (2 in the a.m. and 5 in the p.m.) where adjacent intersections on the crossroad produce queues that spill back into ramp terminals and 13 occurrences (6 in the a.m. and 7 in the p.m.) where ramp terminals produce queues that spill back into adjacent intersections. At all of these locations, the ramp terminal to adjacent intersection spacing is less than ODOT's adopted spacing standard requiring a minimum of 1,320 feet of separation, which if provided, would mitigate all of these occurrences.
- Less than one third of all major intersections adjacent to freeway ramp terminals currently maintain at least 1,320 feet of spacing.
- There are 13 interchanges where the storage lengths between the interchange ramp terminals are inadequate to accommodate stopped vehicles.
- There are 4 off-ramps in the a.m. peak hour and 6 in the p.m. peak hour that currently experience queue spillback beyond the area of the ramp intended to be used for vehicle storage.

Future (2025) Weekday PM Peak Hour Interchange Crossroad Operation

- Out of 42 total interchange ramp terminals, 14 are anticipated to fail during the p.m. peak hour by 2025, including all 5 unsignalized, stop-controlled intersections (compared to 9 ramp terminals failing in 2005). Note that all ramp terminals found to be failing during the 2005 p.m. peak hour were also found to be failing in 2025, with the exception of the intersection with the I-205 northbound ramp on 10th Street, which is planned to be improved with a traffic signal.
- All adjacent intersections that were impacted by queue spillback from interchange ramp terminals during the p.m. peak hour in 2005 continue to be impacted in 2025, in addition to 6 new occurrences. Improving intersection spacing in accordance with ODOT's adopted spacing standard of at least 1,320 feet would be adequate to mitigate 8 of these locations.
- Even though 4 interchanges were mitigated through planned improvements, the number of interchanges that will experience queue spillback between the ramp

terminal intersections during the p.m. peak hour in 2025 has increased from 13 in 2005 to 14.

- All off-ramps experiencing excessive queuing under existing conditions during the p.m. peak hour will continue to do so in 2025, with the exception of the northbound off-ramp at Johnson Creek Boulevard and the southbound loop off-ramp at Highway 224, which have been mitigated through planned improvement projects. In addition, 5 new interchange ramps will experience queue spillback beyond the area of the ramp intended to be used for vehicle storage.

Chapter 2: Mainline Freeway Operation

I-205 Historic Average Daily Traffic Volumes

Figure 1 graphically presents information gathered at the four Automatic Traffic Recorder (ATR) stations along I-205 and displays it alongside an image of the corridor, identifying the approximate location from which the data was collected. From this illustration, the changes in traffic volumes throughout the corridor over the past 20 years can be easily seen. Note that the Glenn Jackson and Stafford ATR stations were established prior to 1984, but the Yamhill and Lents stations were not established until the early 1990's. At each ATR station, the information displayed shows the average daily traffic experienced during past years, a trend line providing the average growth rate per year, and the percent of daily traffic occurring in the 30th highest hour of the year (similar to the weekday peak hour and commonly used for design purposes).

According to these figures, the Stafford and Glenn Jackson areas have experienced a steady and significant amount of growth over the last 20 years. Note that both locations experienced just over 40,000 vehicles per day in 1984, but by 2004, the Glenn Jackson area had approximately 65% more traffic. Also, note that at all ATR stations, the percent of daily traffic experienced in the 30th highest hour of the year has been decreasing over time, while the average daily traffic has been increasing (some of the data for percent of daily traffic in the 30th highest hour was unavailable, which accounts for the missing data points). This indicates that while traffic volumes have been steadily growing on I-205, the growth has not been proportional throughout the day, but has been occurring more during off-peak times. This type of growth results in higher midday traffic volumes and can lead to multi-hour peaks (as seen in the p.m. peak period of the 24-hour volume profiles displayed in Figures 7 and 8). It could also be an indication that this corridor is at or near capacity, forcing the demand to spread out over a greater length of time.

Figure 1: I-205 Historic Average Daily Traffic Volumes

I-205 Crash History (1999 – 2003)

Figure 2 combines tabulated data with an illustration of the I-205 corridor to frame up the crash history on I-205 over a recent 5-year period (2003 was the most recent year of available crash data at the time this study was initiated). The information presented includes the types and frequencies of crashes, locations of top 10% SPIS[1] sites, and crash rates experienced compared to statewide average crash rates for similar facilities.

When examining this figure, note that the crash data has been grouped into sections, with each section beginning and ending between interchanges. The section endpoints have been identified in the illustration of the corridor for quick visualization of where these crashes have occurred and where the crash rates experienced have exceeded the statewide average rates. Also note that this information is not separated out by direction of travel, as that level of detail was not consistently or accurately recorded here in the past.

From this figure, a few interesting occurrences can be noted:

- Rear-end crashes are the most common crash type, making up almost 64% of all crashes experienced;
- The section of freeway encompassing Washington Street through I-84 West has experienced a crash rate much higher than any other section and well above the statewide average rate;
- A cluster of adjacent sections from Highway 212/224 to Sunnyside Road all maintain crash rates higher than the statewide average;
- Most top 10% SPIS sites are in the vicinity of interchanges; and
- Crash rates and number of SPIS sites appear to be lower west of the Willamette River where interchange density is lower.

[1] Safety Priority Index System (SPIS)

Figure 2: I-205 Crash History (1999 – 2003)

I-205 Crash Rates

Figure 3 displays much of the same data provided in Figure 2 (entitled "I-205 Crash History (1999 – 2003)"), but arranges it in a different manner to make it easier to identify high crash rates and locate them within the I-205 corridor. Again, the section of freeway from Stark Street/Washington Street to I-84 is shown to have the highest crash rate and to be exceeding the statewide average crash rate by the greatest margin. It should also be noted that the section surrounding Powell Boulevard and Division Street has the highest traffic volume, but a relatively low crash rate.

Figure 3: I-205 Crash Rates

Weekday AM & PM Average Travel Speeds

Figures 4 and 5 display the average speed of vehicle travel along the northbound and southbound corridors during typical weekday a.m. and p.m. peak periods, respectively, as recorded during travel time runs.[2] Each figure presents a series of sequential time periods to show how travel speeds vary throughout the peak period, as well as a graphic of the corridor illustrating the average travel speed experienced at all locations. When considering these figures, it should be recognized that the data collected represents only a small sample of corridor conditions.

By looking at these figures, it appears the most significant deficiency in the a.m. peak period is on I-205 southbound from OR 99E to I-5, where the average travel speed drops below 45 mph with a low of 30 mph between OR 43 and 10th Street. Slower speeds are experienced to a lesser degree in the southbound direction between Airport Way and Glisan Street and in the northbound direction between Foster Road and Glisan Street, but most of these areas continue to maintain travel speeds greater than 45 mph.

In the p.m. peak period, most of the problem areas are between Powell Boulevard and Airport Way. In the northbound direction, this entire section operates at 40 mph or lower, with a low of 31 mph between Columbia Boulevard and Airport Way. In the southbound direction, the freeway operates below 45 mph between Glisan Street and Powell Boulevard, with another low of 31 mph between Glisan Street and Stark Street. In addition to this area, there is more slowing in the northbound direction between Stafford Road and OR 99E, with a low of 41 mph experienced between 10th Street and OR 43.

[2] During travel time runs, speed and distance were continuously recorded by global positioning system (GPS) devices placed in vehicles driven to imitate observed average travel speeds along the freeway.

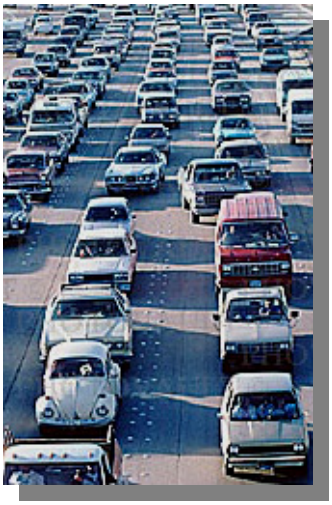
Figure 4: Weekday AM Average Travel Speeds

Figure 5: Weekday PM Average Travel Speeds

Speed/Volume Relationship under Oversaturated Conditions

When reviewing Figures 4 and 5, it should be recognized that the travel speeds shown represent those occurring on "typical" weekday peak hours where the entire corridor can be traversed in approximately 30 minutes. Other conditions were observed where, for a variety of reasons, travel speeds were significantly lower than those shown in Figures 4 and 5, resulting in total corridor travel times of an hour or greater. While these "oversaturated" conditions occur less frequently than those referred to as "typical", they play a significant role in the predictability of corridor travel time and are often the result of unpredictable events such as crashes, presence of debris in the roadway, or other incidents.

Other times, these oversaturated conditions have been noticed with no apparent event as the cause. These occurrences can occur as segments of the facility approach capacity and experience minor demand variations (about 5%) or even slight disruptions, such as abrupt lane changes or sudden braking, under conditions of unstable traffic flow. This phenomenon is consistent with historical research that suggests there is a relationship between average travel speed and the rate of vehicular flow on freeways that is characterized by a sudden and unpredictable drop in both speed and flow when the volume of traffic nears capacity. Eventually, conditions will recover from this drop, but during that recovery period the average travel speeds may be significantly lower than they were before.



This relationship is illustrated in Figure 6, which uses data recovered from loop detectors on I-205 northbound at the 10th Street interchange in West Linn. As seen in this figure, most of the data points lie along a line of travel speeds between 60 and 65 mph as vehicle volume grows. However, there are some data points at lower speeds, with most of these lying near the right end of the chart. Comparing this chart of actual data from I-205 to the theoretical relationship between speed and flow under saturated conditions (shown at the bottom of Figure 6), similarities can be seen that suggest a condition of unstable flow may be occurring at this location as traffic volumes exceed 3,500 vehicles per hour. Beyond this point (point A on the figure), speeds are shown to frequently drop anywhere between 60 and 25 mph. According to the theoretical condition, a minor disturbance occurring under unstable flow at point A could cause traffic to suddenly slow to point B (or even to point C in severe cases) before climbing back to higher speeds. How quickly speeds recover from point B or C may depend on how long peak traffic volumes are sustained and whether or not other disturbances occur that would keep flow at point B.

As an example, under high volumes of traffic, the distances between vehicles are typically shorter than drivers would otherwise encounter. Under these conditions, driver reactions to changes in front of them frequently become more abrupt because they have less time to react. Should a disturbance occur, such as a sudden lane change causing another driver to brake unexpectedly, a chain-reaction of following drivers braking suddenly may occur as well. The chain-reaction results in a shockwave of vehicles breaking suddenly, dropping travel speeds

well below the level they were at before the disturbance. With the vehicles now very close to each other, higher travel speeds can not be regained unless there is steady acceleration by the vehicles in the front of the platoon. However, as even minor disturbances to steady flow can repeat this cycle of sudden speed reductions, relief may not be fully experienced until peak traffic volumes subside to levels below the range characterized by unstable flow (e.g. volumes less than those at point A in Figure 6).

As traffic volume grows in the I-205 corridor and volume-to-capacity ratios for segments approach 1.0, the freeway has less and less ability to recover from minor disturbances or non-reoccurring events without extensive delay and substantial extension of the length of the peak period. This problem propagates into multiple hours as the volume-to-capacity ratios of shoulder hours of the peak or midday hours increase, leaving less and less recovery potential, which may result in more data points on Figure 6 in the "C" zone and longer periods of congestion (beyond 2 and 3 hours).

Figure 6: Speed/Volume Relationship under Oversaturated Conditions

I-205 Northbound & Southbound Weekday 24-Hour Volume Profiles (June 2004)

Figures 7 and 8 show how hourly traffic volumes change on northbound and southbound I-205 throughout a typical weekday in June.[3] Each of the four count locations displayed represents one of the four Automatic Traffic Recorder stations present in the corridor.

Note that on the Glenn Jackson Bridge, traffic volumes on northbound I-205 are significantly higher in the p.m. peak period (4-6 p.m.) than in the a.m. peak period (7-9 a.m.) and that the p.m. peak period is maintaining two consecutive peak hours of nearly identical volume (4 & 5 p.m.). This location also represents the point of highest northbound traffic volume throughout the entire corridor.

In the southbound direction, traffic flow on the Glenn Jackson Bridge peaks in the a.m. peak period rather than in the p.m. peak period, but the duration of the peak period is shorter with the hour between 7 and 8 a.m. significantly higher than either of the adjacent hours. As with the northbound traffic, the Glenn Jackson Bridge maintains the highest southbound traffic flow of the corridor.

In contrast, the Stafford area experiences the lowest traffic volumes throughout the corridor (northbound and southbound), but like the Glenn Jackson Bridge, sees a northbound peak in the p.m. period and a southbound peak in the a.m. peak period. However, the differences in traffic volumes experienced in the a.m. and p.m. peaks are not extreme as they are at the Glenn Jackson Bridge.

The Yamhill and Lents stations, which are fairly close together, maintain similar profiles of hourly fluctuations and have lower peak period traffic volumes than the Glenn Jackson Bridge, but higher peak period volumes than the Stafford area. However, midday traffic volumes experienced at these locations remain higher than either the Glenn Jackson or Stafford areas. The p.m. peak period volumes are generally higher than the a.m. peak period volumes at these locations and, as seen at the Glenn Jackson Bridge, the p.m. maintains a longer, multi-hour peak, while the a.m. peak is mainly contained in a single hour.

While examining these profiles, it should be noted that perhaps more important than the amount of traffic experienced at any one location is the freeway's ability to accommodate that traffic. The Glenn Jackson Bridge may be carrying the highest traffic volumes in the corridor, but it also has more capacity available to accommodate this traffic, with four travel lanes in each direction. In contrast, the Stafford area, which is carrying the least amount of traffic, also has the least amount of capacity, with only two travel lanes in each direction.

[3] The weekday p.m. peak hours in June were found to closely resemble the 30th highest hour of traffic throughout the year, which is the basis of ODOT's performance standards and is often the preferred time period for design purposes.

Figure 7: I-205 Northbound Weekday 24-Hour Volume Profiles (June 2004)

Figure 8: I-205 Southbound Weekday 24-Hour Volume Profiles (June 2004)

I-205 Northbound & Southbound Weekday 24-Hour Truck Volume Profiles

Figures 9 and 10 show how hourly truck traffic volumes change on northbound and southbound I-205 throughout a typical weekday in June.[4] Each of the four count locations displayed represents one of the four Automatic Traffic Recorder stations present in the corridor.

Note that at most locations, truck traffic increases significantly around 5-6 a.m. and decreases significantly around 6 p.m., which is similar to passenger car traffic in the a.m., but very different than passenger car traffic in the p.m. Also note that in all locations, the percent trucks in freeway traffic is at its highest between 11 p.m. and 4 a.m.

In comparison to auto volumes, truck volumes do not appear to peak as dramatically and a.m. peak hours are generally a little later than the auto a.m. peak, but p.m. peak hours are generally a little earlier.

[4] The weekday p.m. peak hours in June were found to closely resemble the 30th highest hour of traffic throughout the year, which is the basis of ODOT's performance standards and is often the preferred time period for design purposes.

Figure 9: I-205 Northbound Weekday 24-Hour Truck Volume Profiles

Figure 10: I-205 Southbound Weekday 24-Hour Truck Volume Profiles

Lane Configurations & Weekday AM & PM Peak Hour Traffic Volumes

Figures 11 and 12 combine an illustration of the number of lanes and locations of on and off-ramps and auxiliary lanes currently present on all sections of the freeway along with traffic volumes on all ramps and mainline sections for the weekday a.m. and p.m. peak hours, respectively. The peak hour volumes shown represent conditions present during a June weekday[5] in 2005. While these figures are not drawn to scale, the approximate mileage between adjacent ramp connections has been included along the inside lanes of the freeway.

[5] The weekday p.m. peak hours in June were found to closely resemble the 30th highest hour of traffic throughout the year, which is the basis of ODOT's performance standards and is often the preferred time period for design purposes.

Figure 11: Lane Configurations & Weekday AM Peak Hour Traffic Volumes

Figure 12: Lane Configurations & Weekday PM Peak Hour Traffic Volumes

Existing Interchange Spacing

According to the *1999 Oregon Highway Plan*,[6] the adopted access spacing standards for Interstate Freeways in urban areas require a minimum separation of 3 miles between the crossroads of adjacent interchanges. Under current conditions, there are very few areas where this standard is being met, indicating the interchange density through the corridor is very high and that opportunities for the addition of new interchanges are limited. Table 1 provides a summary of corridor interchange spacing. While the Stafford Road interchange is actually outside of the urban growth boundary and would technically be considered to be in a rural area (requiring a minimum spacing of 6 miles), it has been treated as an urban interchange for this comparison.

Table 1: Existing Interchange Spacing

Interchange Spacing	Number of Occurrences
< 1 mile	10
1-2 miles	6
2-3 miles	1
≥ 3 miles	2

[6] *1999 Oregon Highway Plan*, Oregon Department of Transportation, 1999, p. 192.

Weekday PM Peak Hour Traffic Volume Chart

Figure 13 presents the same p.m. peak hour volume data shown in Figure 12, but focuses on how mainline volumes change as traffic progresses from one end to the other. This is not as useful for analysis purposes, but facilitates the comparison of traffic volumes experienced on various sections of the freeway. At a glance, it can be seen that the traffic volumes around the Stafford area are much lower than the rest of the corridor, with volumes increasing significantly north of Oregon City (around the transition from 2 to 3 lanes on the freeway). Also, the maximum northbound volume is seen to occur at the Glenn Jackson Bridge, with the maximum southbound volume occurring at the Milwaukie Expressway.

Figure 13: Weekday PM Peak Hour Traffic Volume Chart

I-205 PM Peak Hour Select Link Data (2000)

Figure 14 presents a select link analysis of where vehicle trips are coming from and going to at specific locations along the I-205 corridor.[7] Two locations were selected for analysis: at the south end of I-205 near I-5, and at the north end of I-205 at the Glenn Jackson Bridge. This select link analysis utilized the 2000 Metro Regional Travel Demand Model and was conducted in both the northbound and southbound directions at these two locations. During the p.m. peak hour, the trips that are crossing the Glenn Jackson Bridge are predominately destined to, or originating from, I-84 and other areas to the north. Less than 10% of the trips that utilize the Glenn Jackson Bridge are coming from, or destined to, I-5 to the south. At the opposite end of the corridor near I-5, the majority of trips in this area are coming to/from areas to the west of Oregon City, with less than 20% traveling all the way to/from the Glenn Jackson Bridge. These results indicate that most of the drivers on I-205 will travel on less than half of the entire corridor during any single trip.

[7] Note that all quantities of distributed traffic shown in these figures will not add up to 100% due to minor losses at other interchanges.

Figure 14: I-205 PM Peak Hour Select Link Data (2000)

Weekday AM Peak Hour Freeway Operations Analysis (2005)

In Figure 15, the results of the operational analysis for I-205 during the weekday a.m. peak hour in 2005 are displayed on a graphic of the corridor. This analysis utilized the *Highway Capacity Software*,[8] which was developed to accurately implement the analysis methodologies from the *Highway Capacity Manual*,[9] along with the traffic volumes and lane configurations displayed in Figure 11 and other data collected from the field. Both the level of service and volume-to-capacity ratio are shown as performance measures. Any locations operating at a level of service "F" or volume-to-capacity ratio greater than 0.99 were deemed to be failing.[10]

While there are many failing movements scattered throughout the corridor, noticeable clusters are present that form nearly continuous segments of failing operations. In the northbound direction, these include segments from Hwy 99E/McLoughlin Boulevard to Gladstone/82nd Drive and from Foster/Woodstock to Airport Way. In the southbound direction, there is a segment from Hwy 99E/McLoughlin Boulevard to I-5.

These results are reflected, to some degree, by the travel speed (Figure 4) and traffic volume data (Figures 7 & 8) collected and previously described. From the average travel speed data, the failing northbound segment from Foster/Woodstock to Airport Way was partially noticed by some minor slowing between Foster/Woodstock and Glisan, but the entire southbound segment from Hwy 99E/McLoughlin Boulevard to I-5 was captured. Again, the sample size of speed data collected was small, which may account for the failure to reflect all areas experiencing poor operations.

As shown in the 24-hour volume profiles (Figures 7 & 8), the failing segment on I-205 southbound from Hwy 99E/McLoughlin Boulevard to I-5 in the a.m. peak hour corresponds with the peaking of traffic volume seen at the Stafford ATR station. There is also some evidence of the failing southbound segment from Airport Way to the Milwaukie Expressway where very high traffic volumes are shown on the Glenn Jackson Bridge, with moderate drops in volume at the Yamhill and Lents ATR stations. In the northbound direction, no data was available near the failing segment from Hwy 99E/McLoughlin Boulevard to Gladstone/82nd Drive, but high traffic volumes at the Lents and Yamhill ATR stations correspond with the failing segment from Foster/Woodstock to Airport Way.

[8] *Highway Capacity Software*, Version 4.1e, McTrans Center, University of Florida, Gainesville, FL, 2003.
[9] *Highway Capacity Manual*, Transportation Research Board, Washington, D.C., 2000.
[10] ODOT's adopted mobility standards from the *1999 Oregon Highway Plan* require operation at a volume-to-capacity ratio at or lower than 0.99 during each of the two consecutive peak hours of traffic.

Figure 15: Weekday AM Peak Hour Freeway Operations Analysis (2005)

Weekday PM Peak Hour Freeway Operations Analysis (2005)

In Figure 16, the results of the operational analysis for I-205 during the weekday p.m. peak hour in 2005 are displayed on a graphic of the corridor. This analysis utilized the *Highway Capacity Software*,[11] which was developed to accurately implement the analysis methodologies from the *Highway Capacity Manual*,[12] along with the traffic volumes and lane configurations displayed in Figure 12 and other data collected from the field. Both the level of service and volume-to-capacity ratio are shown as performance measures. Any locations operating at a level of service "F" or volume-to-capacity ratio greater than 0.99 were deemed to be failing.[13]

Looking at this diagram, there are noticeable clusters of failing movements creating nearly continuous segments on I-205 northbound from 10th Street/West Linn to Gladstone/82nd Drive and from Columbia Boulevard to the Glenn Jackson Bridge. In the southbound direction, more clusters of failing movements form segments from Division Street to Sunnyside Road and from 82nd Avenue to the Highway 213/Oregon City interchange.

As with the weekday a.m. peak hour operations, these results are also reflected, in part, by the travel speed (Figure 5) and traffic volume data (Figures 7 & 8) collected. From the average travel speed data, the failing northbound segments from 10th Street/West Linn to Gladstone/82nd Drive and from Columbia Boulevard to the Glenn Jackson Bridge are both shown to be very similar to two segments experiencing significant reductions in travel speeds. However, in the southbound direction, there appears to be little similarity between the travel speeds recorded and the results of the operations analysis, which may be a result of the small sample size of speed data collected.

Compared to the 24-hour volume profiles in Figures 7 & 8, there is noticeable correlation in the northbound direction where the failing segments from 10th Street/West Linn to Gladstone/82nd Drive and from Columbia Boulevard to the Glenn Jackson Bridge are shown to correspond with peaking traffic volumes at the Stafford and Glenn Jackson Bridge ATR stations, respectively. While no data was available to provide a comparison near the failing southbound segment from 82nd Avenue to the Highway 213/Oregon City interchange, the failing southbound segment from Division Street to Sunnyside Road does appear to correspond with peaking traffic volumes at the Yamhill and Lents ATR stations.

[11] *Highway Capacity Software*, Version 4.1e, McTrans Center, University of Florida, Gainesville, FL, 2003.
[12] *Highway Capacity Manual*, Transportation Research Board, Washington, D.C., 2000.
[13] ODOT's adopted mobility standards from the *1999 Oregon Highway Plan* require operation at a volume-to-capacity ratio at or lower than 0.99 during each of the two consecutive peak hours of traffic.

Figure 16: Weekday PM Peak Hour Freeway Operations Analysis (2005)

I-205 Planned Projects (2005 – 2025)

Figure 17 provides a table summarizing planned projects in the I-205 corridor through the year 2025, as taken from ODOT's Statewide Transportation Improvement Program (STIP) and Metro's 2004 Regional Transportation Plan (RTP), along with a corresponding graphic to illustrate each project's approximate location. Projects from the STIP and the Financially Constrained System of the RTP were assumed to be constructed by 2025 when conducting the analysis of future conditions.

Figure 17: I-205 Planned Projects (2005 – 2025)

Future Lane Configurations and Weekday PM Peak Hour Traffic Volumes (2025)

Much like Figures 11 and 12, Figure 18 combines an illustration of the number of lanes and locations of on and off-ramps and auxiliary lanes anticipated to be present on all sections of the freeway along with forecasted p.m. peak hour traffic volumes for the year 2025 on all ramps and mainline sections. While the figure is not drawn to scale, the approximate mileage between adjacent ramp connections has been included along the inside lanes of the freeway.

The assumed lane configurations for 2025 were taken from planned improvements listed in ODOT's Statewide Transportation Improvement Program (STIP) and the Financially Constrained System in Metro's 2004 Regional Transportation Plan (RTP). These assumptions were confirmed with ODOT prior to proceeding with the analysis.[14] Compared to the lane configurations present under existing conditions, the only modifications made were between Stafford Road and I-5, where a third lane was added, and between Johnson Creek Boulevard and 82nd Drive/Gladstone, where ramp connections were significantly modified.

Future traffic volumes for the year 2025 were forecasted by applying an increment of the growth shown between the Metro Regional Travel Demand Models for the base year 2000 and future year 2025 to actual counts collected in 2005. The network assumptions included in the 2025 model were compared to the assumptions for future improvements described above to ensure that there was reasonable similarity prior to use.

[14] Conversation with Mark Johnson, ODOT Preliminary Design, October 12, 2005.

Figure 18: Future Lane Configurations and Weekday PM Peak Hour Traffic Volumes (2025)

Weekday PM Peak Hour Traffic Volume Comparison

Figure 19 provides a direct comparison of the corridor traffic volumes collected in 2005 to the forecasted traffic volumes for 2025. Like Figure 12, this figure shows how mainline volumes change as traffic progresses from one end of the corridor to the other. For many areas, the growth in traffic volumes was fairly low (1 to 5%). However, at other locations, such as around the Glenn Jackson Bridge, Milwaukie Expressway, and Oregon City, higher growth was experienced, ranging from 7 to 13%.

In general, the distribution of traffic throughout the corridor remains as it is under existing conditions, with much lower traffic volumes around the Stafford area than experienced in the rest of the corridor and volumes increasing significantly north of Oregon City (around the transition from 2 to 3 lanes on the freeway). The maximum northbound volume continues to occur at the Glenn Jackson Bridge, but the maximum southbound volume has shifted from the Milwaukie Expressway to the Highway 213/Oregon City interchange.

Figure 19: Weekday PM Peak Hour Traffic Volume Comparison

Weekday PM Peak Hour Freeway Operations Analysis (2025)

Figure 20 displays the results of the operational analysis for I-205 during the weekday p.m. peak hour in 2025 on a graphic of the corridor. As with the existing conditions, this analysis utilized the *Highway Capacity Software*,[15] which was developed to accurately implement the analysis methodologies from the *Highway Capacity Manual*,[16] along with the traffic volumes and lane configurations displayed in Figure 18 and other data collected from the field. Both the level of service and volume-to-capacity ratio are shown as performance measures. Any locations operating at a level of service "F" or volume-to-capacity ratio greater than 0.99 were deemed to be failing.[17]

Compared to the operating conditions shown for existing conditions in Figure 16, most of the movements failing in 2005 will worsen by 2025, with about eleven new failing movements created around the corridor. The operations of some movements do improve, but these are limited to the areas where transportation improvements were assumed to have occurred (Stafford to I-5 and Johnson Creek Boulevard to Gladstone).

Much like the operating conditions results for 2005, there are noticeable clusters of failing movements creating nearly continuous segments on I-205. In the northbound direction, the same clusters that were present under existing conditions are shown again, but have been extended to cover the areas from Stafford Road (previously began at 10th Street) to Gladstone/82nd Drive and from I-84 East (previously began at Columbia Boulevard) to the Glenn Jackson Bridge. In the southbound direction, the clusters of failing movements are very similar to those seen under existing conditions, forming from Division Street to Sunnyside Road and from 82nd Avenue to the Highway 213/Oregon City interchange.

[15] *Highway Capacity Software*, Version 4.1e, McTrans Center, University of Florida, Gainesville, FL, 2003.
[16] *Highway Capacity Manual*, Transportation Research Board, Washington, D.C., 2000.
[17] ODOT's adopted mobility standards from the *1999 Oregon Highway Plan* require operation at a volume-to-capacity ratio at or lower than 0.99 during each of the two consecutive peak hours of traffic.

Figure 20: Weekday PM Peak Hour Freeway Operations Analysis (2025)

Summary of System Deficiencies (2005 – 2025)

In consideration of the operations analysis presented for existing conditions in 2005, as well as for future conditions in 2025, there are a significant number of areas along the I-205 corridor that currently fail to meet ODOT's adopted mobility standards.[18] The congestion in these areas may be experienced to varying degrees from day to day because traffic volumes are now approaching the capacity of the freeway. Under this condition (unstable flow), high travel speeds can be maintained, but even slight disruptions (e.g. abrupt lane change or sudden braking) or demand fluctuations as little as 5% can cause flow to break down. Therefore, one day traffic may progress through the corridor with little delay, while the next day travel time has doubled for no apparent reason.

By 2025, operations in most of these areas will degrade even further where no transportation improvements have been made. Figure 21 provides an illustrative summary of some of the system deficiencies discovered by this study. In this figure, the ranges of the nearly continuous segments of failing freeway movements previously described have been identified alongside a graphic of the corridor. Segments failing during the a.m. peak hour are displayed separately to the left of the figure, with a graphic of segments failing during the p.m. peak hour shown in the center. A third graphic on the right presents those segments failing during both time periods. While an analysis of a.m. peak hour conditions was not conducted for the year 2025, it was assumed that any areas currently failing would continue to do so in the future unless transportation improvement projects occurred (e.g. Stafford to I-5). It should be noted that the segments shown do not account for areas impacted by vehicle queues resulting from failing movements, which could cover a much larger area.

Looking at these graphics, it can be easily seen that the area covered by segments that already fail in 2005 and will continue to fail in 2025 is much larger than the area covered by new segments that will realized after 2005 (this is consistent with a comparison of Figures 16 and 20, which show 39 individual failing movements in 2005 and 52 in 2025). Also of interest, are the two northbound segments from Hwy 99E/McLoughlin Boulevard to Gladstone/82nd Drive and from I-84 East to Airport Way that fail during both the a.m. and p.m. peak hours.

Also identified on these graphics are areas in the corridor that have experienced crash rates higher than the statewide average for similar facilities and locations of "high-volume" interchange ramps.[19] On congested freeways, areas that consistently experience failing operation can often be linked to higher numbers of crashes. This relationship is created when drivers traveling at higher speeds encounter areas impacted by congestion where significant reductions in travel speeds have occurred. The speed differential created is often contrary to driver expectations for freeway travel, which increases the potential for crashes (typically rear-end). Potential relationships between the areas that have experienced high crash rates and the areas experiencing failing operations have been identified on the graphics. It should be noted when considering these potential relationships that the crash rates shown are not

[18] ODOT's adopted mobility standards from the *1999 Oregon Highway Plan* require operation at a volume-to-capacity ratio at or lower than 0.99 during each of the two consecutive peak hours of traffic.
[19] "High-volume" interchange ramps include all ramps experiencing peak hour volumes of 1,000 vehicles or greater.

specific to any one hour of the day and have not been separated into northbound and southbound directions.

Given the high number of failing locations on I-205, improvements to individual interchanges throughout the corridor spread out over time may have less benefit compared to improvements that include several adjacent interchanges or several miles of freeway that are undertaken concurrently or in succession. Areas for such improvements should include those identified in the graphics of Figure 21, with a priority placed on those segments failing in both the a.m. and p.m. peak hours. It may also be beneficial to select segments of the freeway that are in close proximity to local street improvements that are planned in the vicinity to maximize the total area of transportation improvements and consolidate the time period of construction to minimize public inconvenience.

Figure 21: Summary of System Deficiencies (2005 – 2025)

Chapter 3: Ramp/Surface Street Operation

Weekday AM & PM Peak Hour Interchange Crossroad Traffic Volumes (2005)

To support additional analysis of the I-205 interchange operations, traffic volumes during the weekday a.m. and p.m. peak periods were collected at the intersections on the freeway ramps at the interchange crossroads (interchange ramp terminals), as well as at all adjacent signalized intersections within 1,320 feet (¼-mile). For this analysis, a common peak hour was selected for each group of adjacent intersections. In many cases, this common peak hour did not coincide with the peak hour of each intersection in a corridor or of the mainline freeway, but reflects the overall peak hour of traffic traveling on the surface streets through the interchange system area. These weekday peak hour volumes for the a.m. and p.m. peak periods are displayed in Figures 22a through d and 23a through d, respectively.

When comparing the volume of traffic entering and leaving the freeway on and off-ramps from the intersections shown in these figures to the weekday a.m. and p.m. peak hour ramp volumes previously presented in Figures 11 and 12, the ramp volumes are often similar, but in some cases are fairly different. While some of these differences may be the result of seasonal variations between the times of data collection, it should be recognized that the volumes displayed in Figures 22 and 23 for any given group of crossroad intersections may represent a different peak hour within the peak period than was used for the mainline freeway analysis. This occurs frequently when the surface street traffic (not freeway-destined) peaks at times different than when the overall freeway system peaks.

Just as each intersection along a corridor may possess a unique peak hour, the peak hours of total entering intersection volume at an interchange ramp terminal may differ from the peak hour of the ramp or freeway served. In the previous analysis conducted for the operations of the mainline of I-205, data from the four Automatic Traffic Recorder stations was examined, revealing a common freeway weekday p.m. peak hour from 4:00 to 5:00 p.m. As this was determined to be the time period of interest for assessing freeway operations, the traffic volumes on the on and off-ramps were selected from this hour as well. However, in most cases, this time does not coincide with the hour analyzed on the surface street system, which was selected separately to account for peak conditions on the crossroad.

To illustrate the potential differences in the timing of peak volumes experienced within the I-205 corridor, Figures 24 and 25 present data taken from two interchange areas. The two cases represent conditions where: 1) the crossroad and ramp volume peak align but do not occur at the same time as the overall mainline freeway system peak, and 2) where the ramp and mainline freeway systems peak together but are not aligned with a surface street (crossroad) peak. Figure 24 displays the first condition, with traffic volume data from the OR 99E northbound on-ramp. As shown, during the hour from 4:00 p.m. to 5:00 p.m., when the freeway is experiencing peak volumes, the ramp volume is nearly at its lowest level for the peak period. However, peak ramp volumes appear to occur between 5:00 p.m. and 6:00 p.m., when the crossroad is experiencing its peak volumes.

Figure 22a: 2005 AM Peak Hour Traffic Volumes

Figure 22b: 2005 AM Peak Hour Traffic Volumes

Figure 22c: 2005 AM Peak Hour Traffic Volumes

Figure 22d: 2005 AM Peak Hour Traffic Volumes

Figure 23a: 2005 PM Peak Hour Traffic Volumes

Figure 23b: 2005 PM Peak Hour Traffic Volumes

Figure 23c: 2005 PM Peak Hour Traffic Volumes

Figure 23d: 2005 PM Peak Hour Traffic Volumes

Figure 24: OR 99E NB On-ramp volume

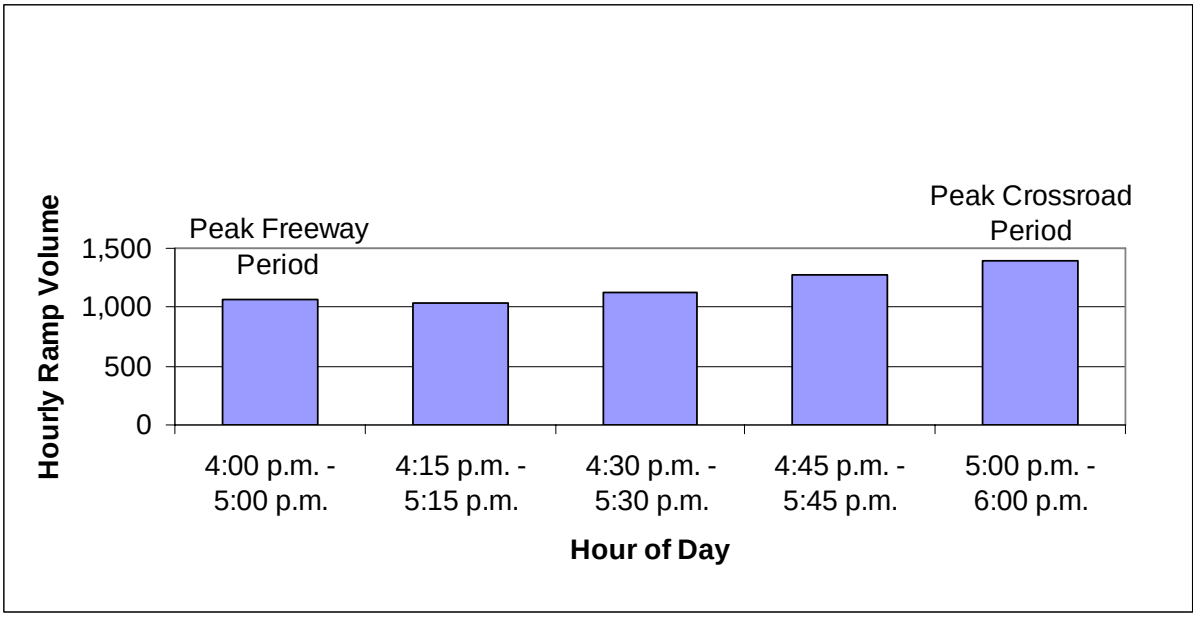
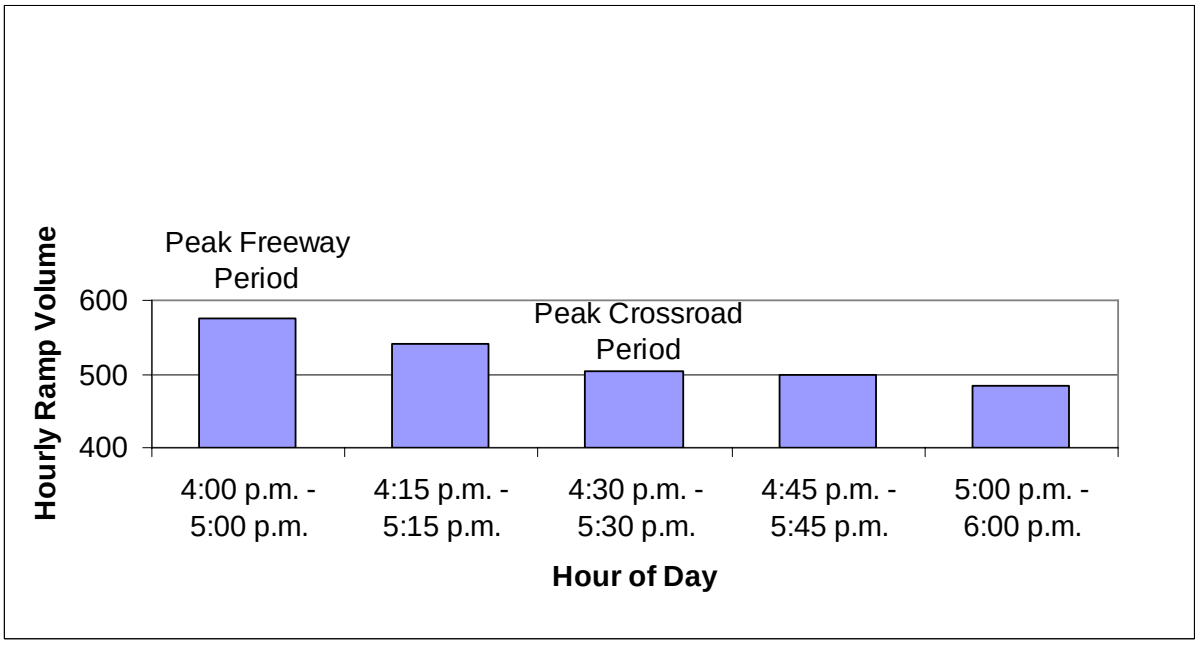


Figure 25: Milwaukie Expressway SB Off-ramp volume



In contrast, Figure 25 shows the second condition where volumes on the Milwaukie Expressway southbound off-ramp reach peak levels at the same time as the freeway mainline. In this area, the crossroad experiences peak volumes approximately 30 minutes later, after ramp volumes have dropped nearly 13%.

To best understand the system operational performance, the peak traffic of the freeway system is investigated independently from the surface street system peak hour capacity analysis. To understand the influence of varying traffic levels over the entire peak period (two or three hours), simulation of traffic operations would be recommended.

Existing (2005) Weekday AM & PM Peak Hour Interchange Crossroad Operation

To provide needed information for the analysis of the interchange crossroad intersections, an inventory of existing operating parameters was assembled through field visits and by obtaining signal timing data from various agencies. The existing lane configurations and traffic controls present at study intersections are displayed in Figures 26a through d.

The study of weekday a.m. and p.m. peak hour operations included intersection capacity analysis and queue length calculations for all intersection movements. The capacity analysis was conducted by using Synchro®, which is a program that employs the *Highway Capacity Manual*[20] methodology. Queue calculations were obtained through a series of micro-simulations using SimTraffic®. The use of both of these programs was consistent with the recommended methodology provided by ODOT[21].

The results of the intersection capacity analysis are shown in Figures 27a through d and 29a through d for the a.m. and p.m. peak hours, respectively. Both the level of service and volume-to-capacity ratio are shown as performance measures. Any intersections under state jurisdiction (ramp terminals or crossroads that are state highways) operating at a volume-to-capacity ratio greater than 0.99 and any non-state intersections operating at a level of service "E" or worse were deemed to be failing.[22] In addition, Figures 28a through d and 30a through d display the calculated 95th percentile queue length for all intersection movements during the a.m. and p.m. peak hours, respectively. Movements found to have insufficient storage to contain these queues have been highlighted.

From examining Figures 27 and 29, it is seen that most of the intersections analyzed are operating adequately during the a.m. peak hour, with only 8 of the 69 intersections shown to be failing. Many of these intersections also operate acceptably during the p.m. peak hour, but the number of failing intersections increases to 15. It should be noted that all intersections failing during the a.m. peak hour also fail during the p.m. peak hour and that 5 of these intersections are currently unsignalized with stop-control. The failing intersections have been listed below in Table 2.

[20] *Highway Capacity Manual*, Transportation Research Board, Washington, D.C., 2000.
[21] *Analysis Procedures Manual*, Oregon Department of Transportation, 2005.
[22] ODOT's adopted mobility standards from the *1999 Oregon Highway Plan* require operation at a volume-to-capacity ratio at or lower than 0.99 during each of the two consecutive peak hours of traffic. Mobility standards for the City of Portland, Clackamas County, and City of West Linn require operation at LOS "D" or better.

Table 2: Failing Intersections under Existing Conditions (2005)

AM Peak Hour	PM Peak Hour
	I-205 SB @ Killingsworth St.
	Stark St. @ 99th Ave.
	I-205 SB @ Division St.
	I-205 NB @ Powell Blvd.
	Hwy 224 @ Johnson Rd.
I-205 SB @ Hwy 212/Hwy 224*	I-205 SB @ Hwy 212/Hwy 224*
82nd Dr. @ Oatfield Rd.	82nd Dr. @ Oatfield Rd.
I-205 NB @ Hwy 213*	I-205 NB @ Hwy 213*
Hwy 213 @ Washington St.	Hwy 213 @ Washington St.
	I-205 SB @ Hwy 99E
Hwy 99E @ 14th St.	Hwy 99E @ 14th St.
10th St. @ Blankenship Rd.	10th St. @ Blankenship Rd.
I-205 NB @ 10th St.*	I-205 NB @ 10th St.*
I-205 SB @ Stafford Rd.*	I-205 SB @ Stafford Rd.*
	I-205 NB @ Stafford Rd.*

*unsignalized, stop-controlled intersection

Figures 28 and 30 show that many of the vehicle queues experienced at study intersections exceed the amount of storage currently available. This phenomenon, known as "queue spillback", can significantly reduce the capacity of a roadway by presenting temporary lane blockages, which can also be hazardous when vehicles are required to react to unexpected conditions. It should be noted that the presence of queue spillback on an intersection approach can make operating conditions worse than they may appear to be from intersection capacity analysis alone. For the consideration of interchange operations, three types of queue spillback are of primary concern: 1) spillback between ramp terminals and adjacent crossroad intersections, 2) spillback between ramp terminals, and 3) spillback on off-ramps from the ramp terminal to the mainline.

Under existing conditions, there are 7 different occurrences where adjacent intersections on the crossroad produce queues that spill back into ramp terminals and 13 occurrences where ramp terminals produce queues that spill back into adjacent intersections (see Table 3). At all of these locations, the ramp terminal to adjacent intersection spacing is less than ODOT's adopted spacing standard requiring a minimum of 1,320 feet of separation[23], which if

[23] OAR 734-051-0125 (2), Tables 5 and 6.

provided, would mitigate all of these occurrences. As shown in Table 4, less than one third of all major intersections adjacent to freeway ramp terminals currently maintain at least 1,320 feet of spacing. The ability to maintain safe and efficient traffic flow on the interchange crossroads by eliminating queue spillback through appropriate intersection spacing should be considered when evaluating potential improvement alternatives.

Table 3: Queue Spillback between Ramp Terminals and Adjacent Intersections (2005)

Ramp Terminals Blocked by Adjacent Intersection Queues		
Ramp Terminal	Adjacent Intersection	Peak Hour
I-205 SB @ Powell Blvd.	Powell Blvd. @ 92nd Ave.	PM
I-205 NB @ Powell Blvd.	Powell Blvd. @ Tri-Met Access	PM
I-205 SB @ Johnson Creek Blvd.	Fuller Rd. @ Johnson Creek Blvd.	AM
I-205 NB @ Hwy 212/Hwy 224	Hwy 212/Hwy 224 @ 82nd Dr.	AM/PM
I-205 SB @ 82nd Dr.	82nd Dr. @ Oatfield Rd.	PM
I-205 SB @ 10th St.	10th St. @ Blankenship Rd.	PM
Adjacent Intersections Blocked by Ramp Terminal Queues		
Adjacent Intersection	Ramp Terminal	Peak Hour
Division St. @ 92nd Ave.	I-205 SB @ Division St.	PM
Powell Blvd. @ Tri-Met Access	I-205 NB @ Powell Blvd.	AM/PM
Fuller Rd. @ Johnson Creek Blvd.	I-205 SB @ Johnson Creek Blvd.	AM/PM
92nd Ave. @ Johnson Creek Blvd.	I-205 NB @ Johnson Creek Blvd.	AM
Hwy 212/Hwy 224 @ 82nd Dr.	I-205 NB @ Hwy 212/Hwy 224	AM/PM
82nd Dr. @ Oatfield Rd.	I-205 SB @ 82nd Dr.	PM
Hwy 99E @ Dunes Dr.	I-205 SB @ Hwy 99E	AM/PM
10th St. @ Blankenship Rd.	I-205 SB @ 10th St.	AM/PM

Table 4: Existing Crossroad Intersection Spacing

Spacing between Ramp and Adjacent Intersection (feet)	Number of Occurrences
< 500	7
500 - 1300	22
1300 - 2000	5
> 2000	7

In addition to the presence of queue spillback between ramp terminals and adjacent intersections, there are also 13 interchanges where the storage lengths between the interchange ramp terminals are inadequate to accommodate stopped vehicles (see Table 5). Where these deficiencies can not be improved through operational enhancements such as signal timing adjustments and lane restriping, potential improvement alternatives for consideration could include structure widening for additional lanes, use of loop ramps to eliminate left turns, or possibly reconfiguring the interchange to better accommodate demands.

Table 5: Queue Spillback between Ramp Terminals (2005)

Interchange	Movements Experiencing Spillback	
	AM Peak Hour	PM Peak Hour
Airport Way		EB LT*
Killingsworth St.	WB LT	WB LT, EB LT
Glisan St.		WB LT
Division St.		WB LT, EB LT
Powell Blvd.	EB LT, EB THRU	WB THRU, EB LT, EB THRU
Johnson Creek Blvd.	WB LT	WB LT
Sunnyside Rd.	WB LT	WB LT, EB LT*
Sunnybrook Blvd.	WB LT*	WB LT*, EB LT*
Hwy 224 (SB Side)	EB LT, EB THRU	WB LT, EB LT, EB THRU
Hwy 224 (NB Side)	EB LT	EB LT
Hwy 212/224	WB LT, EB LT, EB THRU	WB LT, WB THRU, EB LT, EB THRU
82nd Dr. (Gladstone)		WB LT, WB THRU
Hwy 99E		SB LT
Hwy 43	NB LT	NB LT

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound

LT = Left, THRU = Through

* Available storage would be adequate with improved lane balance between dual turn lanes.

Queue spillback on interchange off-ramps not only reduces the interchange capacity, but can create a significant safety hazard as well. When vehicle queues extend beyond the area of the off-ramp intended to be used for storage, they begin to decrease the area of the off-ramp needed for vehicle deceleration from freeway operating speeds, causing drivers to brake at uncomfortable speeds and increasing the risk of a crash. As the degree of spillback gets

greater, the available deceleration distance get smaller, and in severe cases can even result in an obstruction on the freeway itself. Interchange off-ramps found to be currently experiencing excessive queues are listed in Table 6. Potential improvements for consideration that may mitigate these conditions could include adjustments to signal timing or intersection lane configurations, ramp widening to add storage lanes, ramp lengthening, or new interchange configurations to better serve demand.

Table 6: Queue Spillback on Interchange Off-Ramps (2005)

Interchange Off-ramp	Peak Hour
I-205 SB (slip) @ Killingsworth St.	AM
I-205 SB @ Glisan St.	PM
I-205 SB @ Division St.	PM
I-205 NB @ Powell Blvd.	PM
I-205 NB @ Johnson Creek Blvd.	AM/PM
I-205 SB @ Sunnyside Rd.	AM/PM
I-205 SB (loop) @ Hwy 224	AM/PM

Figure 26a: Existing Lane Configuration and Traffic Control

Figure 26b: Existing Lane Configuration and Traffic Control

Figure 26c: Existing Lane Configuration and Traffic Control

Figure 26d: Existing Lane Configuration and Traffic Control

Figure 27a: Existing AM Peak Hour Intersection Performance

Figure 27b: Existing AM Peak Hour Intersection Performance

Figure 27c: Existing AM Peak Hour Intersection Performance

Figure 27d: Existing AM Peak Hour Intersection Performance

Figure 28a: Existing AM Peak Hour 95th Percentile Queue & Storage Length

Figure 28b: Existing AM Peak Hour 95th Percentile Queue & Storage Length

Figure 28c: Existing AM Peak Hour 95th Percentile Queue & Storage Length

Figure 28d: Existing AM Peak Hour 95th Percentile Queue & Storage Length

Figure 29a: Existing PM Peak Hour Intersection Performance

Figure 29b: Existing PM Peak Hour Intersection Performance

Figure 29c: Existing PM Peak Hour Intersection Performance

Figure 29d: Existing PM Peak Hour Intersection Performance

Figure 30a: Existing PM Peak Hour 95th Percentile Queue & Storage Length

Figure 30b: Existing PM Peak Hour 95th Percentile Queue & Storage Length

Figure 30c: Existing PM Peak Hour 95th Percentile Queue & Storage Length

Figure 30d: Existing PM Peak Hour 95th Percentile Queue & Storage Length

Future (2025) Weekday PM Peak Hour Interchange Crossroad Operation

The study of future conditions on the interchange crossroads was limited to the intersections at the ramp terminals during the weekday p.m. peak hour. Future traffic volumes for the year 2025 were forecasted by applying an increment of the growth shown between the Metro Regional Travel Demand Models for the base year 2000 and future year 2025 to actual counts collected in 2005. The network assumptions included in the 2025 model were compared to the assumptions for future improvements previously described to ensure that there was reasonable similarity prior to use. The forecasted turn movements for the ramp terminal intersections are displayed in Figures 31a through d.

For this analysis, the same intersection geometry and traffic controls used for the analysis of existing conditions were assumed to be present, unless a project to improve capacity was currently planned. A list of intersections affected by planned improvements is provided below, with the resulting lane configurations and traffic controls used for the analysis of conditions in 2025 shown in Figures 32a through d.

- Airport Way @ I-205 SB (added southbound right turn lane)
- Airport Way @ I-205 NB (added eastbound to northbound fly-over ramp)
- Powell Blvd. @ I-205 SB (added westbound to southbound left turn)
- Johnson Creek Blvd. @ I-205 SB (added southbound loop on-ramp)
- Johnson Creek Blvd. @ I-205 NB (added northbound slip on-ramp)
- Hwy 224/Milwaukie Expressway (Sunrise interchange assumed to be constructed)
- Hwy 212/224 @ I-205 SB & NB (added eastbound through lane)
- 10th St. @ I-205 NB (added traffic signal)

Intersection operations and queuing calculations were again provided for future conditions in 2025, using the same methodology employed for the analysis of existing conditions. Figures 33a through d display the results of the capacity analysis for the interchange ramp terminals, with failing intersections highlighted.[24] Compared to the 9 interchange ramp terminals found to be failing during the p.m. peak hour today, the number of interchange ramp terminals anticipated to fail by 2025 will increase to 14 (out of a total of 42 intersections), including all 5 unsignalized, stop-controlled intersections. The failing intersections have been listed below in Table 7. Note that all ramp terminals found to be failing during the 2005 p.m. peak hour were also found to be failing in 2025, with the exception of the intersection with the I-205 northbound ramp on 10th Street, which was improved with a traffic signal.

[24] As with the existing conditions analysis, all ramp terminal intersections operating at volume-to-capacity ratios greater than 0.99 were considered to be failing.

Table 7: Failing Intersections under Future Conditions (2025)

PM Peak Hour	
I-205 SB @ Killingsworth St.	I-205 NB @ 82nd Dr.
I-205 SB @ Glisan St.	I-205 SB @ Hwy 213*
I-205 SB @ Division St.	**I-205 NB @ Hwy 213***
I-205 NB @ Powell Blvd.	**I-205 SB @ Hwy 99E**
I-205 NB @ Sunnyside Rd.	I-205 SB @ Hwy 43
I-205 SB @ Hwy 212/Hwy 224*	**I-205 SB @ Stafford Rd.***
I-205 SB @ 82nd Dr.	**I-205 NB @ Stafford Rd.***

*unsignalized, stop-controlled intersection

Bold type indicates failure in both 2005 and 2025.

The calculated 95th percentile vehicle queues for all intersection movements during the 2025 p.m. peak hour are shown in Figures 34a through d. As with existing conditions, queue spillback into adjacent travel lanes and intersections continues to be a common problem that will need to be addressed during the development of improvement alternatives through new intersection design and increased intersection spacing.

As shown below in Table 8, all adjacent intersections that were impacted by queue spillback from interchange ramp terminals during the p.m. peak hour in 2005 continue to be impacted in 2025, with the intersections on Sandy Boulevard at 102nd Avenue, Glisan Street at 99th Avenue, Stark Street at 99th Avenue, Powell Boulevard at 92nd Avenue, Sunnyside Road at Stevens Road, and Highway 43 at Hood Street being added to the list. Because the future year analysis only considered the interchange ramp terminals during the p.m. peak hour, future queuing during the a.m. peak hour and the impacts on ramp terminals due to adjacent intersection queues are not available.

At 8 of these locations, intersection separation meeting ODOT's adopted spacing standard of at least 1,320 feet would be adequate to mitigate the queue spillback. However, at the other 5 locations (Division Street at 92nd Avenue, Powell Boulevard at 92nd Avenue, Powell Boulevard at Tri-Met Access, Sunnyside Road at Stevens Road, and Highway 43 at Hood Street) increased separation ranging from 1,400 to 3,000 feet would be required.

Table 8: Queue Spillback between Ramp Terminals and Adjacent Intersections (2025)

Adjacent Intersections Blocked by Ramp Terminal Queues		
Adjacent Intersection	Ramp Terminal	Peak Hour*
Sandy Blvd. @ 102nd Ave.	I-205 NB @ Killingsworth St.	PM
Glisan St. @ 99th Ave.	I-205 NB @ Glisan St.	PM
Stark St. @ 99th Ave.	I-205 NB @ Stark St.	PM
Division St. @ 92nd Ave.	**I-205 SB @ Division St.**	**PM**
Powell Blvd. @ 92nd Ave.	I-205 SB @ Powell Blvd.	PM
Powell Blvd. @ Tri-Met Access	**I-205 NB @ Powell Blvd.**	**PM**
Fuller Rd. @ Johnson Creek Blvd.	**I-205 SB @ Johnson Creek Blvd.**	**PM**
Sunnyside Rd. @ Stevens Rd.	I-205 NB @ Sunnyside Rd.	PM
Hwy 212/Hwy 224 @ 82nd Dr.	**I-205 NB @ Hwy 212/Hwy 224**	**PM**
82nd Dr. @ Oatfield Rd.	**I-205 SB @ 82nd Dr.**	**PM**
Hwy 99E @ Dunes Dr.	**I-205 SB @ Hwy 99E**	**PM**
Hwy 43 @ Hood St.	I-205 SB @ Hwy 43	PM
10th St. @ Blankenship Rd.	**I-205 SB @ 10th St.**	**PM**

*AM Peak Hour not analyzed for future conditions.

Bold type indicates spillback in both 2005 and 2025.

Table 9 lists the interchanges that will experience queue spillback between the ramp terminal intersections during the p.m. peak hour in 2025. Although the 4 interchanges at Airport Way, Johnson Creek Boulevard, Highway 224, and Highway 212/224 that experienced queue spillback in 2005 have been improved, the number of interchanges impacted has increased from 13 to 14. As noted previously, potential improvements for mitigating these conditions that should be investigated include operational enhancements such as signal timing adjustments and lane restriping, structure widening for additional lanes, use of loop ramps to eliminate left turns, or possibly reconfiguring the interchange to better accommodate demands.

Table 9: Queue Spillback between Ramp Terminals (2025)

Interchange	Movements Experiencing Spillback (PM Peak Hour)
Killingsworth St.	**WB LT, EB LT**
Glisan St.	**WB LT**
Stark St.	WB LT, WB THRU
Washington St.	EB THRU
Division St.	**WB LT, EB LT**
Powell Blvd.	**EB LT, EB THRU**
Sunnyside Rd.	**WB LT, EB LT***
Sunnybrook Blvd.	**WB LT, EB LT**
82nd Dr. (Gladstone)	**WB LT, WB THRU**, EB THRU EB RT
Hwy 213	SB LT
Hwy 99E	**SB LT**
Hwy 43	**NB LT**
10th St.	SB LT
Stafford Rd.	SB LT

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound

LT = Left, THRU = Through, RT = Right

* Available storage would be adequate with improved lane balance between dual turn lanes.

Bold type indicates spillback in both 2005 and 2025.

Interchange off-ramps projected to experience excessive queues are listed below in Table 10. Note that all off-ramps experiencing excessive queuing under existing conditions during the p.m. peak hour will continue to do so, with the exception of the northbound off-ramp at Johnson Creek Boulevard and the southbound loop off-ramp at Highway 224, which have been mitigated through planned improvement projects. Potential improvements for consideration that may mitigate these conditions could include adjustments to signal timing or intersection lane configurations, ramp widening to add storage lanes, ramp lengthening, or new interchange configurations to better serve demand.

Table 10: Queue Spillback on Interchange Off-Ramps (2025)

Interchange Off-ramp (PM Peak Hour)	
I-205 SB (loop) @ Killingsworth St.	I-205 SB @ Hwy 43
I-205 SB @ Glisan St.	I-205 SB @ 10th St.
I-205 SB @ Division St.	I-205 SB @ Stafford Rd.
I-205 NB @ Powell Blvd.	I-205 NB @ Stafford Rd.
I-205 SB @ Sunnyside Rd.	

Bold type indicates spillback in both 2005 and 2025.

Figure 31a: 2025 PM Peak Hour Traffic Volumes

Figure 31b: 2025 PM Peak Hour Traffic Volumes

Figure 31c: 2025 PM Peak Hour Traffic Volumes

Figure 31d: 2025 PM Peak Hour Traffic Volumes

Figure 32a: 2025 Lane Configuration and Traffic Control

Figure 32b: 2025 Lane Configuration and Traffic Control

Figure 32c: 2025 Lane Configuration and Traffic Control

Figure 32d: 2025 Lane Configuration and Traffic Control

Figure 33a: 2025 PM Peak Hour Intersection Performance

Figure 33b: 2025 PM Peak Hour Intersection Performance

Figure 33c: 2025 PM Peak Hour Intersection Performance

Figure 33d: 2025 PM Peak Hour Intersection Performance

Figure 34a: 2025 PM Peak Hour 95th Percentile Queue & Storage Length

Figure 34b: 2025 PM Peak Hour 95th Percentile Queue & Storage Length

Figure 34c: 2025 PM Peak Hour 95th Percentile Queue & Storage Length

Figure 34d: 2025 PM Peak Hour 95th Percentile Queue & Storage Length

Chapter 4: Summary of Background Documents

A number of existing documents and studies related to other projects in and around the corridor were obtained from ODOT and reviewed to identify issues relevant to the future of I-205. These documents have been listed below with brief summaries and comments.

I-205 Reconnaissance Report, Stafford Rd. – Pacific Highway 1E (June 2003)

This study was conducted to determine the feasibility, approximate cost, and conceptual engineering configuration of an added lane of capacity in each direction on I-205 between the Stafford Road and OR 99E interchanges. The traffic analysis conducted included an examination of existing (2001) and future (2025) conditions. Separate peak hours were used for analysis of the northbound and southbound directions of travel, with volumes from the 5:00 – 6:00 p.m. hour used for the northbound direction and volumes from the 7:00 – 8:00 a.m. hour used for the southbound direction.

Under existing conditions, it was found that in the northbound direction all ramp diverge and merge junctions within the study area operated at level of service (LOS) D or better, with the exception of the Oswego Highway off-ramp and loop on-ramp, which operated at LOS E. The Oswego Highway loop on-ramp appeared to be impacted by a substandard acceleration lane. In addition, it was noted that the northbound traffic flow rate was being constrained by a bottleneck at the I-5/I-205 interchange caused by capacity deficiencies at the I-5 northbound and southbound ramps to I-205. Because of these deficiencies, the actual traffic demand in the peak hour is higher than the traffic volume measured through the study area. Should sufficient capacity be added on the I-5 ramps and along I-205 west of Stafford Road, traffic volumes on I-205 east of Stafford Road would increase to reflect the true demand.

In the southbound direction, the section between the OR 99E off-ramp and the Oswego Highway interchange currently operates at LOS D, but the section between the Oswego Highway and Stafford Road interchanges operates at LOS F as the two-lane freeway fails to accommodate the increased traffic volumes. In addition, it was noted that the Oswego Highway on-ramp merge operates at LOS F, mainly because of the uphill grade and high truck percentage on the freeway.

Under the future year (2025) scenario, additional improvements beyond the proposed I-205 widening were assumed to be present to address the bottleneck between I-5 and Stafford Road. The improvements included:

- Construction of an auxiliary lane on I-5 in each direction between the Stafford/North Wilsonville interchange and the I-205 interchange (not currently identified in the Regional Transportation Plan); and
- Construction of a third lane on I-205 in each direction from I-5 to Stafford Road.

The proposed project to widen I-205 between Stafford Road and OR 99E was assumed to include a third lane in each direction. In the northbound direction, the third lane would be a

continuation of the third lane added from the I-5 to Stafford Road section. The existing northbound on-ramp from OR 99E would operate under a merge condition as the third through lane northbound would continue through the OR 99E interchange and connect with the existing northbound three-lane section north of the OR 99E on-ramp. The third through lane southbound would be developed by extending the existing outside lane immediately north of the off-ramp to OR 99E through the Stafford Road interchange. In addition, there would be an auxiliary lane in each direction between the Oswego Highway and OR 99E interchanges as currently exists.

With these improvements in place in 2025, the northbound and southbound traffic operations were analyzed again. In the northbound direction, the weaving area between the Oswego Highway and OR 99E interchanges was found to operate at LOS E. Examining this section further, it was noted that LOS D could be obtained by providing a two-lane off-ramp to OR 99E. However, with the freeway modeled with three-lanes and no auxiliary lane, the operation would degrade to LOS F. In addition, it was found that the OR 99E on-ramp merge would operate at LOS F due to a downstream capacity deficiency that could be mitigated by adding a fourth lane on the freeway north of the OR 99E on-ramp. All other ramp junctions within the study area would operate at LOS D.

In the southbound direction, the weaving area between the OR 99E and Oswego Highway interchanges was found to operate much like the same area in the northbound direction with a LOS E as proposed and improvement to LOS D if a two-lane off-ramp to Oswego Highway is provided. Again, removing the auxiliary lane and leaving only a three-lane section would result in LOS F. In addition, the OR 99E off-ramp diverge would operate at LOS E. All other ramp junctions would operate at LOS D.

In summary, it was concluded that the proposed widening of I-205 to include three through lanes in each direction between Stafford Road and OR 99E would be able to accommodate traffic volumes in 2025. Also, it was recommended that the existing auxiliary lanes between the Oswego Highway and OR 99E interchanges be retained and that two-lane off-ramps be provided at the southbound Oswego Highway exit and northbound OR 99E exit. It was also concluded that the addition of a third through lane on I-205 southbound between the Oswego Highway and 10th Street interchanges is critical, as it would provide a climbing lane for slow-moving trucks that currently exacerbate congestion in this section.

I-205 Full Reconnaissance Study Work Plan

The work plan for the I-205 Full Reconnaissance Study provides the associated goals, approach, scope, and staffing desired for this effort. Key elements of the plan are described below.

The goals of the I-205 Full Reconnaissance Study are:

- Gather all existing technical information about the corridor into one document;
- Discover and describe in general terms problem areas or constraints within the corridor;

- Provide easily accessed baseline information that can be utilized in subsequent corridor studies, interchange studies, financial investment strategy planning, and/or early scoping for specific construction projects;
- Share information with local jurisdictions and other stakeholders; and
- Provide preliminary cost estimates for items in the RTP.

To meet these goals, the traffic analysis conducted for this study will collect data throughout the I-205 corridor describing traffic volumes, crash history, freight usage, and transit activity. This information will be provided in easy to read graphics for future reference and used to analyze corridor operations and identify areas in need of improvement. The information contained in the final report will then be used to develop preliminary improvements and associated cost estimates.

In conducting this study, the corridor will be separated in two segments: a north segment from Sunnyside Road to the State line and a south segment from I-5 to Sunnyside Road. By breaking the corridor into two study areas, work tasks can be more easily scheduled and completed and obtaining comments from stakeholders will be simplified.

The work scope includes a list of Regional Transportation Plan (RTP) Constrained improvements and "Hot Spots" to be evaluated for constructability and feasibility by the reconnaissance study. The traffic analysis conducted will need to focus on these areas to provide needed information for preliminary design. These improvements are shown below.

Item	***Improvement***	***RTP*** ***Constrained***	***"Hot Spot"***
A.	Auxiliary lanes between Stafford Road and I-5: Northbound I-5 on-ramp to northbound I-205 – widen to two lanes.		X
B.	Auxiliary lanes between Stafford Road and I-5: Southbound on-ramp to I-5 widening.	X	
C.	Auxiliary lanes between Stafford Road and I-5: three lanes from Stafford Road to I-5.		X
D.	Auxiliary lane southbound from OR99E to 10th Street off ramp.		X
F.	Reconstruction of I-205 southbound off-ramp to highway 213 to provide more storage and enhance operation and safety.	X	
G.	Coordinate with Highway 213 Urban Corridor Study (complete) and I-205/Highway 213 interchange alternatives analysis and NEPA work. (RTP #5016 and 5017)	X	
I.	Reconfigure intersection termini to allow OR224 SB exit from I-205 to use double left at Milwaukie Expressway.		X
J.	Reconfigure 82nd Drive intersection by adding double left turns both northbound and southbound to reduce		X

	phase time for north/south movement.		
K.	Add northbound and southbound auxiliary lanes between Powell and Foster ramps.	X	X
L.	At Johnson Creek Blvd, rebuild ramps and termini in the southbound direction to alleviate closely spaced signalized intersections. Add northbound slip ramp to simplify ramp termini operation.		X
M.	Lengthen southbound on-ramp on frontage road at Glisan, to provide adequate acceleration distance and storage for ramp meter operation.		X
N.	Evaluate modifications to the existing overpass at Powell, including full access ramps to and from I-205. Address impacts to the interchange influence area along Powell, Division, and 92nd Avenue.	X	X
O.	New I-205 NB on-ramp at I-205/Airport Way interchange; modify signing, striping channelization and signal timing. Coordinate with right lane back up onto bridge created by SR 14 interchange in Washington.	X	
P.	Widen I-205 SB on-ramp at Airport Way; modify signing, striping channelization and/or signal timing for F.	X	

Completion of the traffic analysis conducted will be among the first steps for this study. This work will be performed prior to preliminary design to provide guidance on interchange layout. This will include both existing conditions analysis and future 2025 conditions (with potential update to 2030 at a later time). Future analysis will include all RTP Constrained projects and will assume a three lane section from I-5 to OR 99E and a four lane section from OR 99E to the Glenn Jackson Bridge. Through this work, key improvements will be recommended in two reports: one for the North segment and one for the South segment.

SE 82nd Avenue Corridor Study

The purpose of this study was to evaluate capacity constraints on the SE 82nd Avenue corridor from approximately SE Johnson Creek Boulevard to SE Sunnybrook Road. No direct improvements were considered along I-205 or at the interchanges near the study area. Improvements along SE 82nd Avenue (in the long term) could eventually allow for alternative travel paths for trips that would use I-205 and could reduce the potential trips along I-205.

South Corridor Final Environmental Impact Statement

The South Corridor Final Environmental Impact Statement was focused on evaluating the impacts of operating a new Light Rail alignment parallel to I-205 from the Gateway Regional Center south to the Clackamas Regional Town Center. The new light rail alignment would add a number of park-and-ride facilities along the I-205 corridor that would support the use of light rail. A few potential improvements to interchanges were recommended to allow for

adequate traffic operations within 20 years, however many of the improvements were to intersections surrounding interchanges, not the interchange themselves. The following list summarizes these improvements specific to the interchanges:

- SE Sunnyside Road/I-205 southbound on/off-ramp – optimize signal timing, and
- SE Johnson Creek Boulevard interchange – Reconstruct interchange to allow for partial cloverleaf design eliminating the eastbound and westbound left turn access to I-205 southbound and northbound on-ramps. Alternative access would be via loop ramps.

Port of Portland – Airport Way Improvements

The Port of Portland has identified improvements at the I-205/Airport Way interchange. The improvements consist of:

- An additional I-205 southbound off-ramp right turn lane/pocket to Airport Way westbound; and
- An eastbound to northbound I-205 on-ramp improvement either via a flyover or a loop-ramp. This improvement would remove the existing dual left turns from eastbound Airport Way to northbound I-205.

Sunrise Corridor NEPA Project

The purposed and goal of this study is to develop alternatives for the stretch of Highway 212/224 from I-205 to/from Rock Creek Junction. The alternatives would help address congestion along the existing corridor by constructing a new corridor that is an extension from the Milwaukie Expressway to the east to connect with the existing alignment of Hwy 212/224. Currently the project is in the phase of developing alternatives to take forward into the Draft Environmental Impact Statement, and is forecasted to select alternatives in the Fall of 2006. Initial concepts focus on a proposed interchange via the extension of the Milwaukie Expressway with I-205.

Phase 3 Preservation Project Traffic Report

This project is located along I-205 from mile post 0.00 to mile post 8.80 (approximately I-5 to the south up to the Willamette River Bridge). The project is a pavement perseveration project consisting of an overlay to the existing roadway. The project also proposes to add auxiliary lanes in the northbound and southbound directions. The northbound auxiliary lane would start at I-5 and stop at the Stafford Road interchange. In the southbound direction the auxiliary lane would start from the Stafford Road on-ramp and continue on to connect to the third lane on I-205 located at the SW 65th Avenue overpass.

I-205 Strategic Corridor Pre-Design Study: Access Point Decision Report

The purpose of this study was to implement improvements along I-205 between the interchanges at SR 14 and NE 83rd Street. This is outside the study area for the I-205 Reconnaissance study and therefore improvements do not directly impact this analysis.

I-5/99W Connector Study

There is very little information available on this study. It is expected that by December 2005 more information will be available on findings related to this study.