APPENDIX L

CAREER TECHNICAL EDUCATION STUDY

DATE: MARCH 2022

PCC Career and Technical Education (CTE) Enrollment Study

ECONorthwest

ECONOMICS · FINANCE · PLANNING

Background and purpose

- For selected Career and Technical Education (CTE) pathways at Portland Community College (PCC), ECONorthwest conducted a study of enrollment patterns by geography and prepared enrollment projections using PCC-provided student-level data.

- These analyses can help guide planning for future space needs and other College initiatives.

Selected CTE pathways

For facilities planning purposes, PCC asked ECONorthwest to identify and focus on the following pathways:

- Healthcare and Emergency Professions
- Construction, Manufacturing Tech, and Transportation (CMTT)
  - Automotive Service
  - Diesel Service
  - Building Construction Technology

Takeaways

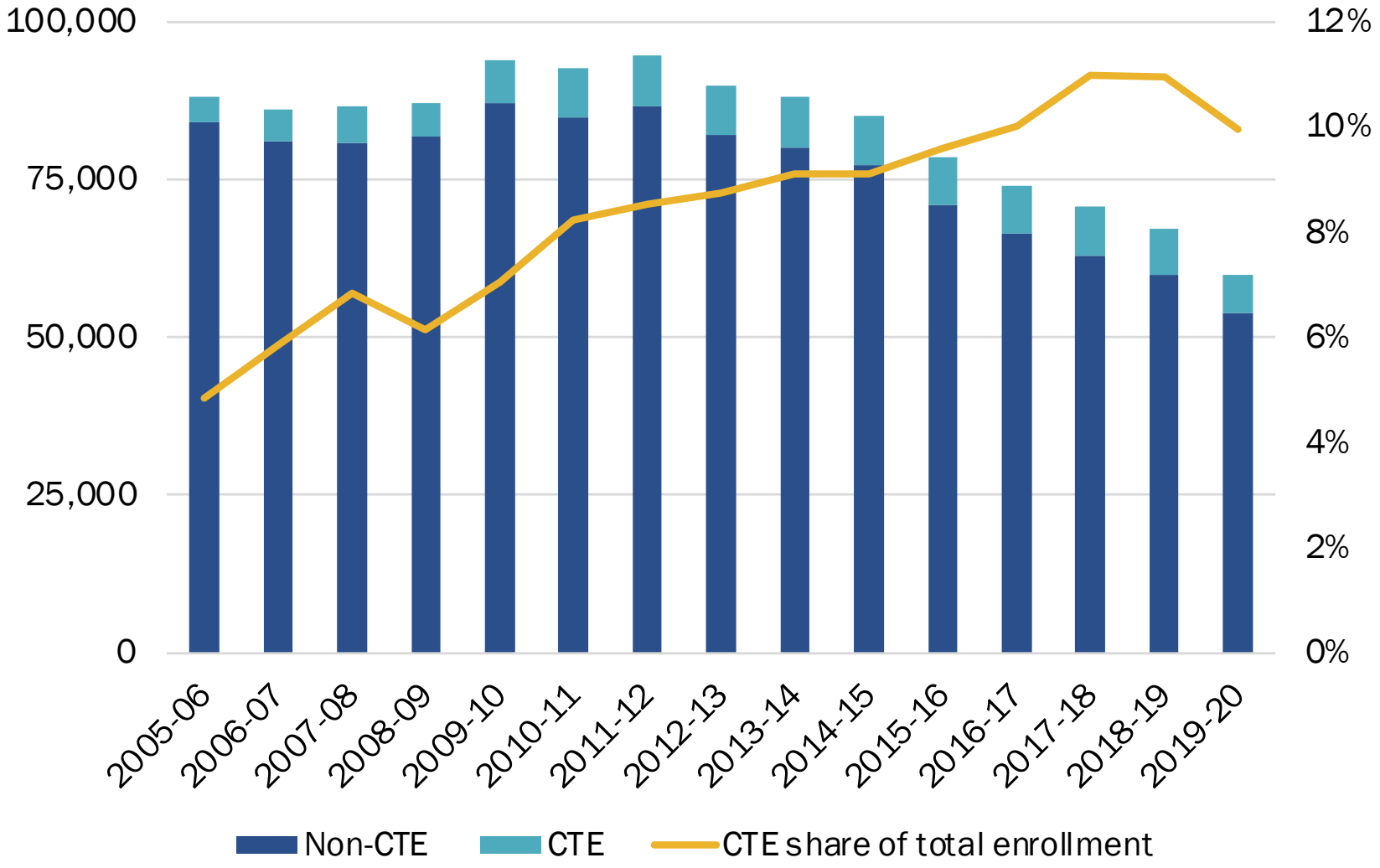
- Enrollment in the selected CTE pathways has risen since the mid-2000s and remained relatively steady until the 2019-20 academic year
- The selected CTE pathways make up about 10 percent of total enrollment, increasing from 5 percent in 2005-06
- The distribution of enrollment across the selected pathways has been stable over time
- Enrollees in the selected CTE pathways, and jobs relevant to these pathways, are distributed across the region
- Pathway-specific enrollment projections and the gap analysis suggest room for PCC programs to grow, through increased enrollment as well as higher completion rates

PCC data

- PCC provided ECONorthwest with anonymized student- and course-level data for academic years 2005-06 through 2019-20.
- These data included all courses students had taken as well as student demographic characteristics, including the zip code (either 5- or 9-digit, also known as zip+4) of the student's residence.
- Pathways were identified using program information available on PCC's website and were refined to exclude general education and other less relevant courses.
- Enrollees were assigned to pathways based on the pathway to which most of their credits were assigned.
- Enrollment projections are based on credit-hour based FTE, which differs from the clock-hour based FTE that PCC reports to the state.[1]

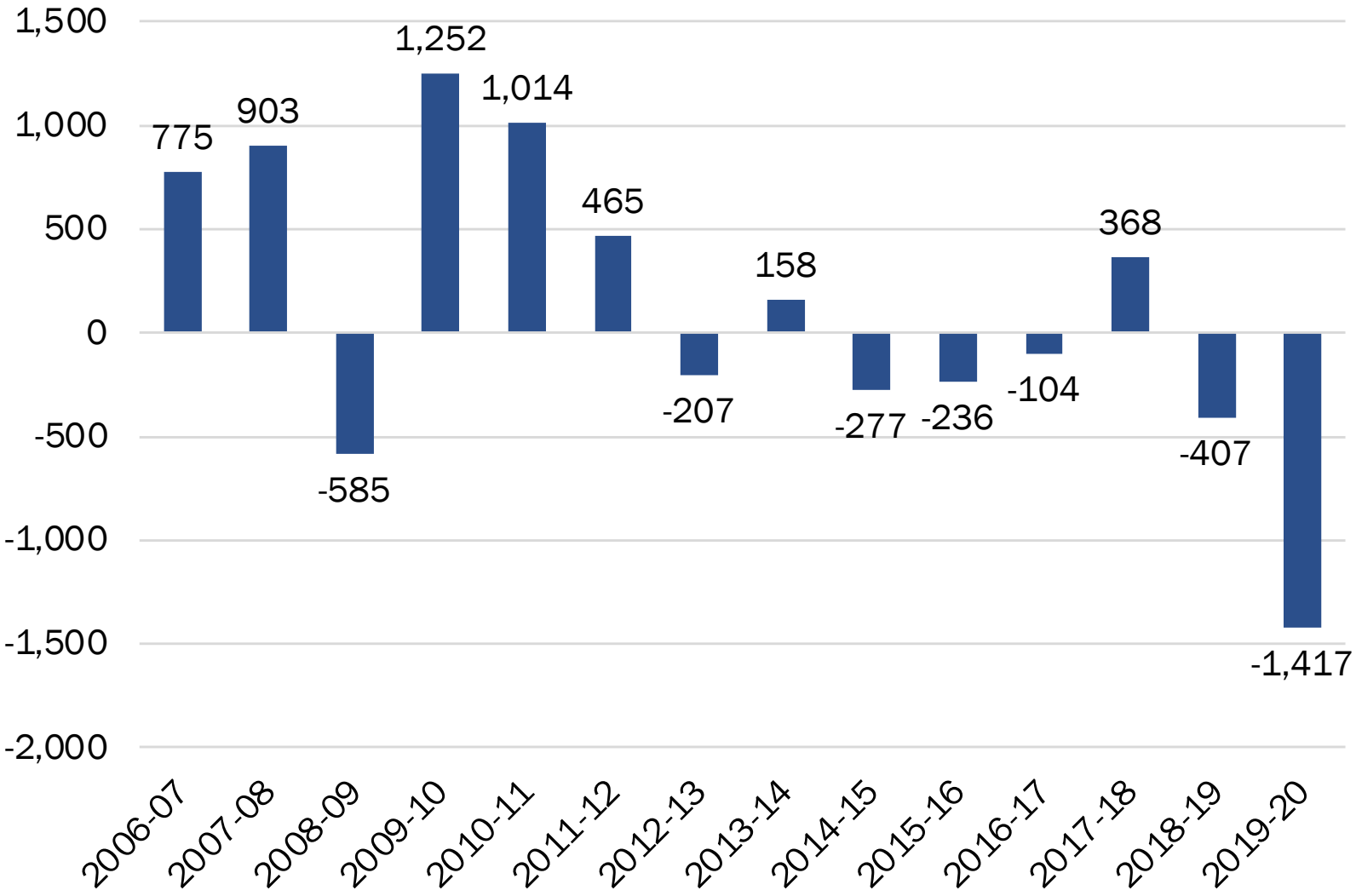
Career and Technical Education Enrollment and Completions

Selected CTE enrollment compared to total



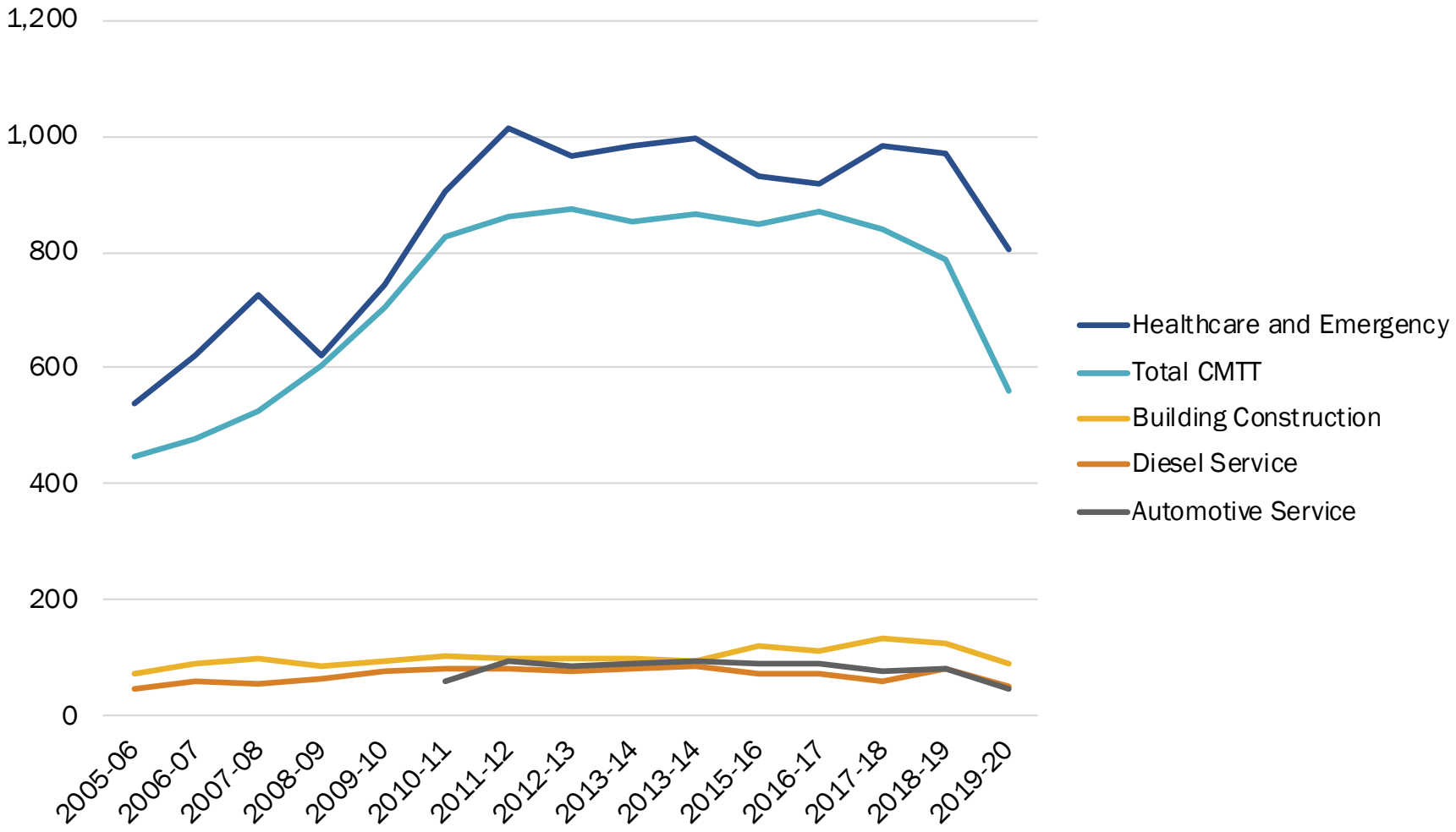
"CTE" encompasses the selected pathways of interest and is not inclusive of all CTE enrollment at PCC.
Source: ECONorthwest analysis of PCC student-level data.

Absolute change in selected CTE enrollment



Source: ECONorthwest analysis of PCC student-level data.

Selected pathway FTE over time

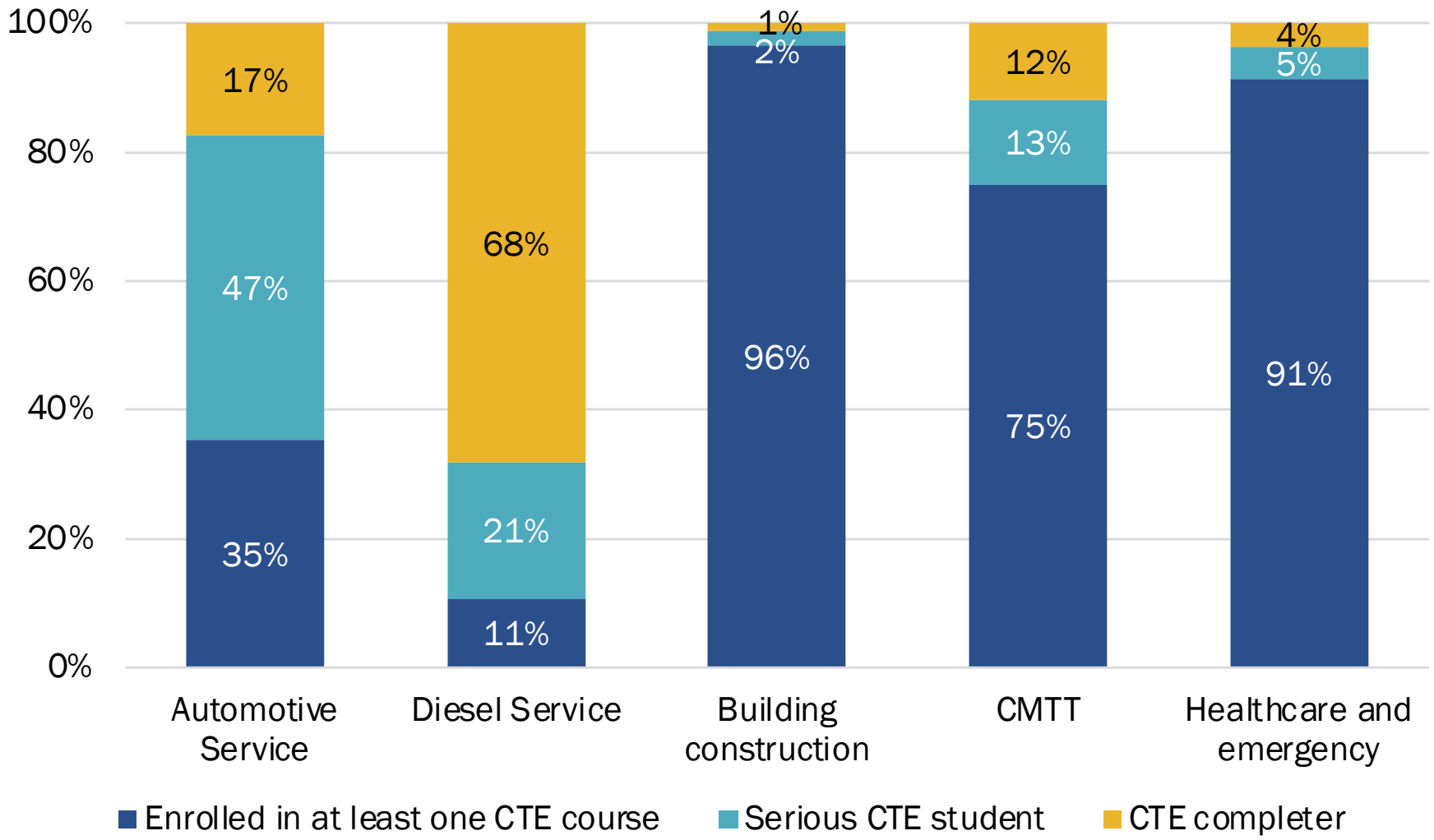


Source: ECONorthwest analysis of PCC student-level data

CTE enrollment intensity

- We defined three levels of CTE intensity
  1. CTE enrollee – Student enrolled in at least one CTE course within the academic year
  2. Serious CTE enrollee – Student enrolled in at least the median number of credits (pooled for 2013-14 through 2018-19) for certificate completers within each relevant pathway
  3. CTE completer – Student completed in a selected CTE pathway within the academic year

CTE enrollment intensity by pathway, 2018-19



Source: ECONorthwest analysis of PCC student-level data

Pathway Enrollment Geography and Projections

Roadmap for each pathway

1. Geography of enrollment
2. Jobs distribution
3. Projections and gaps

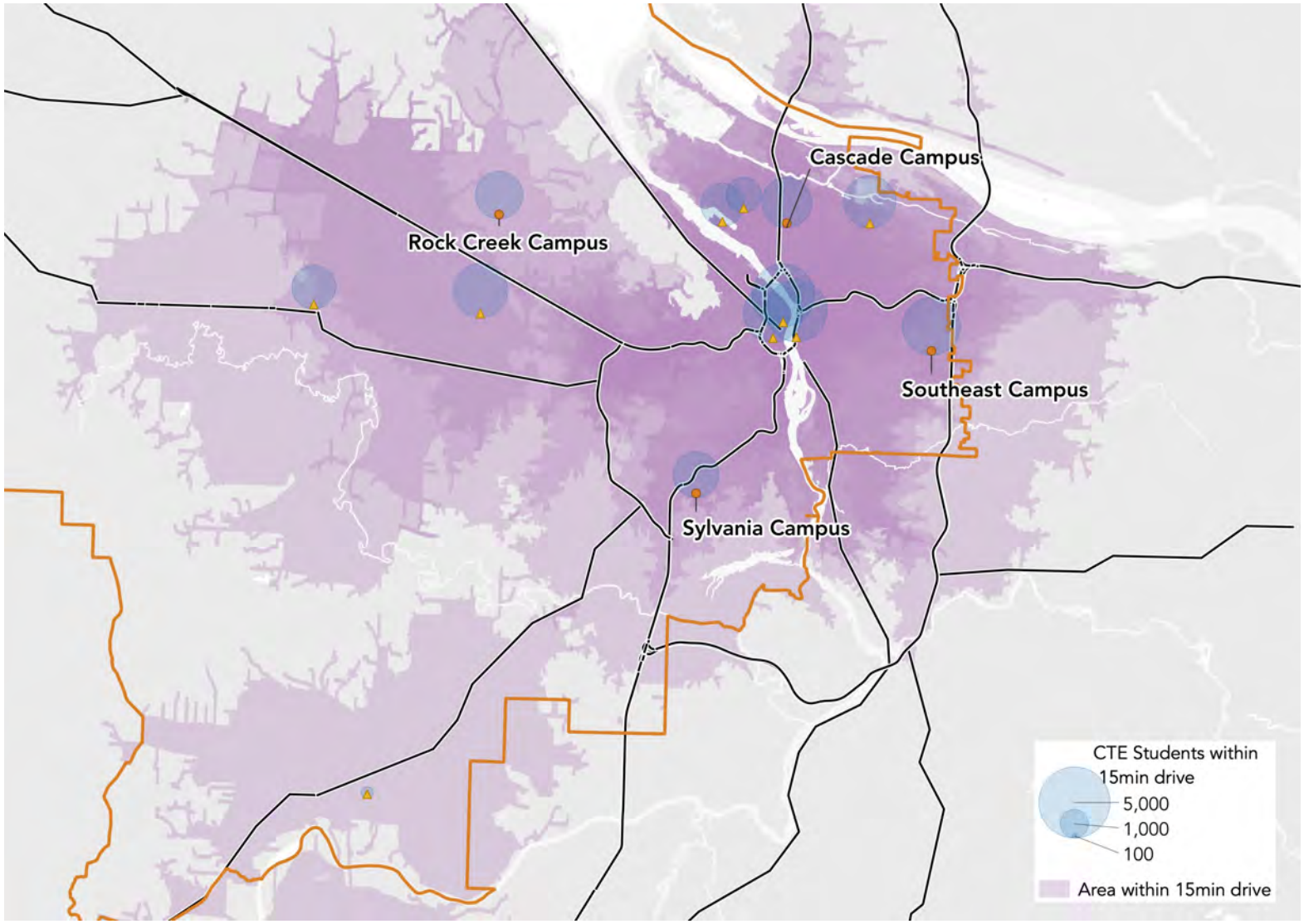
Note about the enrollment projections

- We produced high and low projections based on historical CTE enrollment and the growth rate derived from our previously completed enrollment projections.

- The high and low projections provide a potential range for how CTE enrollment may perform in the future. Future enrollment will depend on many things, including recovery from the COVID-19 pandemic.
  - **High projections:** High projections were produced using CTE enrollment in 2018-19 as the base and applying growth rates from previously completed enrollment projections.
  - **Low projections:** Low projections were produced using CTE enrollment in 2019-20 as the base and applying growth rates from previously completed enrollment projections.

Healthcare and Emergency

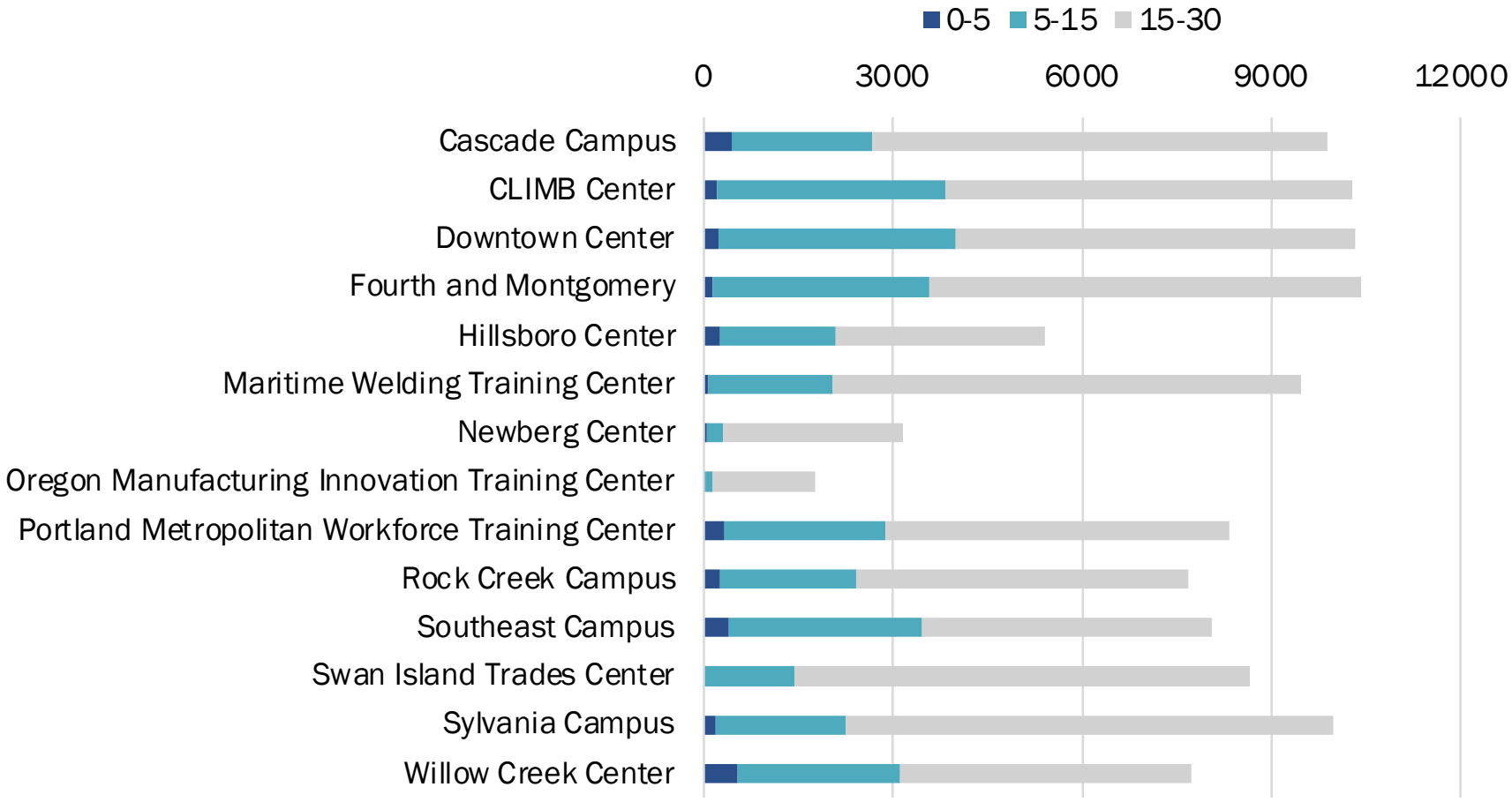
Healthcare and Emergency enrollees, by drive time



Enrollees in 2016-19 (three academic years). Source: ECONorthwest

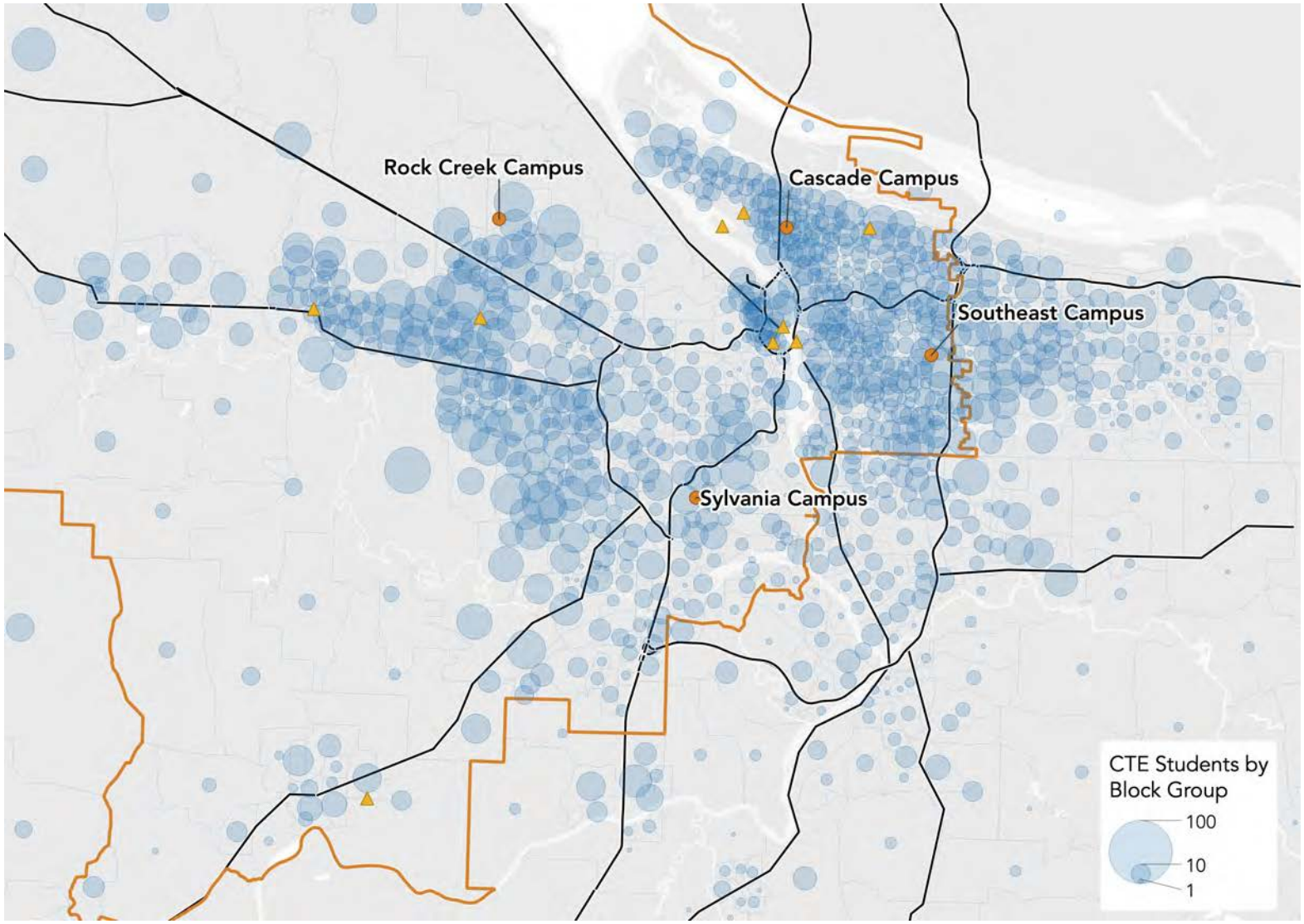
Drive times: Healthcare and Emergency

Drive time to each PCC campus/center (in minutes) for Healthcare enrollees



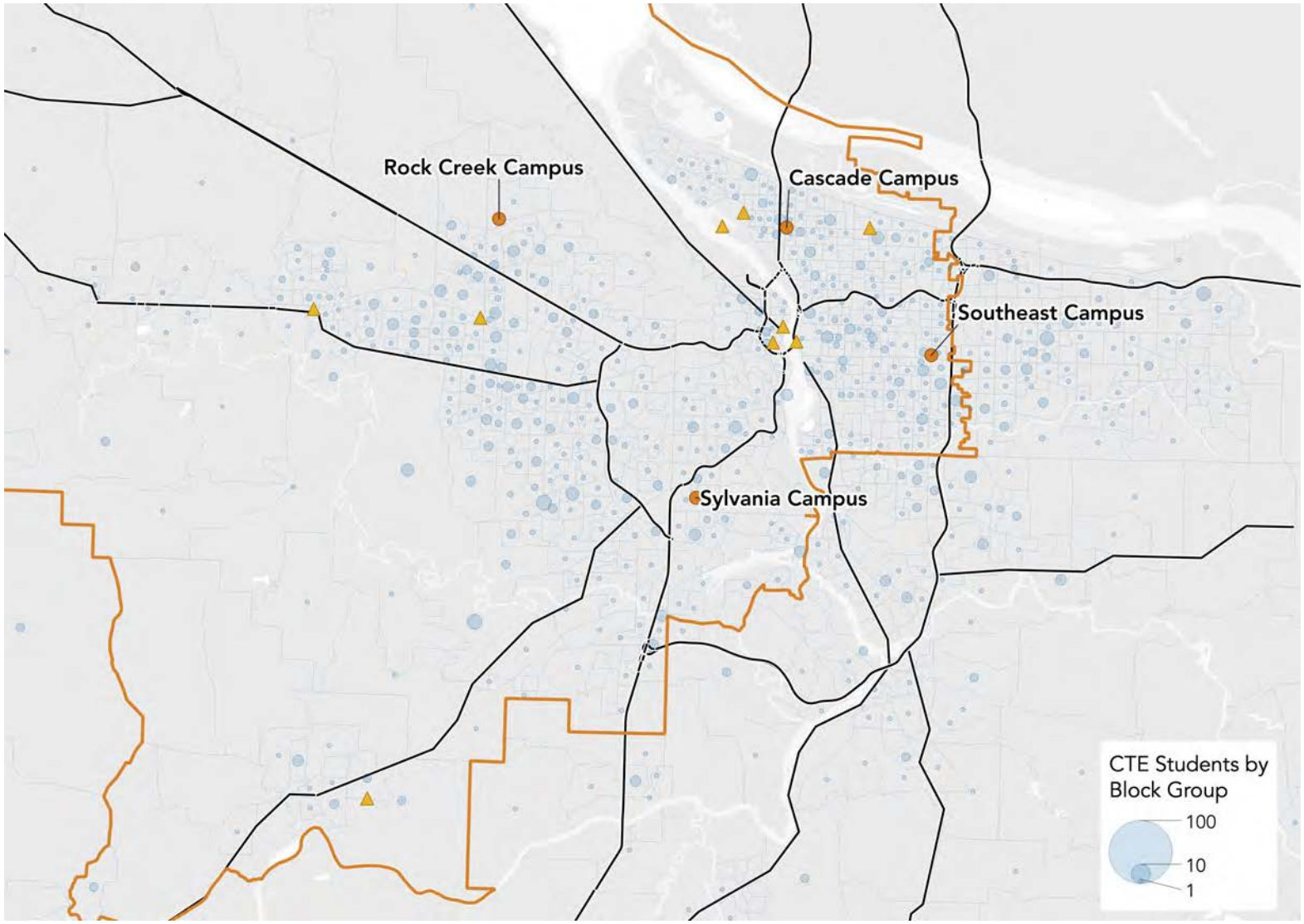
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency, all enrollees



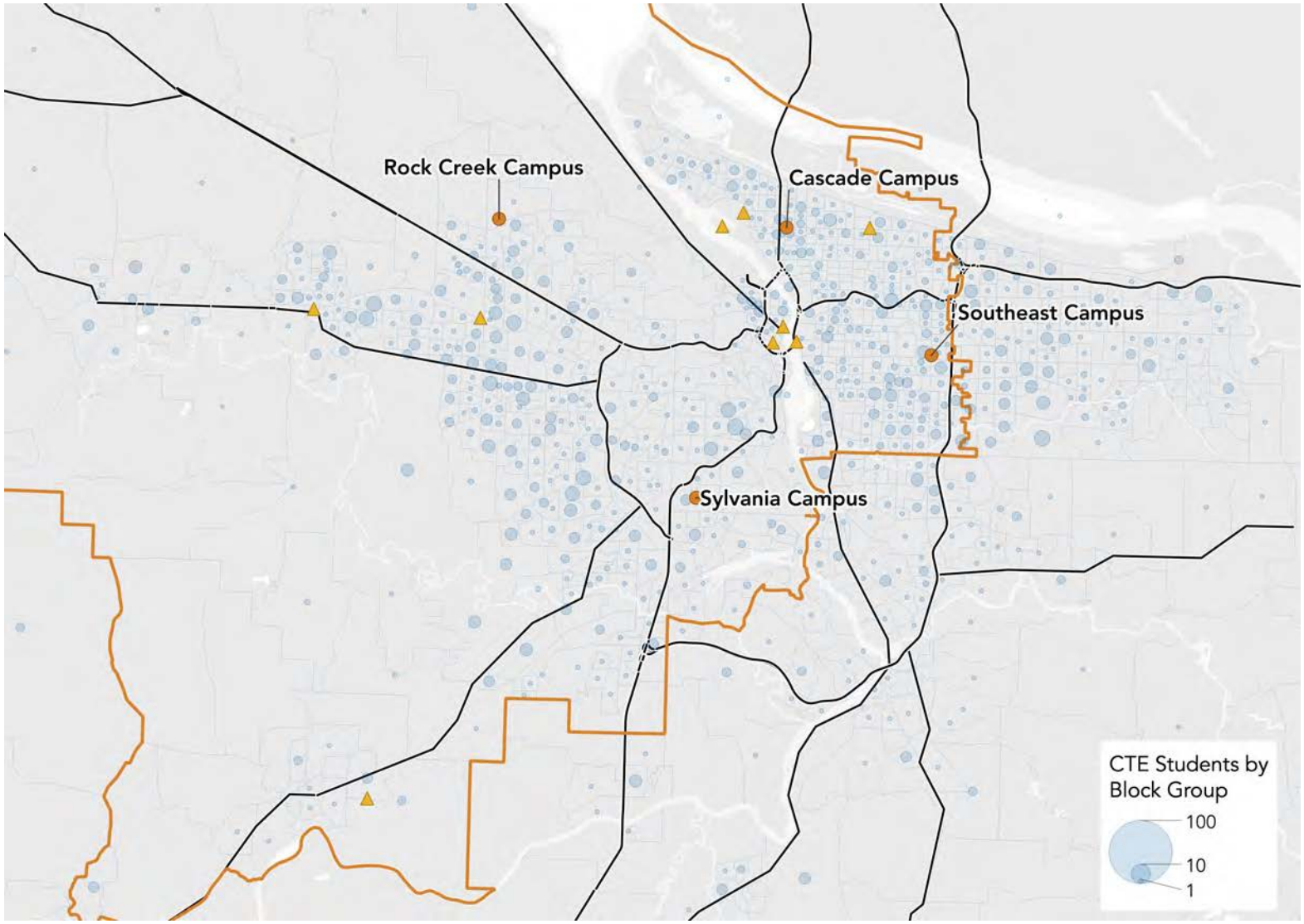
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency, serious enrollees



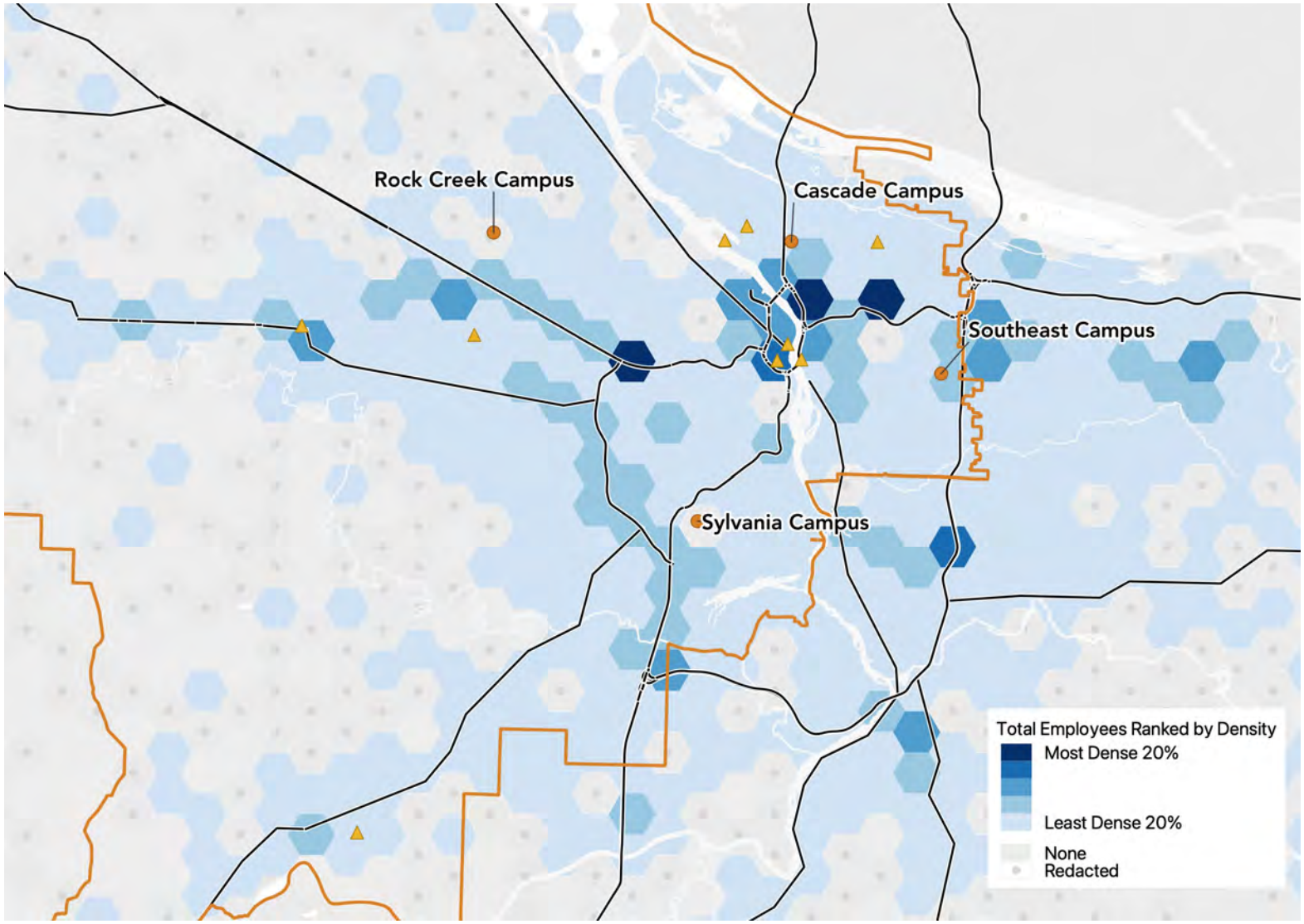
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency, completers



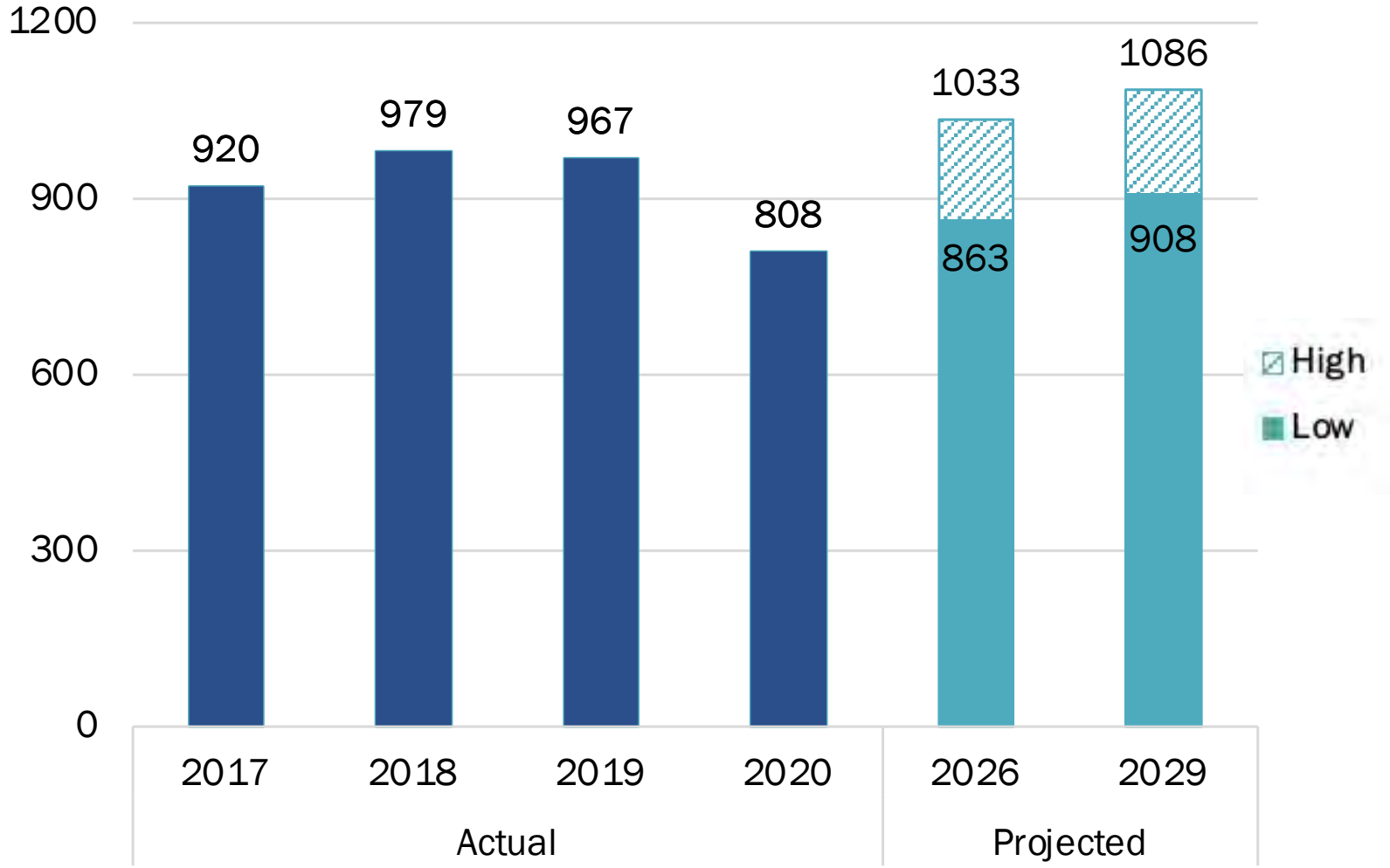
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency jobs



Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

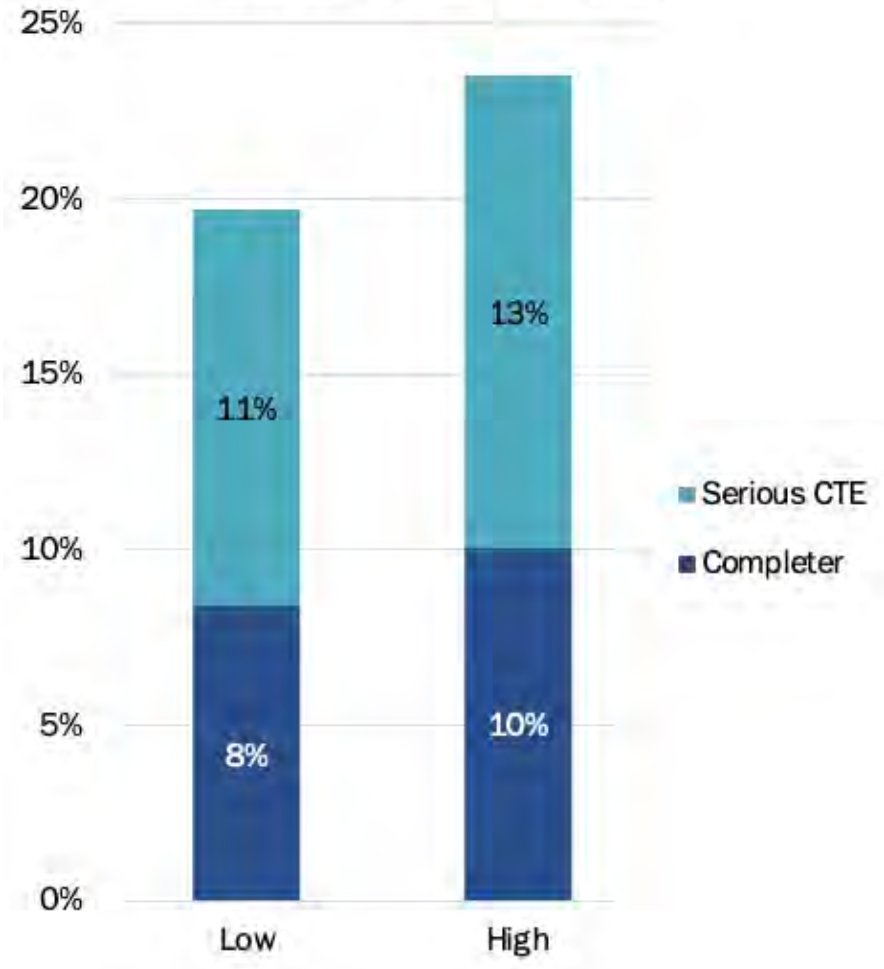
Projection of enrolled FTE: Healthcare and Emergency



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Healthcare and Emergency

Serious PCC Healthcare and Emergency enrollees as a share of average annual job openings, 2029



- 4,779 healthcare and emergency job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Healthcare and Emergency takeaways

- We expect Healthcare and Emergency enrollment to be at the high end of our projected enrollment and completion estimates due to high existing demand and turnover related to the COVID-19 pandemic.

- In 2029, we expect about 1,000 enrolled Healthcare and Emergency FTE and around 500 completers.

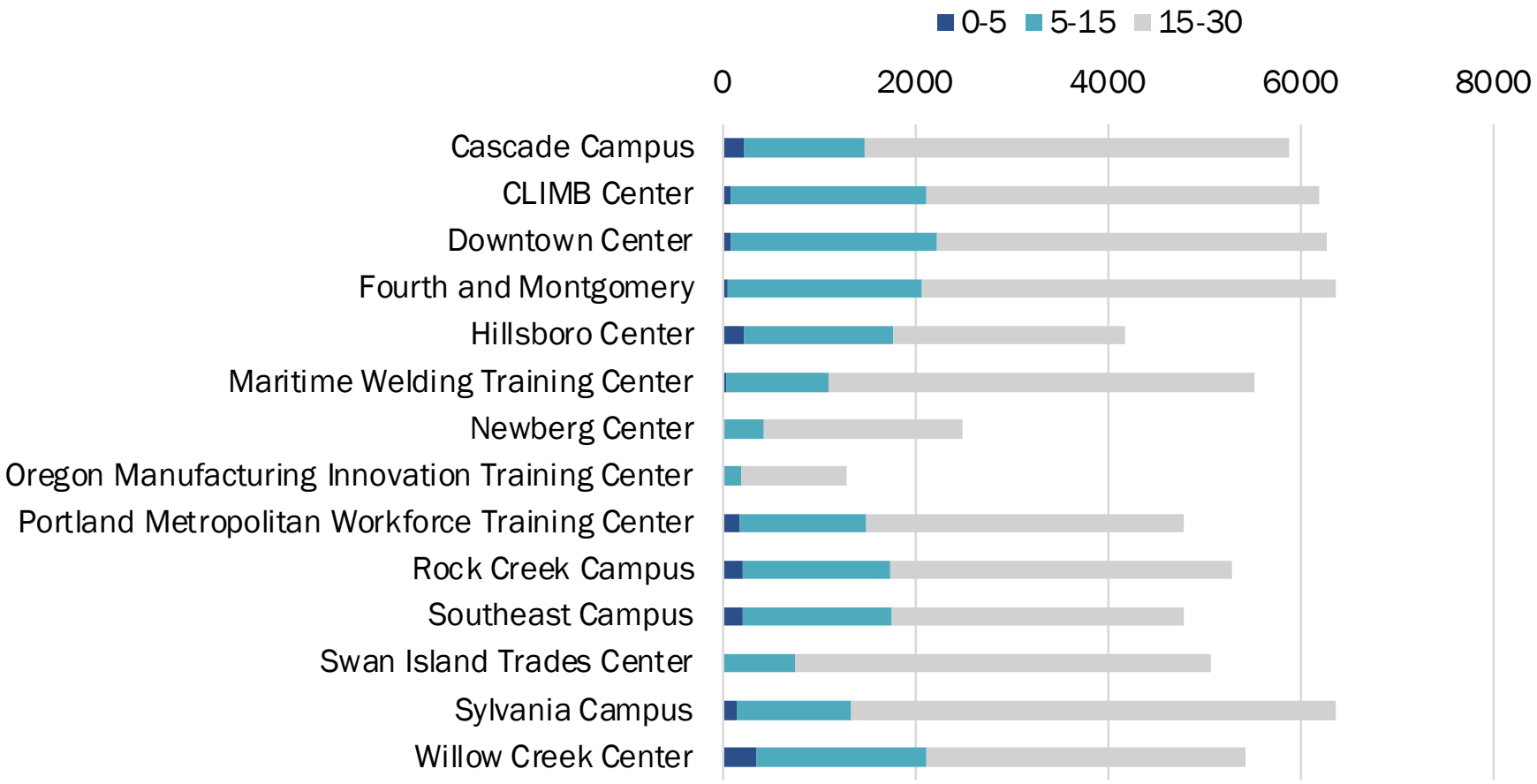
- At this level, serious PCC enrollees and completers could potentially fill between 10 and 23 percent of Healthcare and Emergency job openings in 2029.

- The largest concentration of Healthcare and Emergency jobs is in the downtown area and along major roads and thoroughfares. About 30 percent of enrollees lived within 15 minutes of the Downtown Center and CLIMB Center, respectively.

Construction, Manufacturing Tech, and Transportation (CMTT)

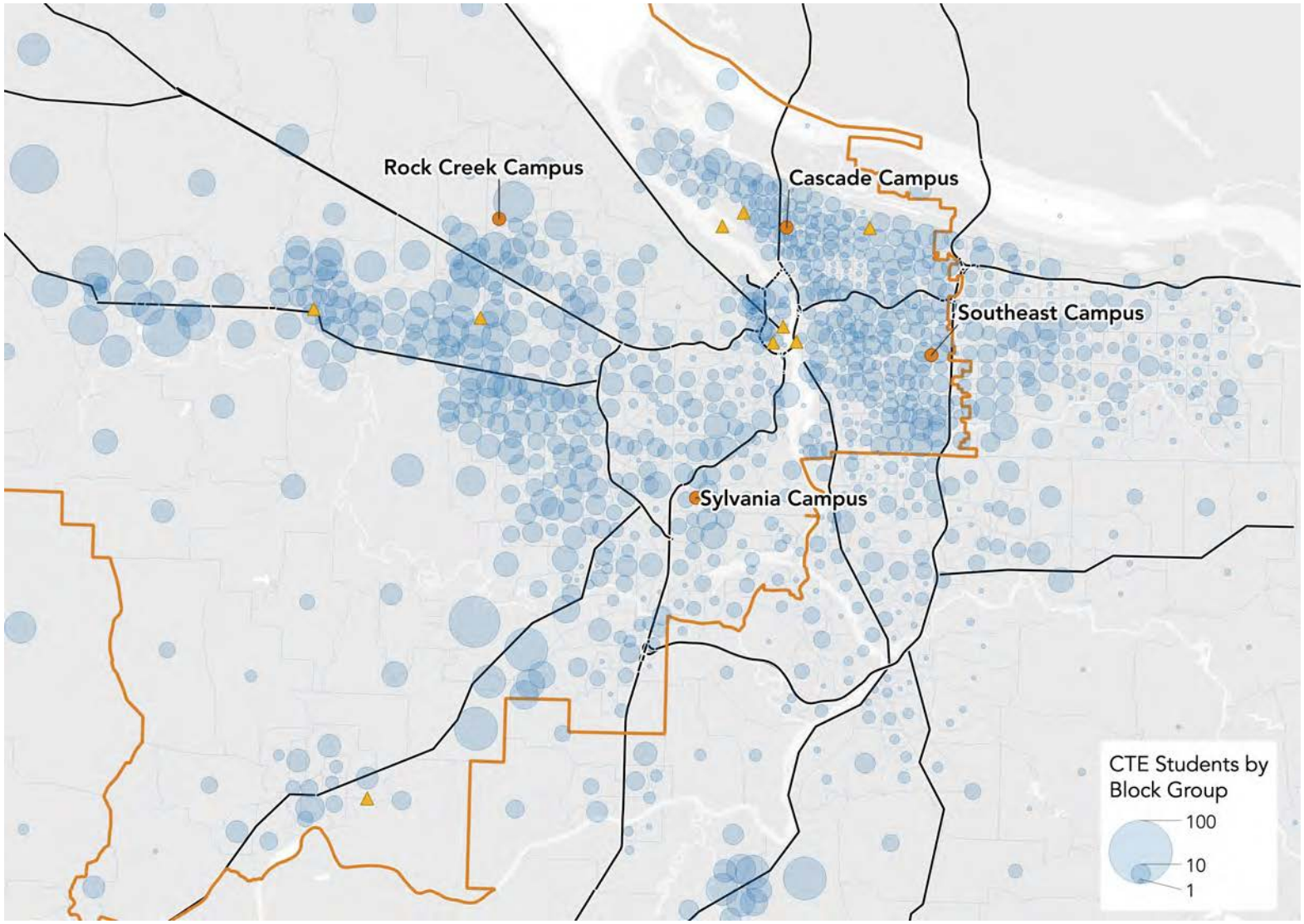
Drive time: CMTT

Drive time to each PCC campus/center (in minutes) for CMTT enrollees



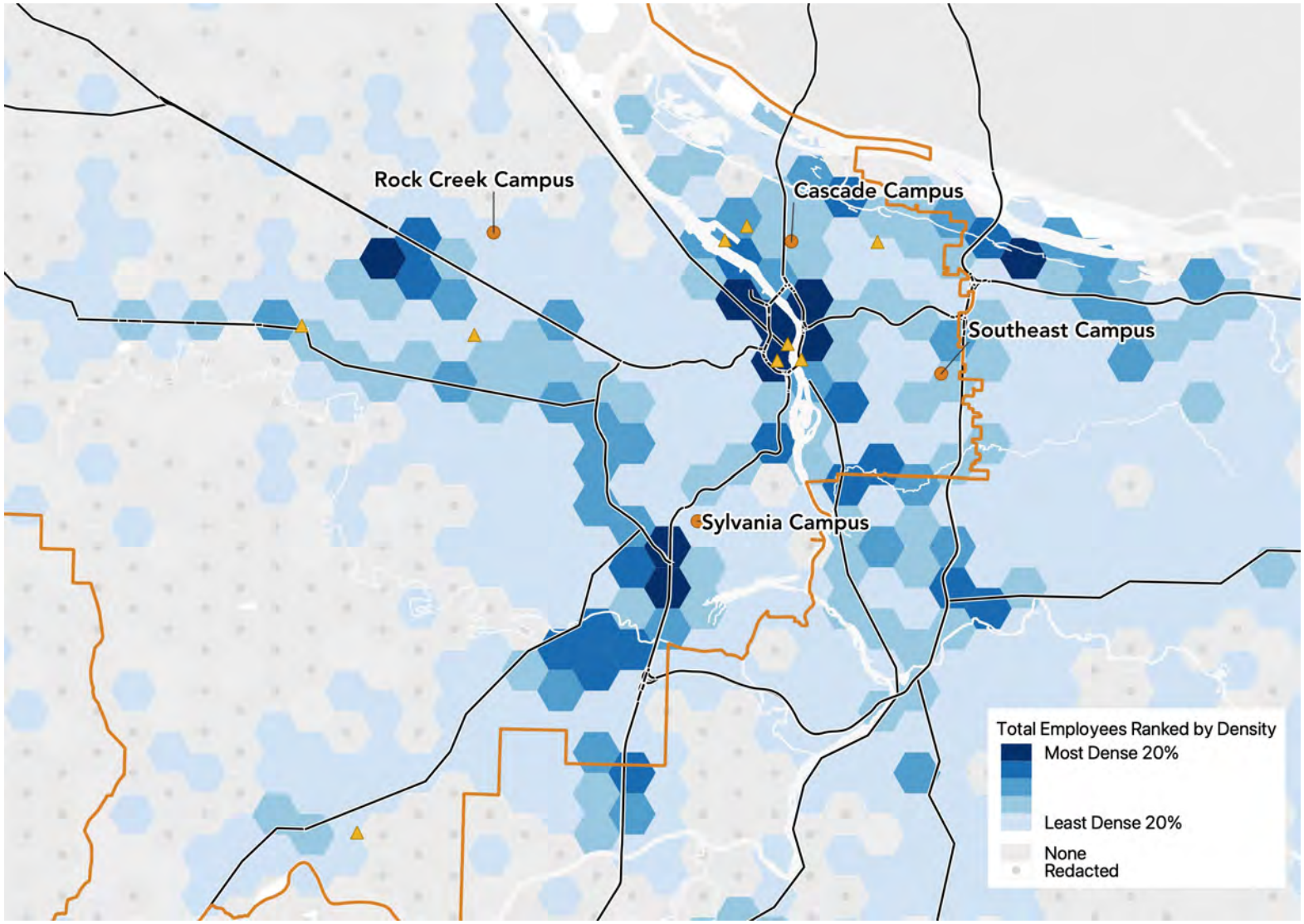
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

CMTT, all enrollees



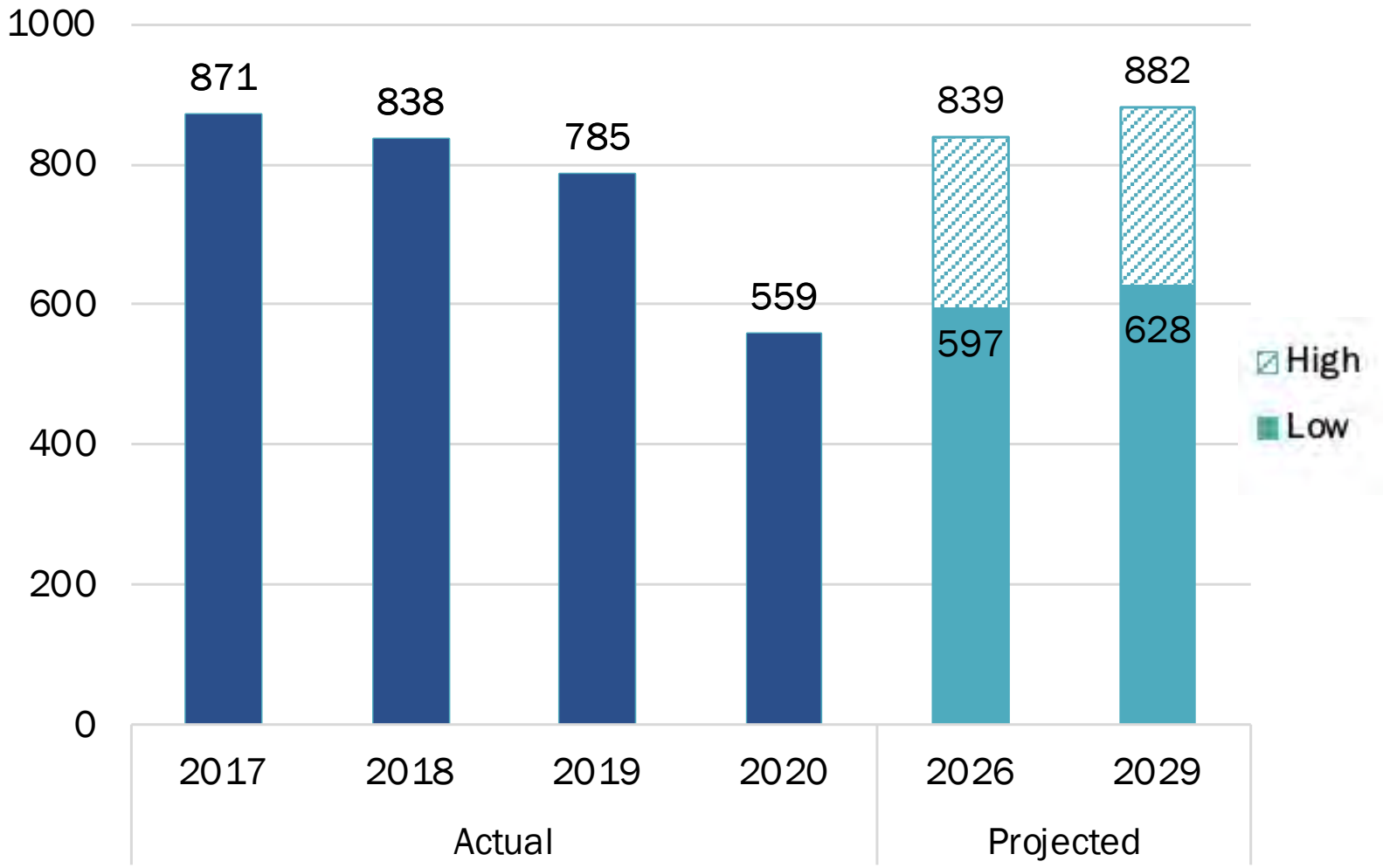
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

CMTT jobs



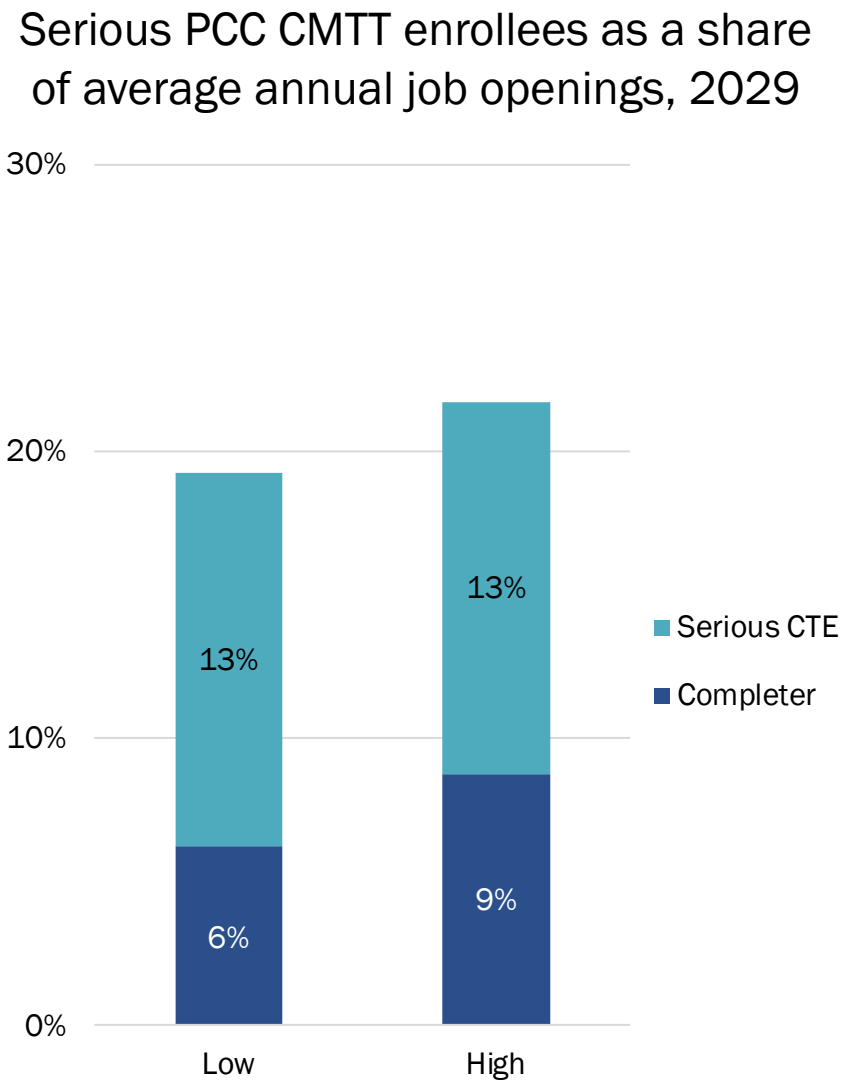
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: CMTT



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: CMTT



- 3,360 CMTT job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

CMTT takeaways

- We expect the CMTT enrollment to be toward the mid to high end of our projected enrollment and completion based on pre-existing trends.

- In 2029, we expect around 900 enrolled CMTT FTE and around 300 completers at the high end.

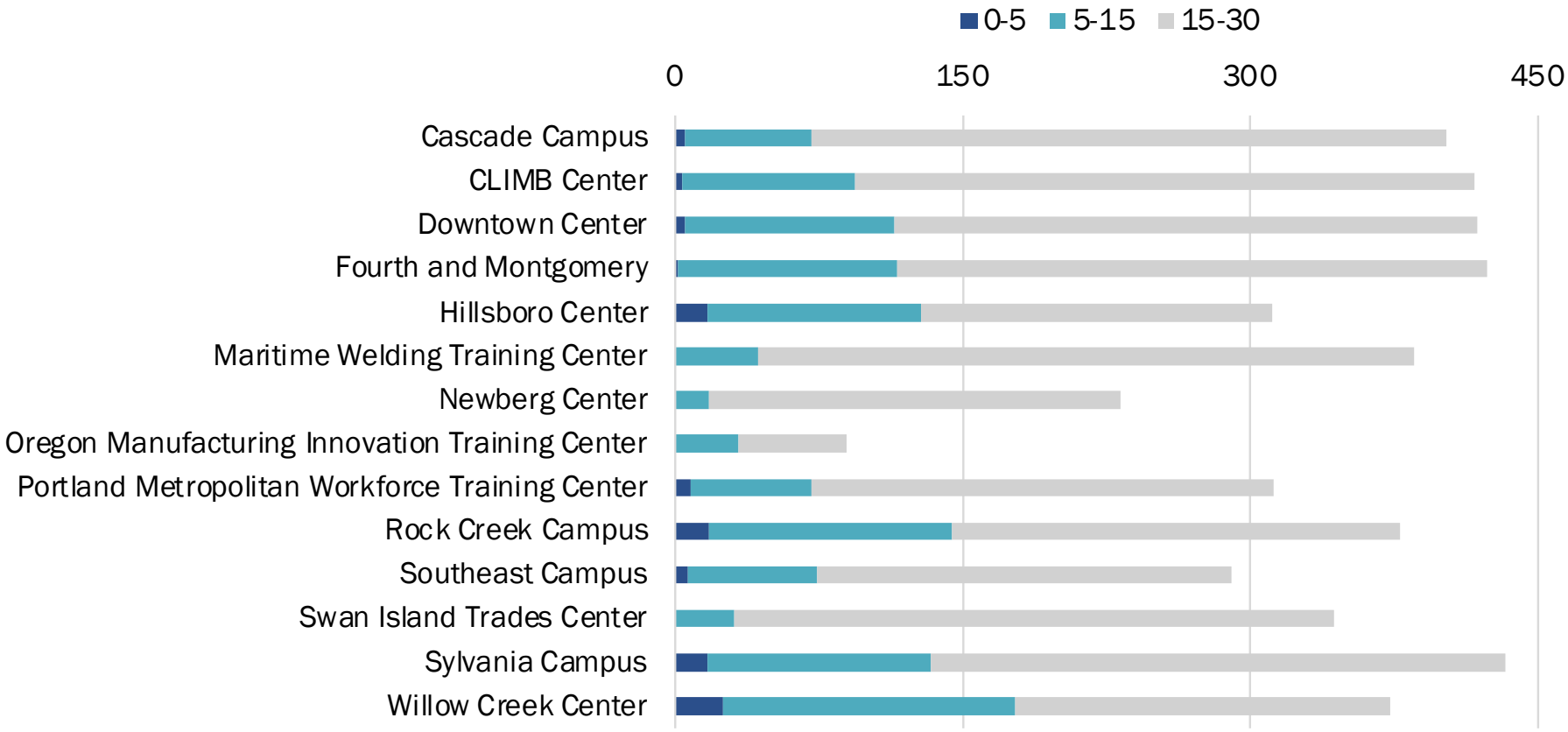
- At this level, serious PCC enrollees and completers could potentially fill between 9 and 22 percent of CMTT job openings in 2029.

- The largest concentrations of CMTT jobs are in the downtown area, toward North Plains, Tigard, and in north Portland. The Downtown Center has the highest share of enrollees (24 percent) living within 15 minutes.

Automotive Service

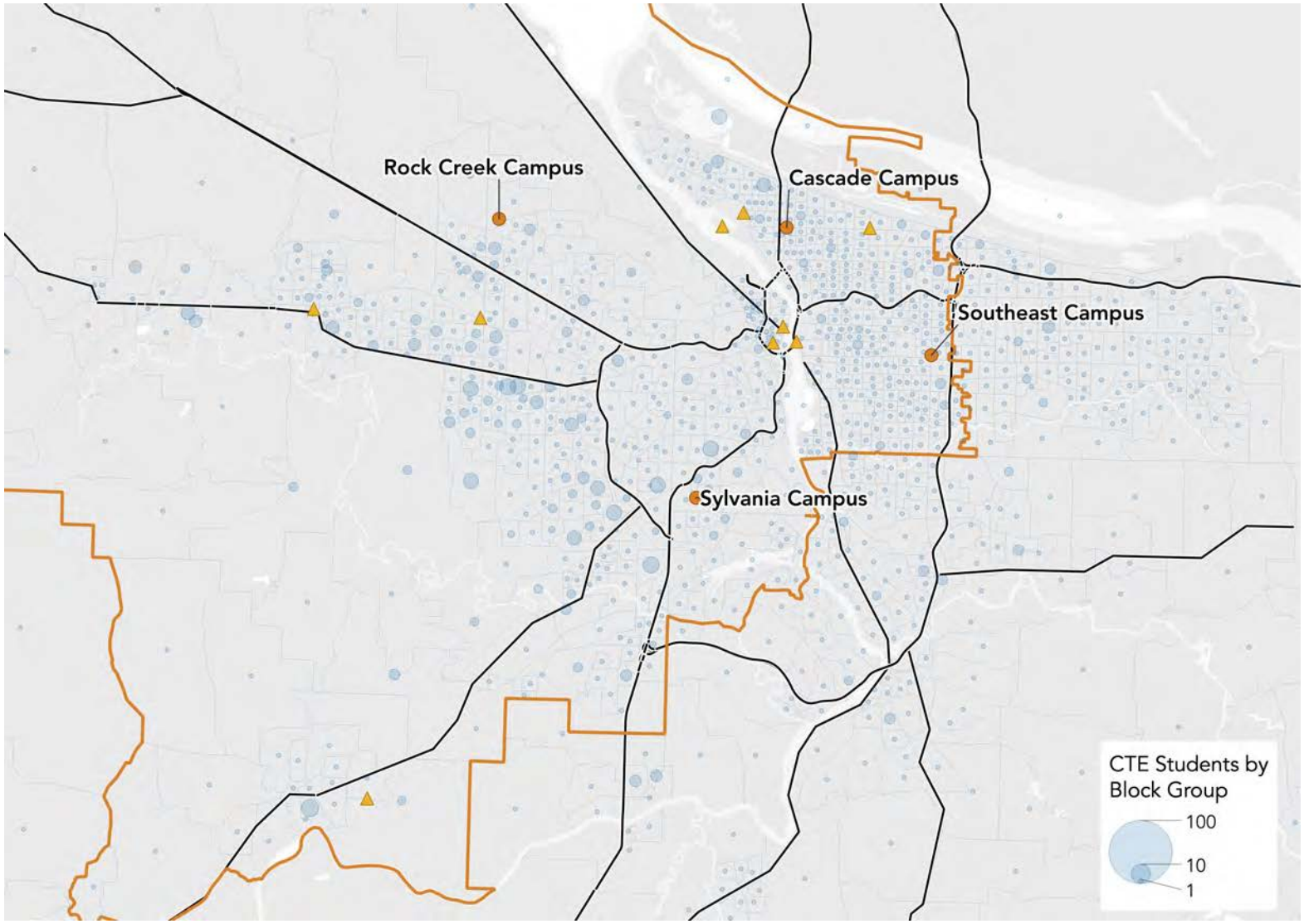
Drive time: Automotive Service

Drive time to each PCC campus/center (in minutes) for Automotive Service enrollees



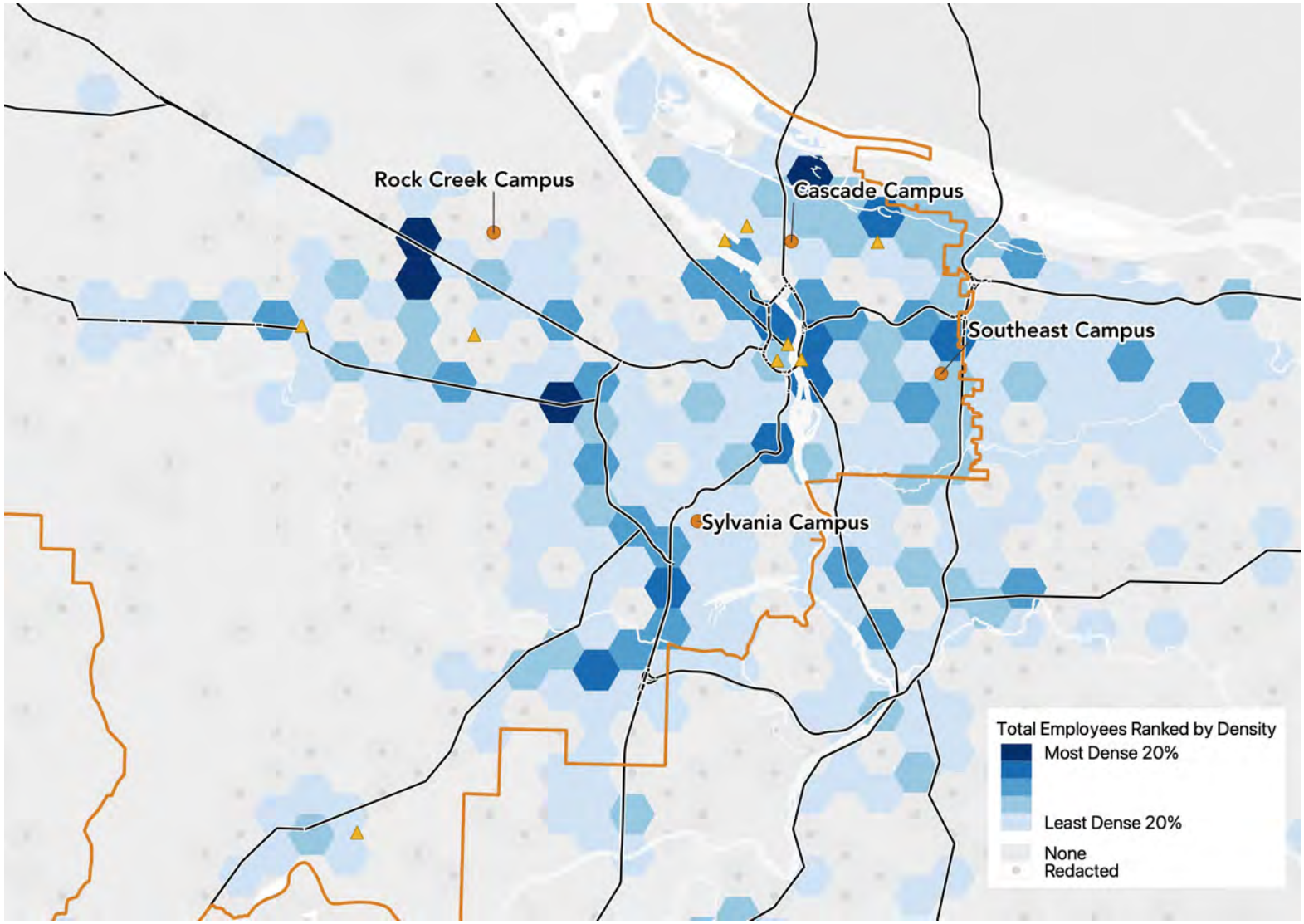
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Automotive Service, all enrollees



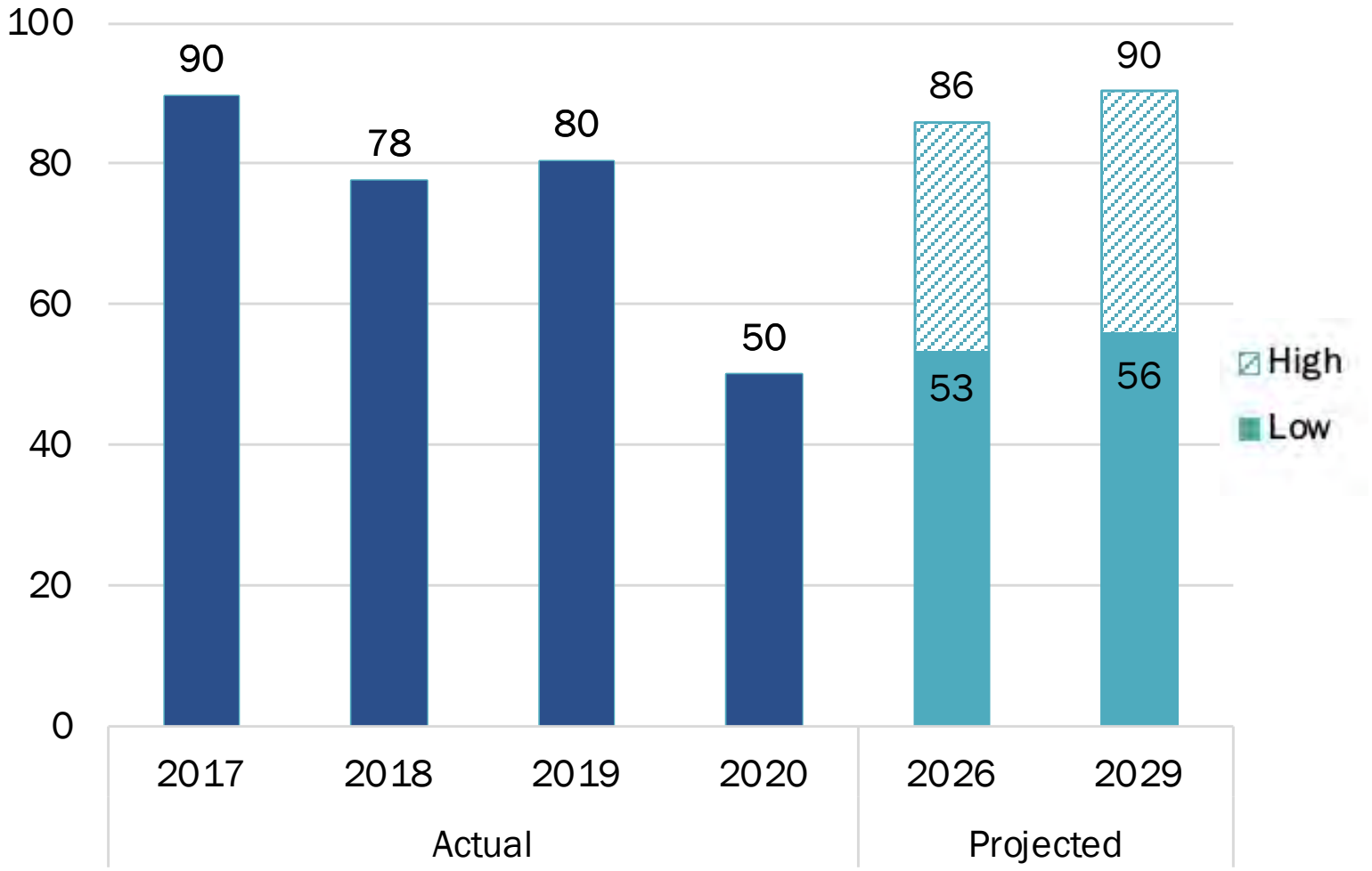
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Automotive Service jobs



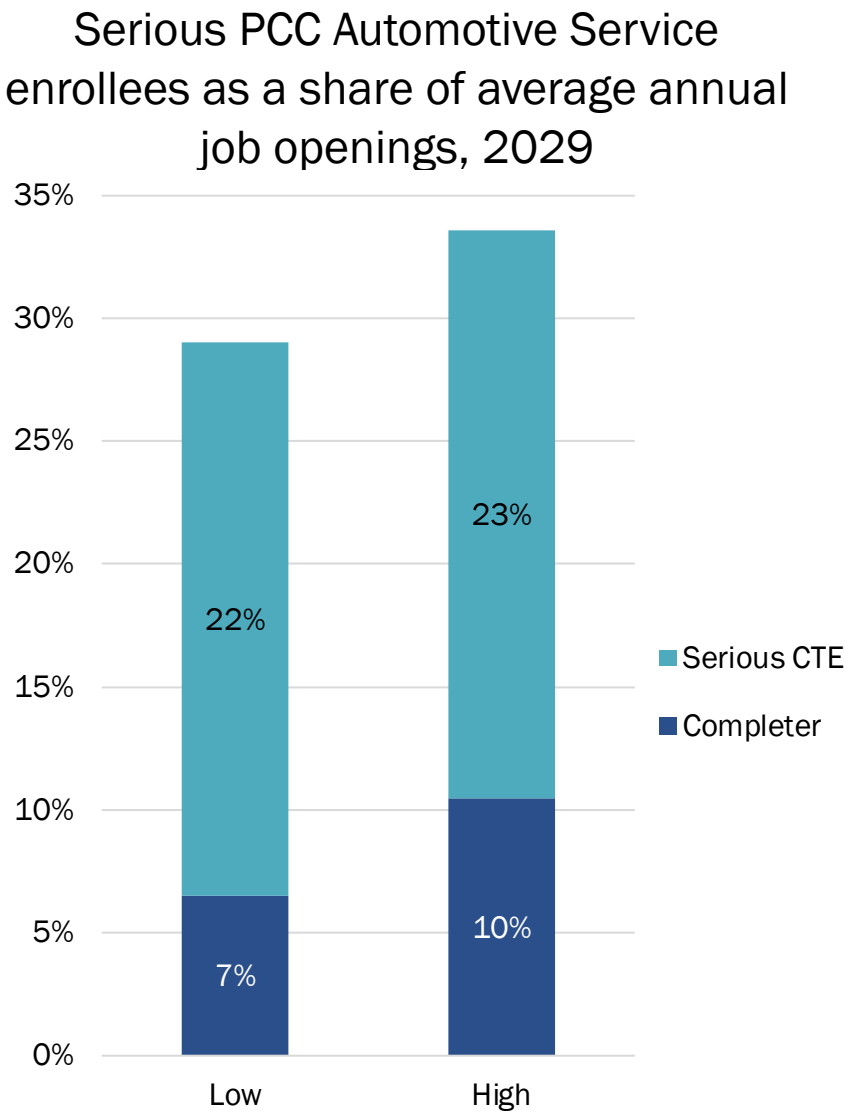
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: Automotive Service



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Automotive Service



- 358 Automotive Service job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Automotive Service takeaways

- We expect Auto Service enrollment to be toward the low end of our projected enrollment and completion estimates based on pre-existing trends.

- In 2029, we expect around 56 enrolled Auto Service FTE and around 23 completers.

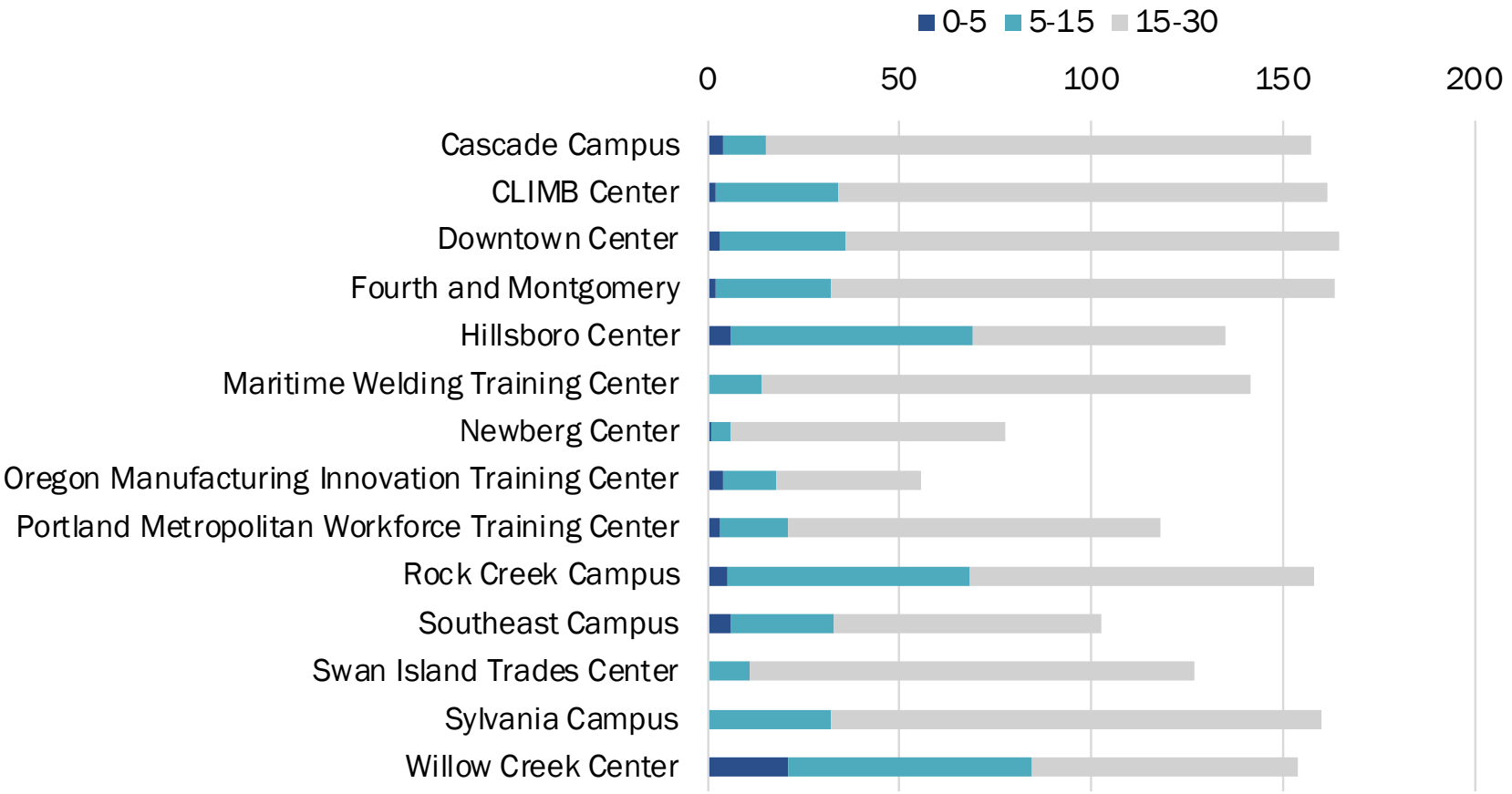
- At this level, we estimate serious PCC enrollees and completers could fill between 10 and 33 percent of Auto Service job openings in 2029.

- The largest concentrations of Auto Service jobs are on the west side of the river along Highway 217 and west of Rock Creek Campus. There is also a concentration of jobs in north Portland. Approximately the same number of enrollees live near Rock Creek (within 15 minutes) as Sylvania (26 percent and 24 percent, respectively).

Diesel Service

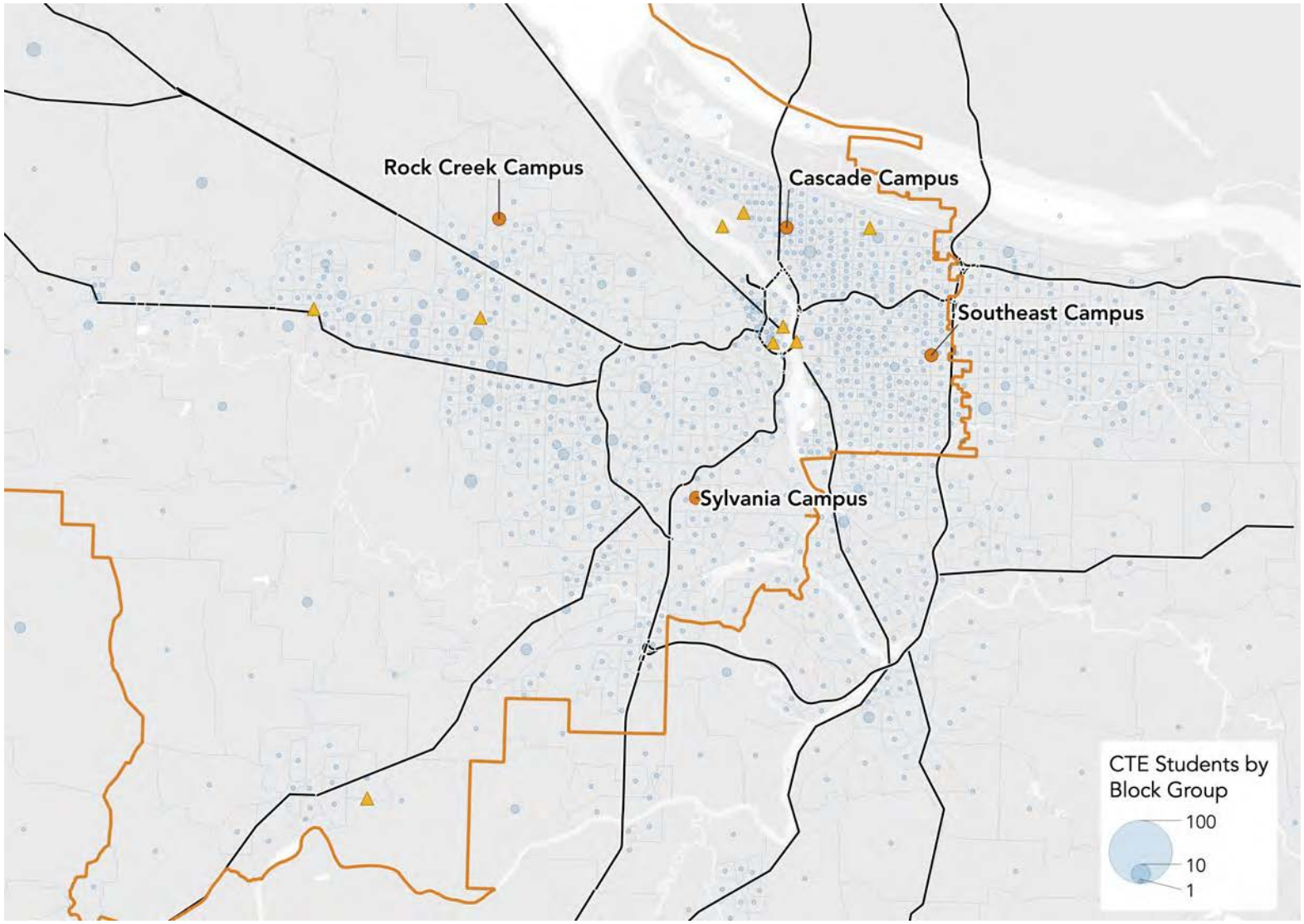
Drive time: Diesel Service

Drive time to each PCC campus/center (in minutes) for Diesel Service enrollees



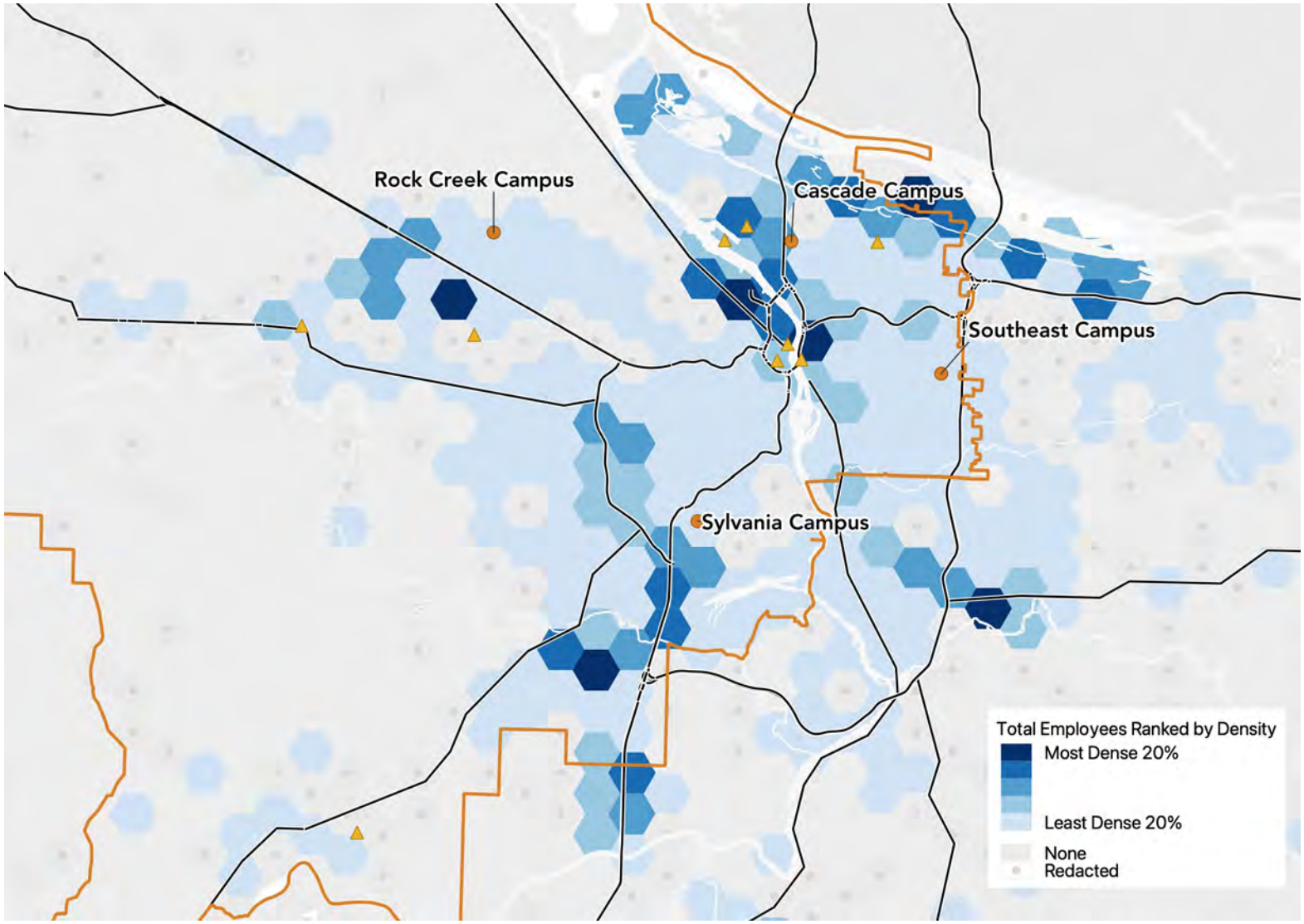
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Diesel Service, all enrollees



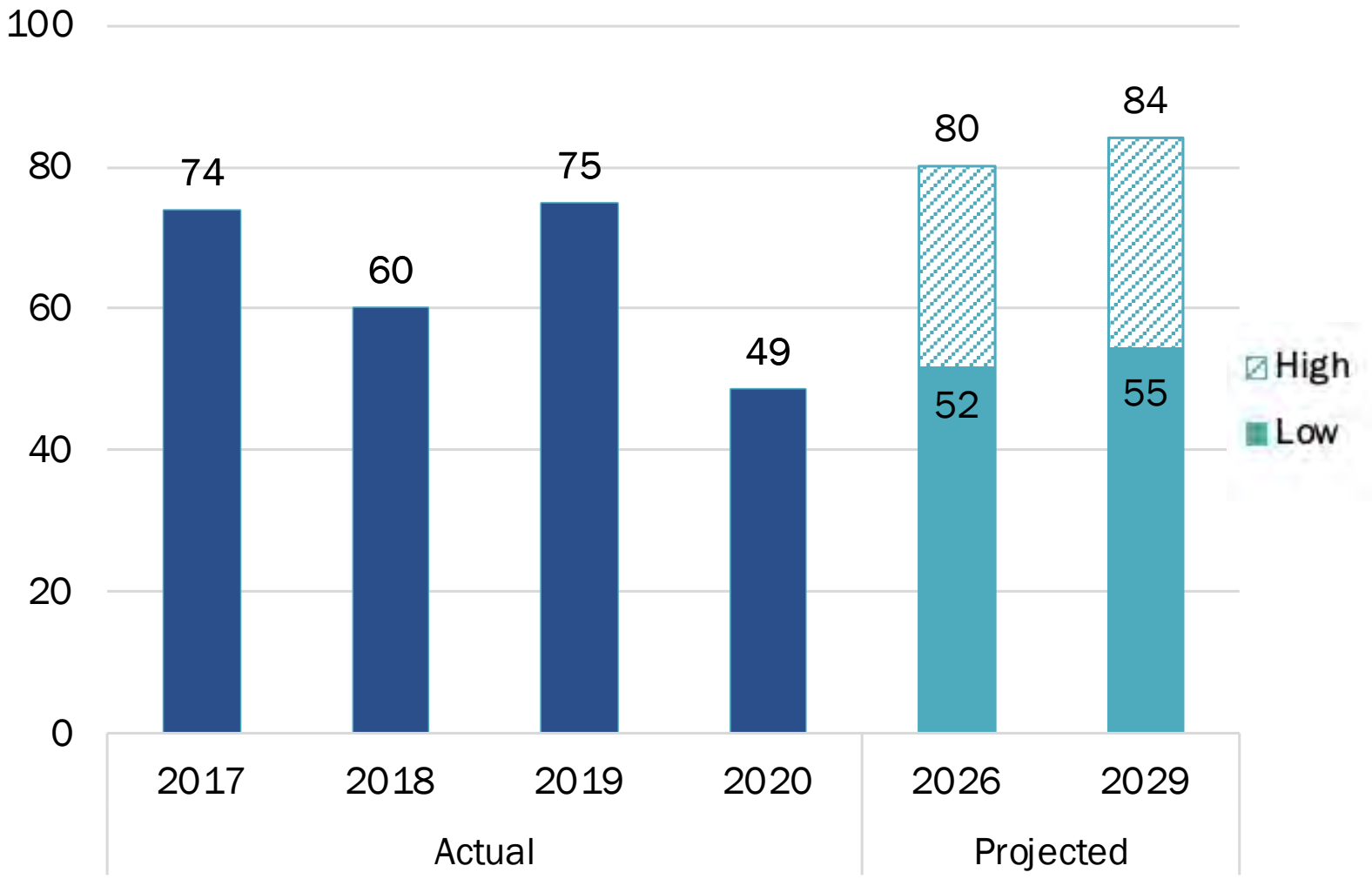
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Diesel Service jobs



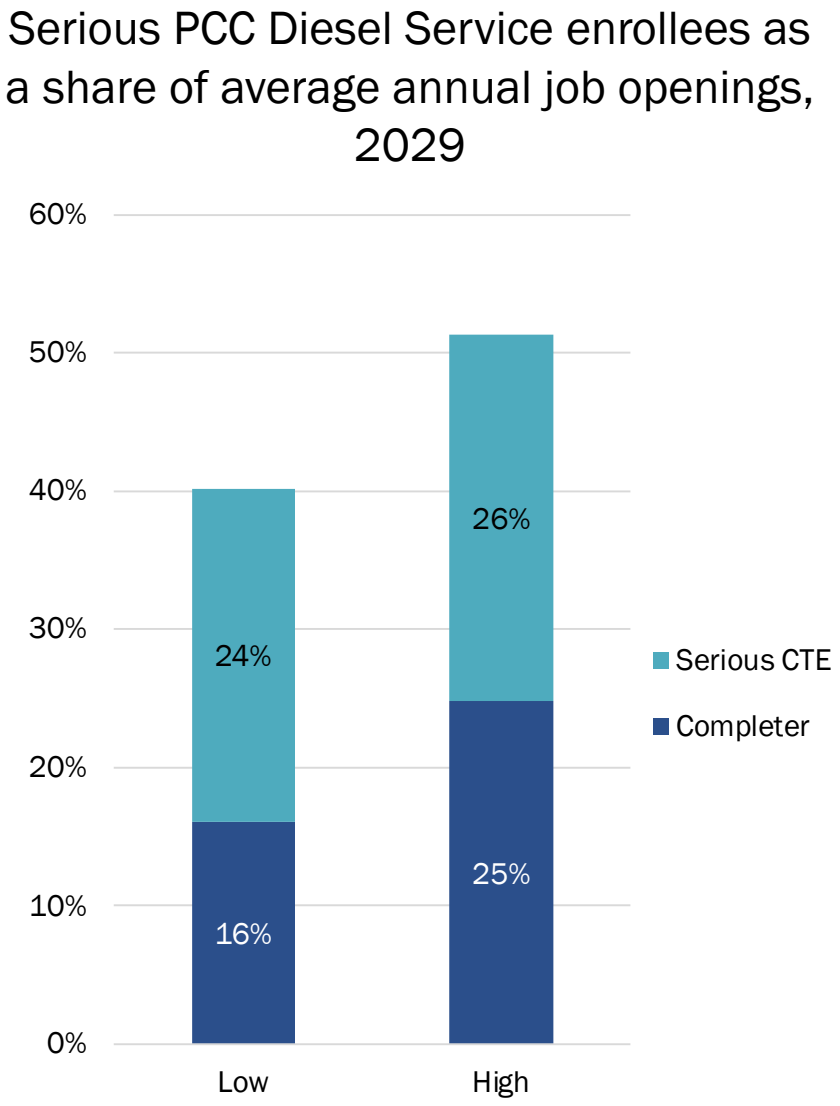
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: Diesel Service



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Diesel Service



- 191 Diesel Service job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Diesel Service takeaways

- We expect Diesel Service enrollment to fall midway between our projected high and low enrollment and completion estimates based on pre-existing trends.

- In 2029, we expect around 70 enrolled Diesel Service FTE and around 40 completers.

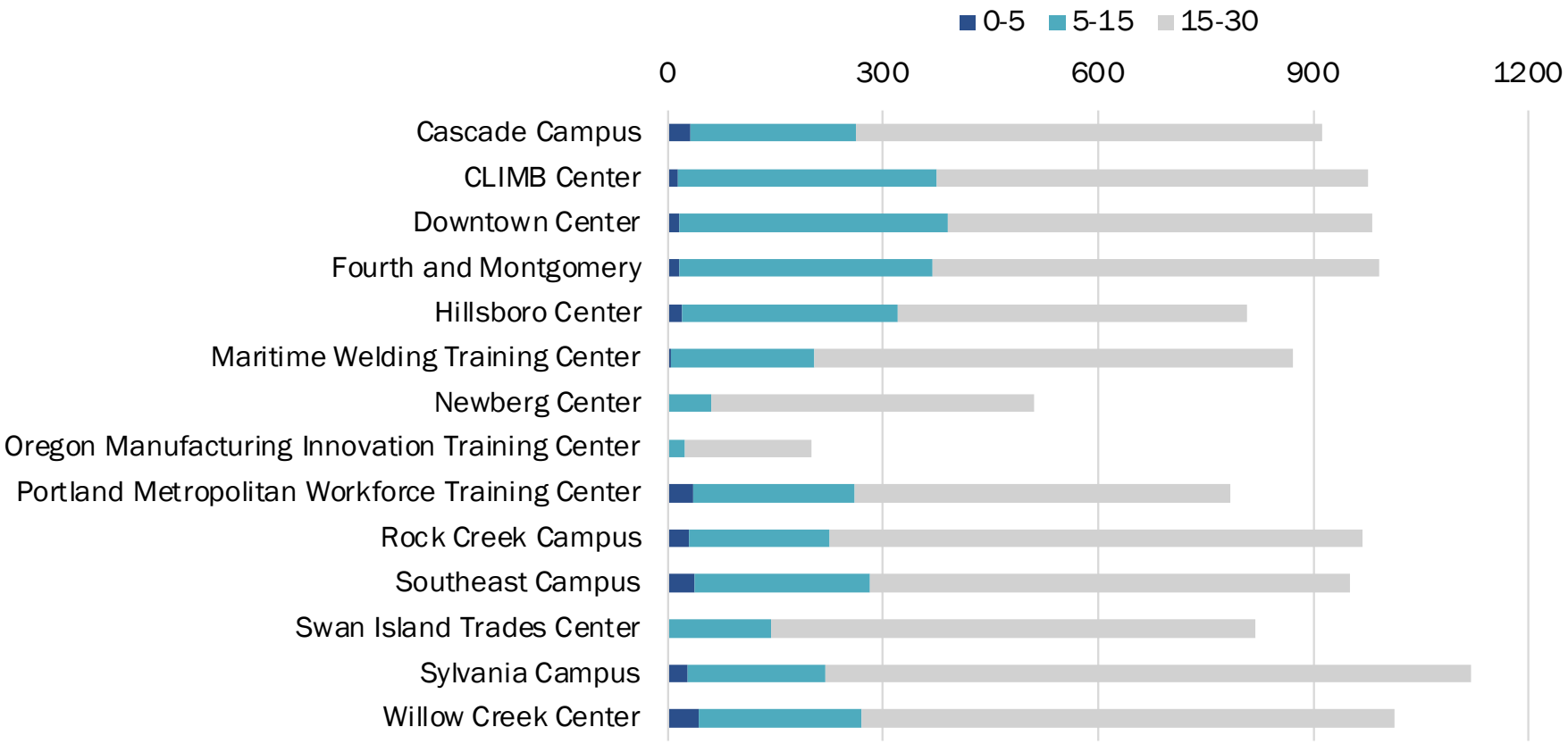
- At this level, we estimate serious PCC enrollees and completers could fill between 20 and 51 percent of Diesel Service job openings in 2029.

- The largest concentrations of Diesel Service jobs are around North Portland, Clackamas, and Tualatin. About one quarter (26 percent) of enrollees lived within 15 minutes of the Willow Creek Center and 21 percent lived within 15 minutes of the Rock Creek Campus and the Hillsboro Center, respectively.

Building Construction Technology

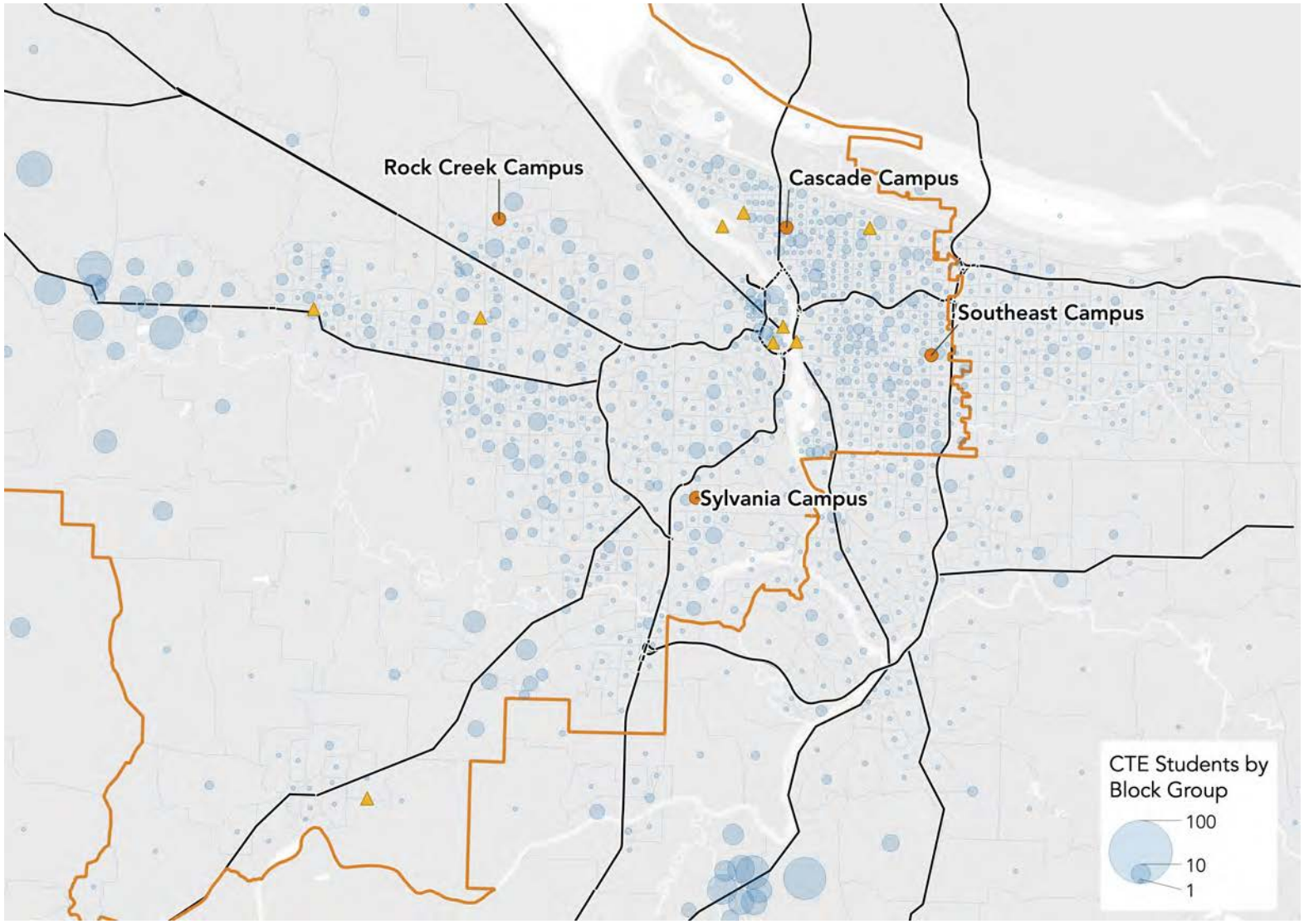
Drive time: Building Construction

Drive time to each PCC campus/center (in minutes) for Building Construction enrollees



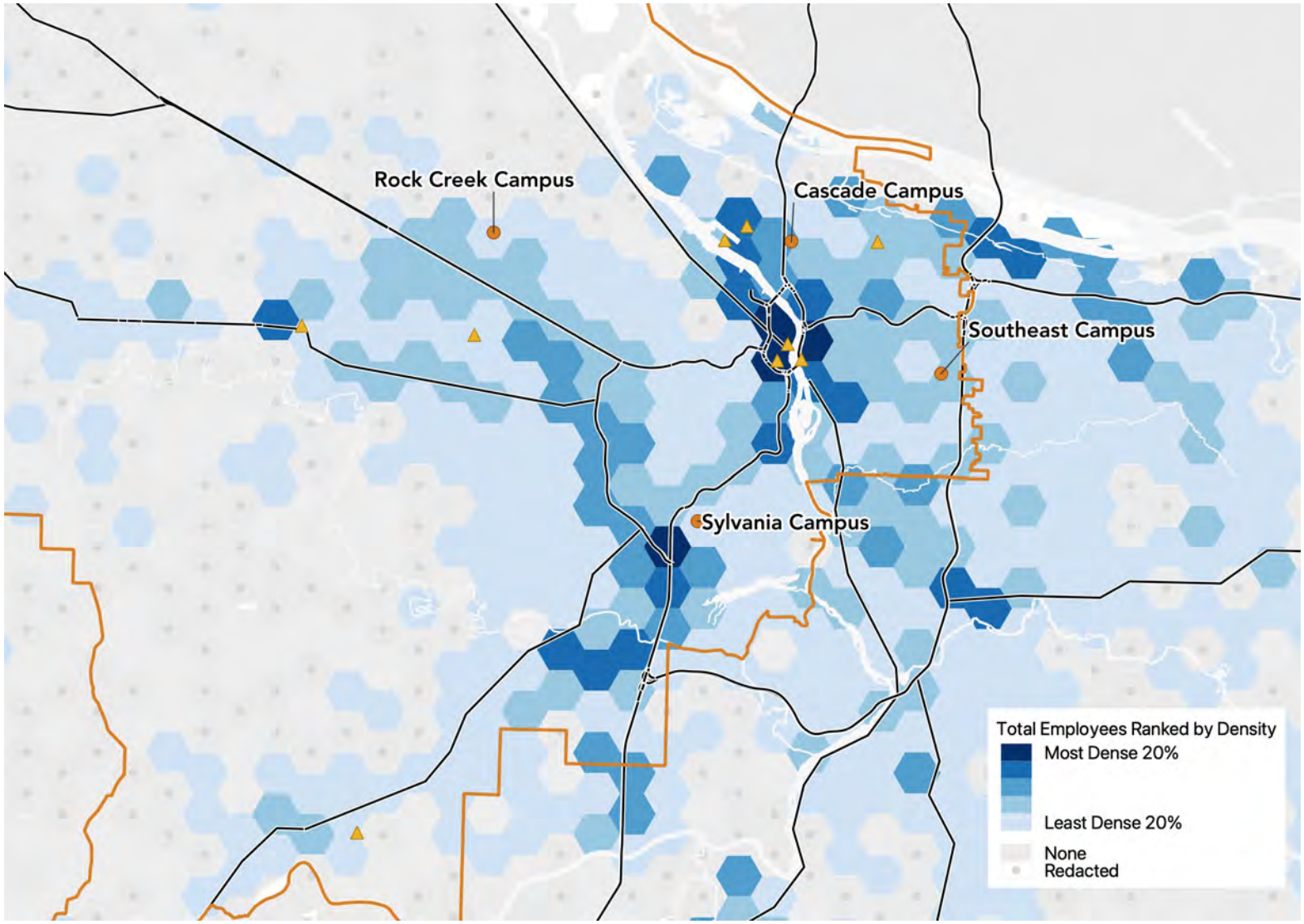
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Building Construction, all enrollees



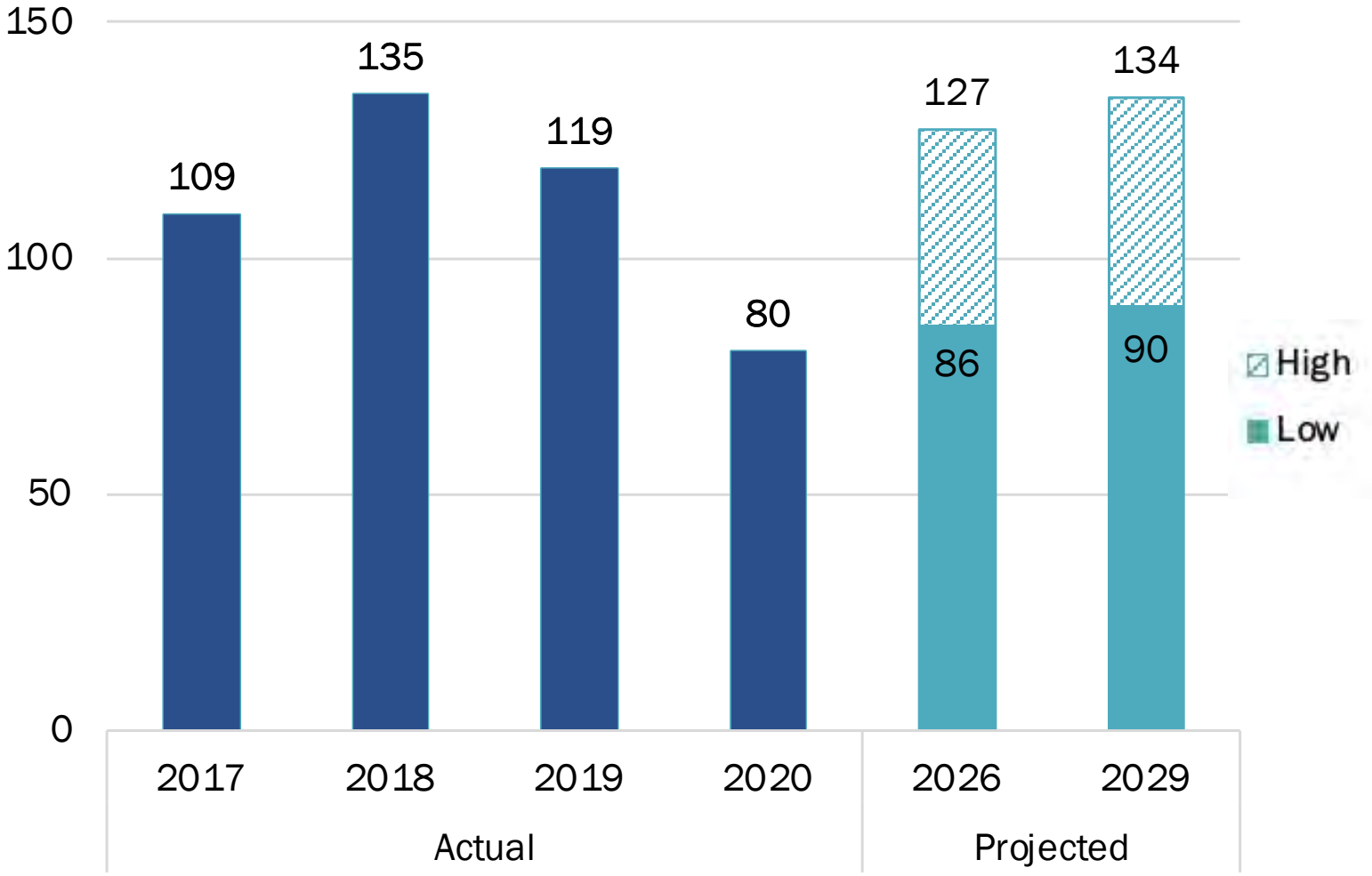
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Building Construction jobs



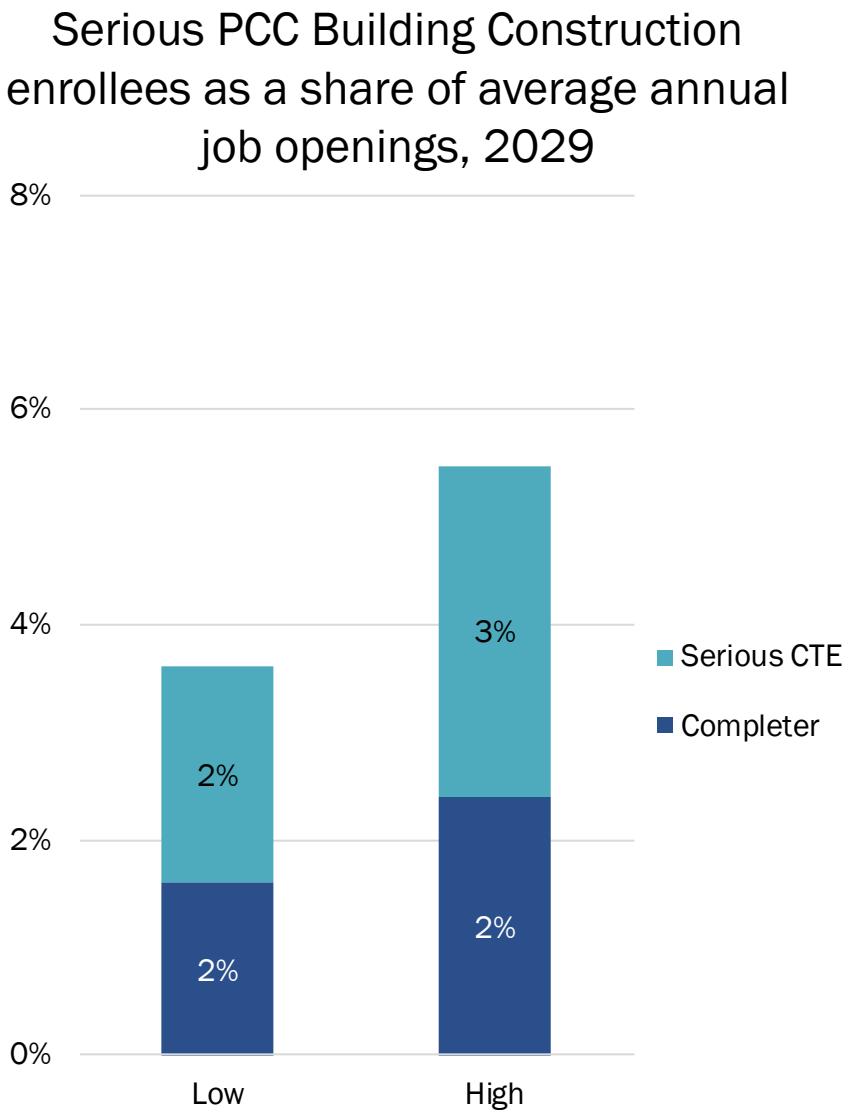
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: Building Construction



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Building Construction



- 507 Building Construction Technology job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Building Construction takeaways

- Enrollment in the Building Construction pathway has grown in recent years. Whether this growth continues will depend on economic conditions; the recently passed infrastructure bill may support additional enrollment.

- In 2029, we expect between 90 and 134 enrolled Building Construction FTE and between 8 and 12 completers.

- There are few completions relative to enrollment in the Building Construction pathway.

- The largest concentrations of Building Construction jobs are in the downtown area and in Tigard.

Appendix

Methodology

Defining CTE courses

- Programs and their required courses within each relevant pathway were identified manually via a search of PCC's website

- Required courses within CTE pathways were matched to student data using subject and course codes

- The definition of a CTE course was refined further. Remedial, liberal arts, and general studies courses and courses in irrelevant CIP codes were identified and removed

Defining CTE completions

- CTE completers were identified using CIP codes derived from the list of CTE courses we identified earlier in the analysis

- The CIP code list was hand-vetted and cross-walked with older CIP codes to ensure accuracy

Assigning students to pathways

- Enrollees
  - Students were given a single, mutually-exclusive pathway assignment based on their enrolled credits within a given academic year
  - Students enrolled in multiple courses that fell into two or more CTE pathways were assigned to the pathway in which they had taken the most credits
- Completers
  - Completers were given a single, mutually-exclusive pathway assignment based on the CIP code of their completion within a given academic year
  - For completers with multiple completions in a single year, associate degree completions were prioritized

Allocating students to zip codes

- Student data were recorded at the end of the last term the student was enrolled in the data set.
- The maps display information about the distribution of students' assumed residences across the PCC district and beyond. We choose 2018-19 and earlier years instead of more-current years to avoid displaying enrollment anomalies related to the COVID-19 pandemic.
- We used the zip code / zip+4 field in the data PCC provided to determine where PCC enrollees were located. Students were assigned to the Census block group that includes the center point of the delivery route.
- Students with missing zip+4 data (about a third of student observations in the 2018-19 academic year) were allocated proportionally across five-digit zip codes.
- This method allowed us to capture 98.4% of completers and 99.5% of enrollees in 2018-19.
- Students who were missing zip codes entirely or who lived outside of Oregon were not mapped.
  - 6.1% percent of selected CTE enrollees and 9.0% of completers in 2018-19 were outside the state or missing geographic data. Of these, 90% of enrollees and 91% of completers were Washington residents.

Drive-time and employment maps

- Drive times calculated using ArcGIS Online. Block groups were assigned to a distance band based on where they had the most overlap. Block groups with less than 25 percent overlap with any distance band were not included.

- The industry job maps are based on QCEW data from 2019 for 5 counties: Multnomah, Clackamas, Washington, Columbia, and Yamhill. Based on the business's NAICS code, a percentage of the total average annual employment was determined to be CTE-relevant for each pathway. This employment was aggregated to 2km hexbins (2km height/width). Hexbins with data that did not meet disclosure requirements are redacted from the maps. To meet disclosure requirements, a hexbin had to have no fewer than 3 firms and one firm could not represent 80 percent of the reported employment. Hexbins were ranked by number of jobs (i.e., ranked by density with constant area) and split into quintiles from most to least dense.

Projections and gap analysis

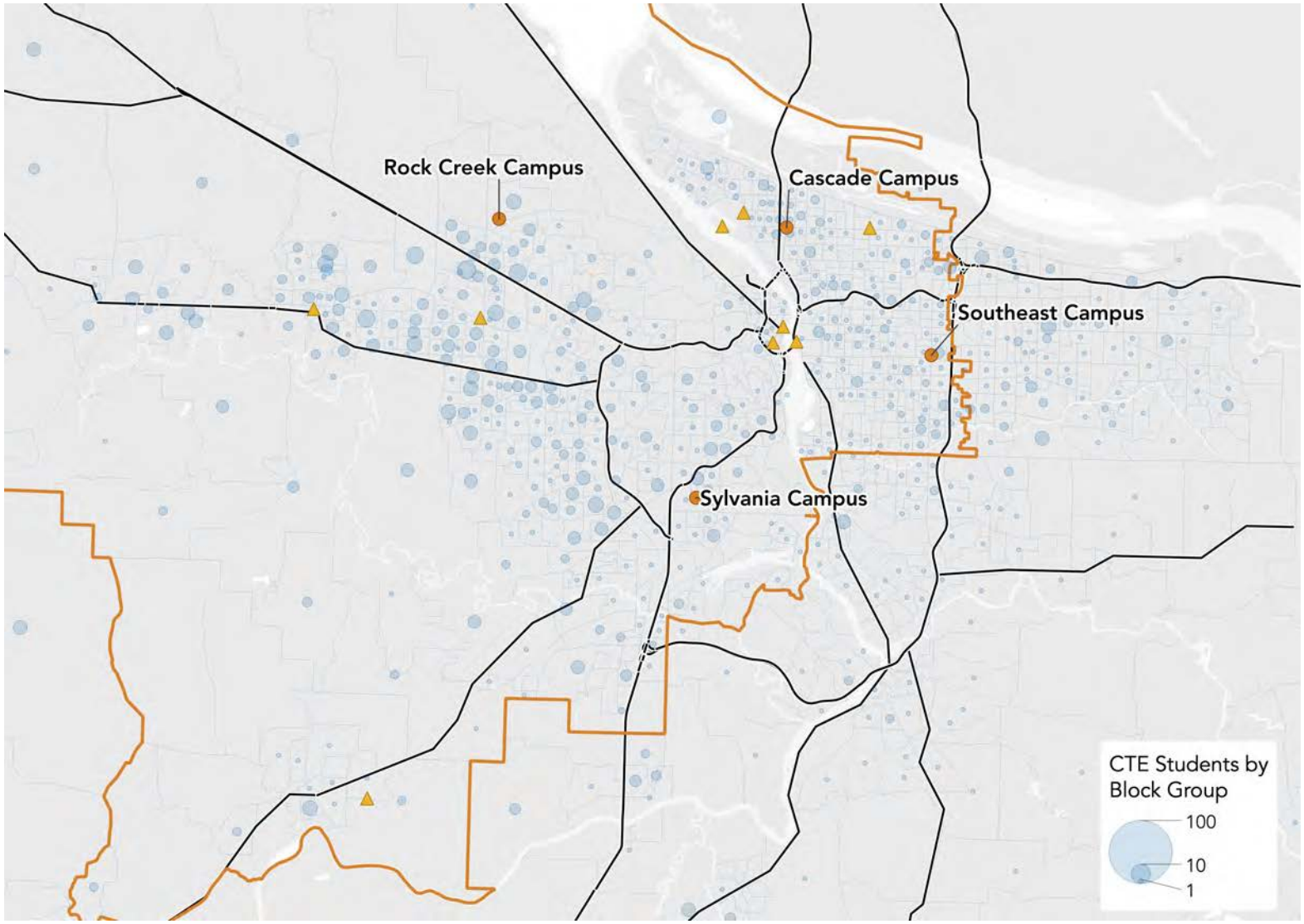
- We applied growth rates from our previously completed enrollment projections in Spring 2021 to estimate FTE enrollment for the selected PCC pathways. We produced high and low projections to provide a potential range for how CTE enrollment may perform in the future. Future enrollment will depend on many things, including recovery from the COVID-19 pandemic.
- **High projections:** High projections were produced using CTE enrollment in 2018-19 as the base and applying growth rates from previously completed enrollment projections.
- **Low projections:** Low projections were produced using CTE enrollment in 2019-20 as the base and applying growth rates from previously completed enrollment projections.
- To project completions, we applied a completion to FTE ratio (pooling completions from the 2014-15 to 2018-19 academic years) for each pathway. Due to an anomaly in the PCC completion data, we averaged 2008-09 through 2012-13 completions for the Diesel pathway. We applied these completion to FTE ratios to the high and low FTE projections to estimate a potential range of completions for the 2022-23 through 2029-30 academic years.

Gap analysis

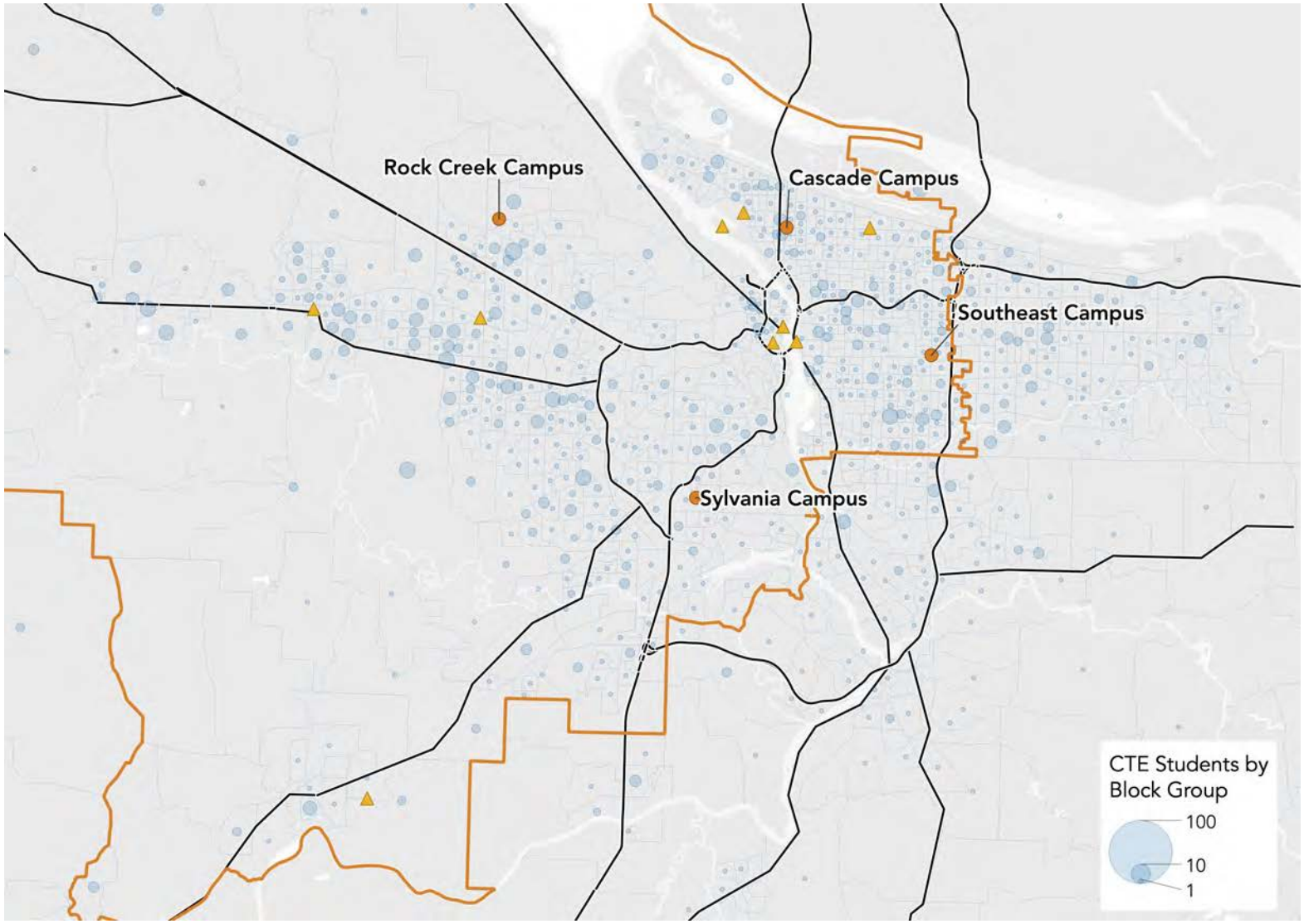
- The gap analysis is based on enrollment projections by pathway and projected job openings (2020-2030) in the tri-county region for occupations relevant to each pathway. CIP codes for PCC pathway coursework are crosswalked to SOC codes to identify relevant occupations.

Additional enrollee maps

CMTT, serious enrollees

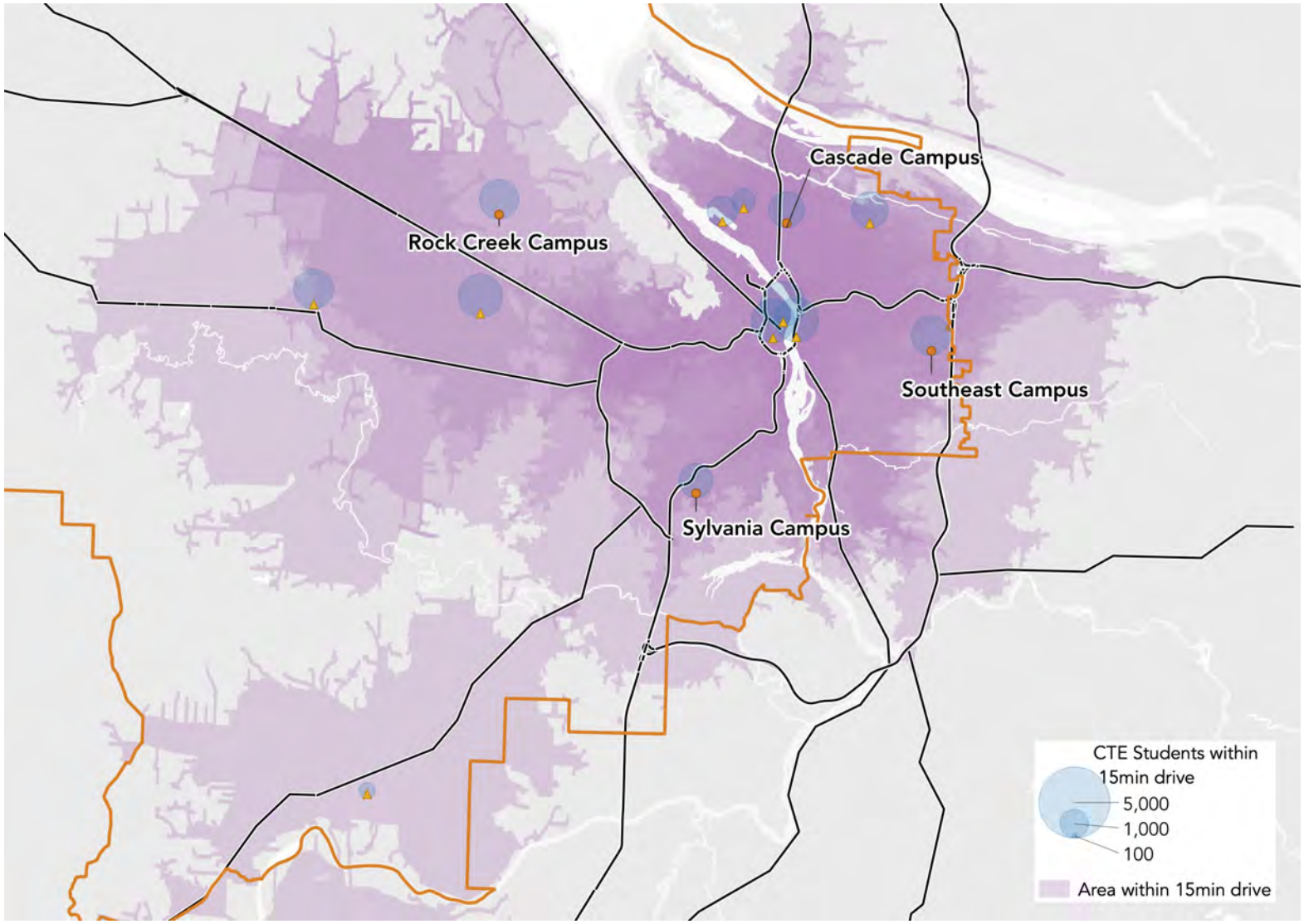


CMTT, completers

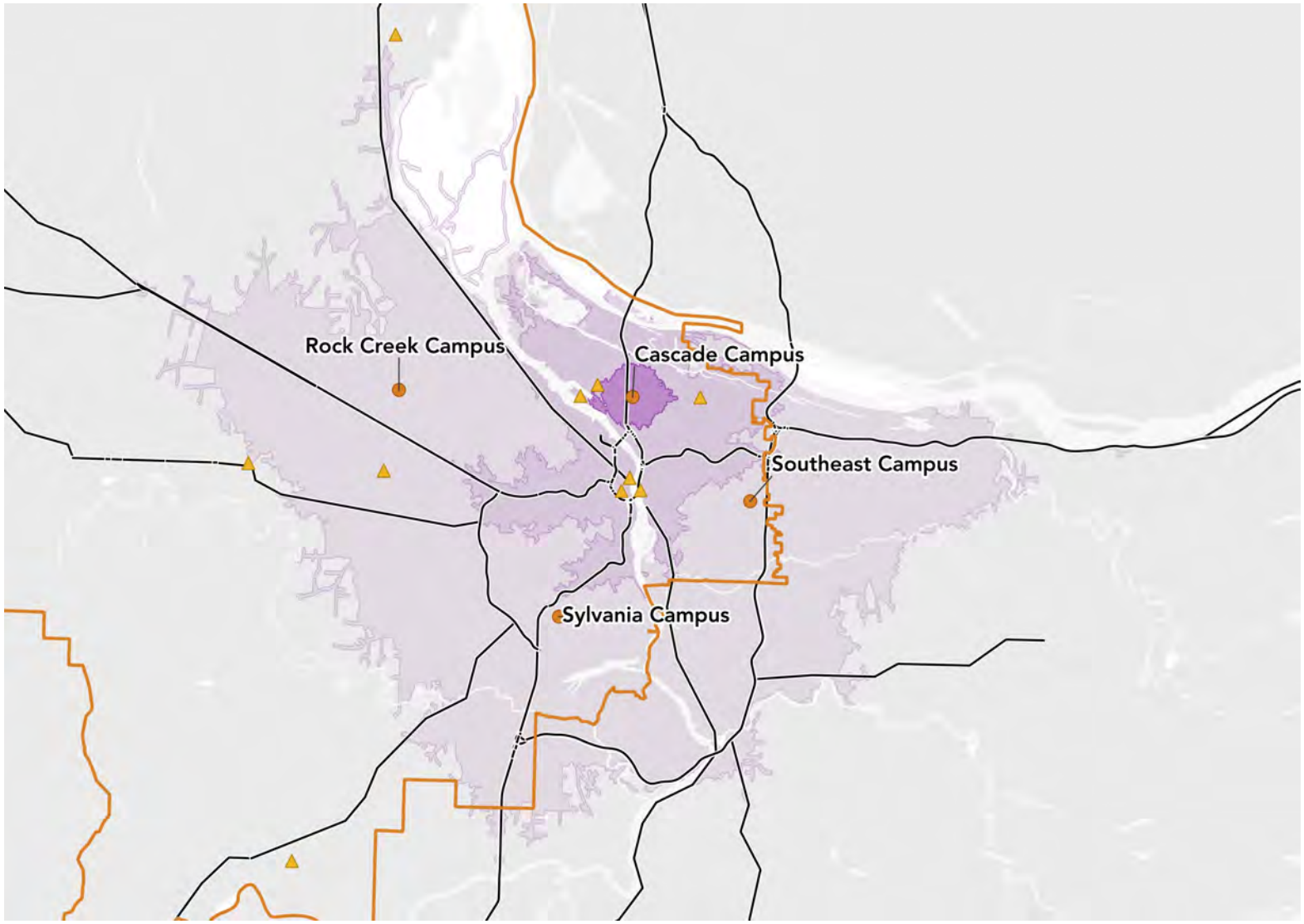


Drive-time reference maps

CMTT enrollees, by drive time

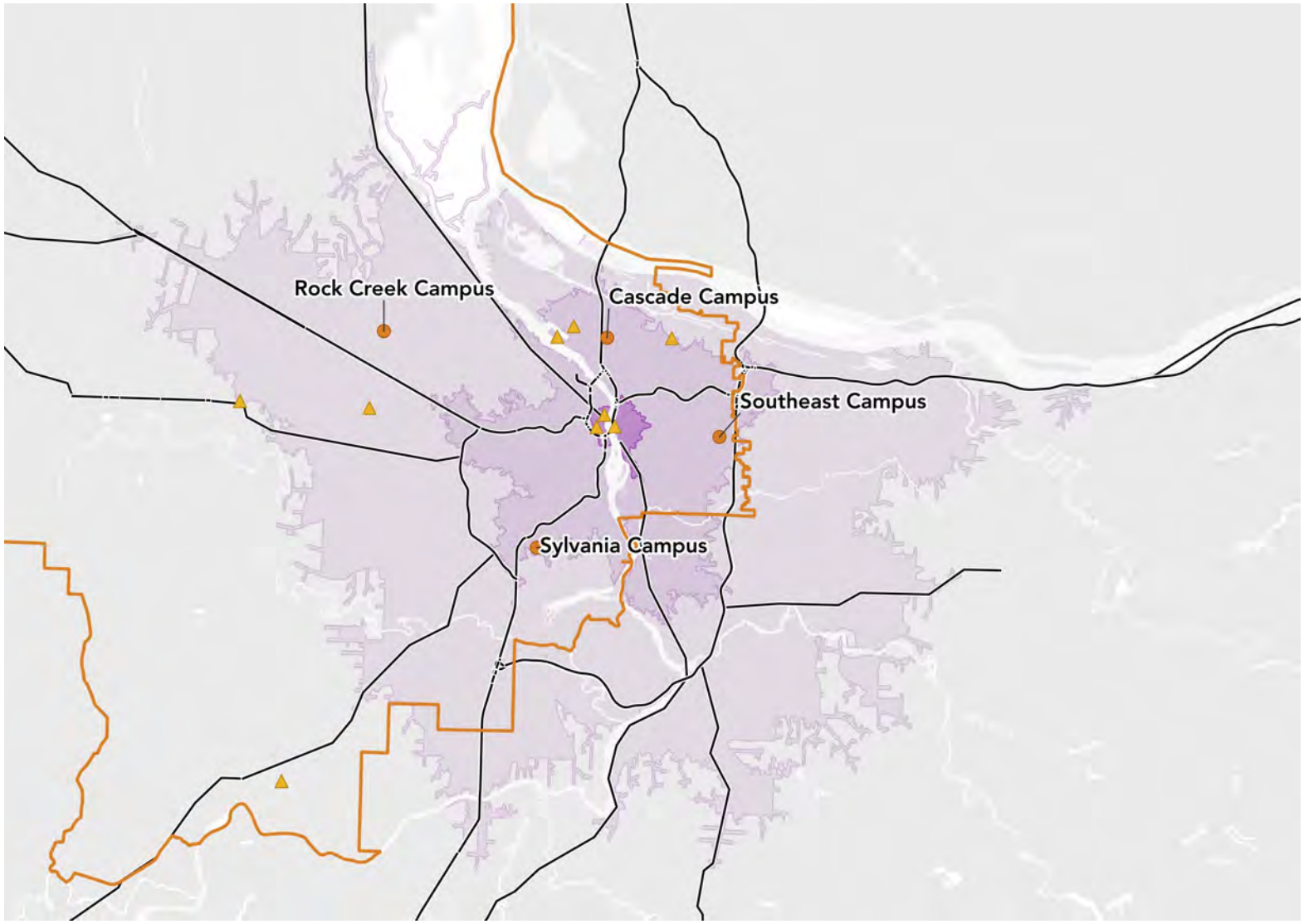


Cascade Campus



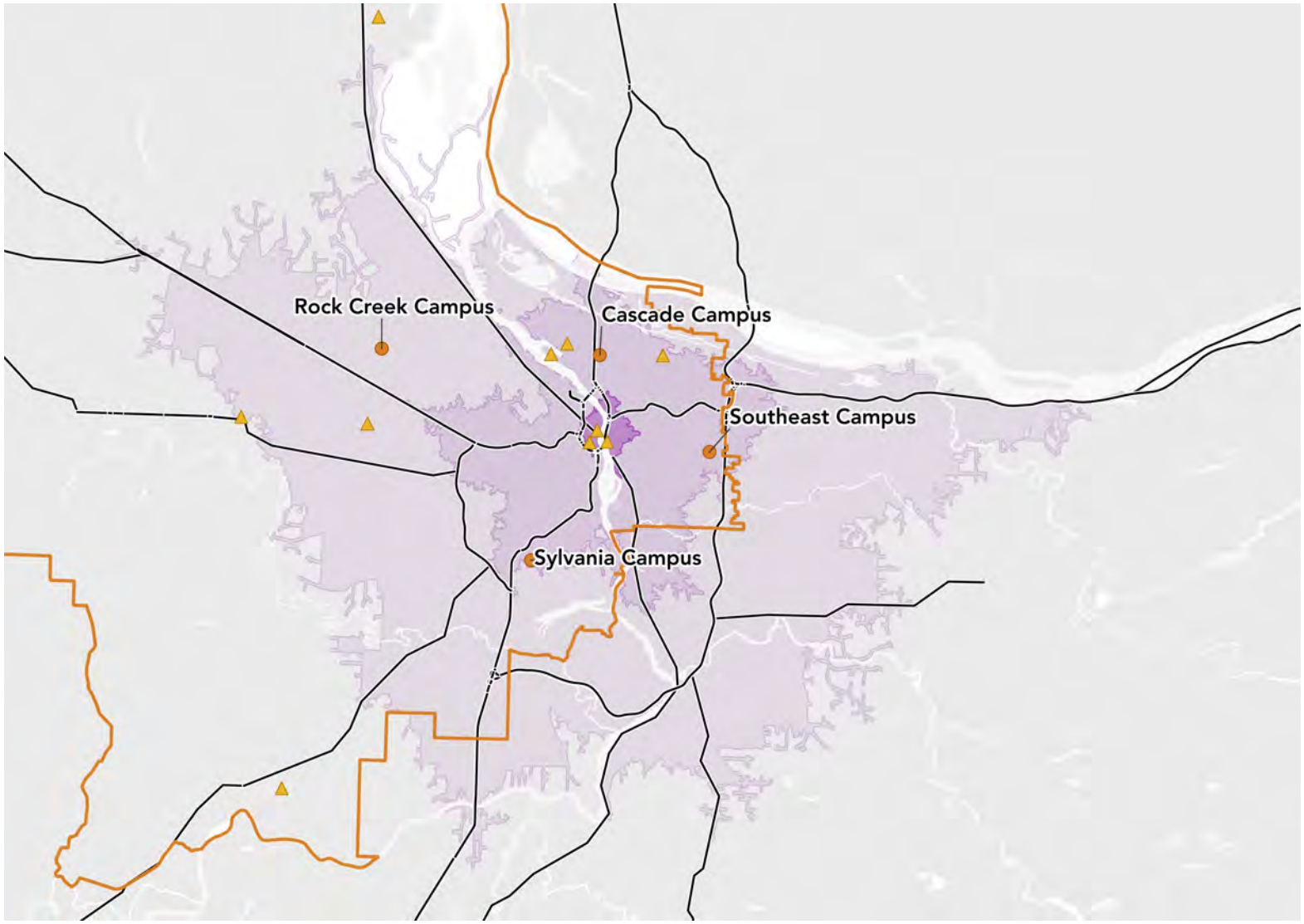
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

CLIMB Center



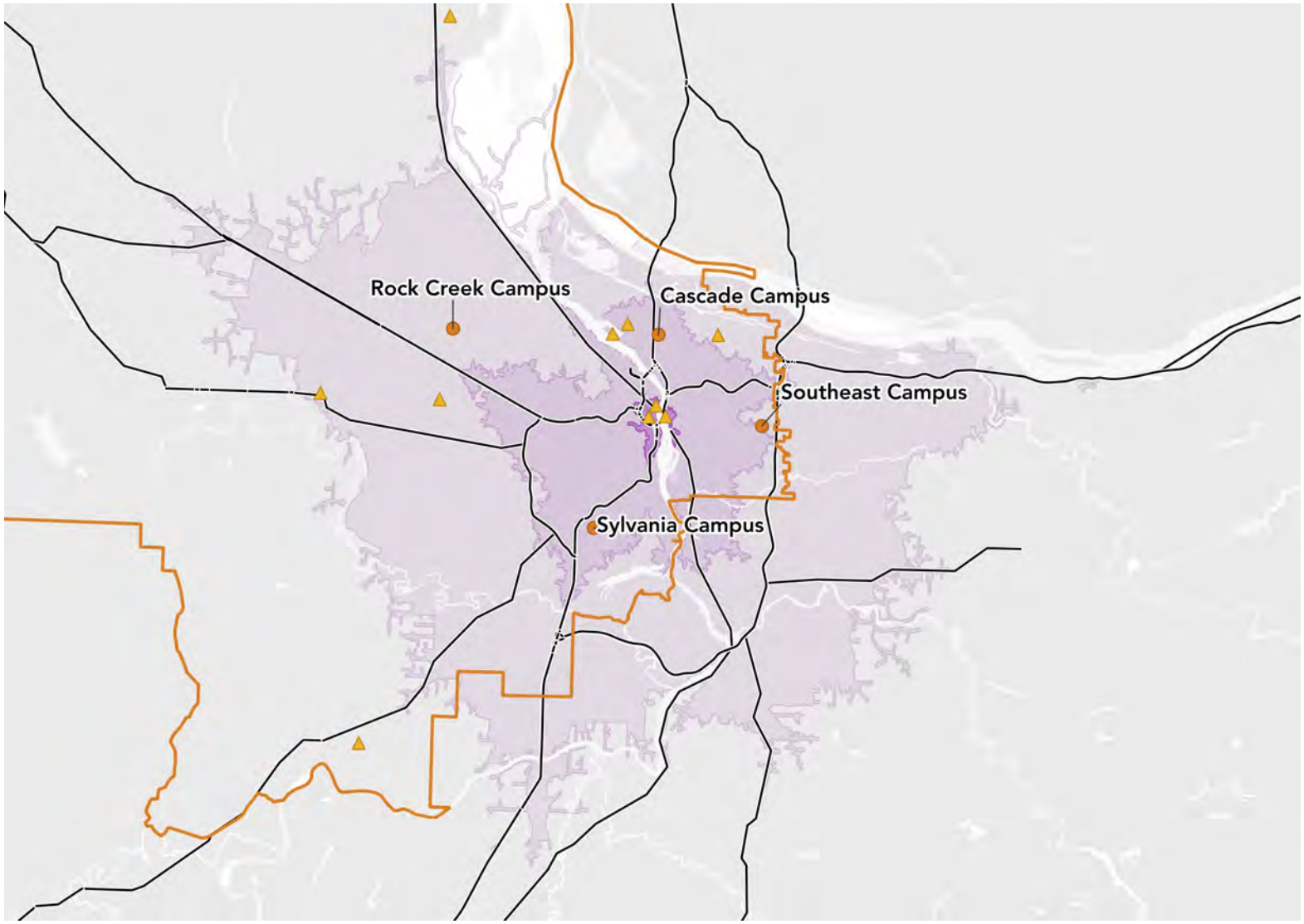
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Downtown Center



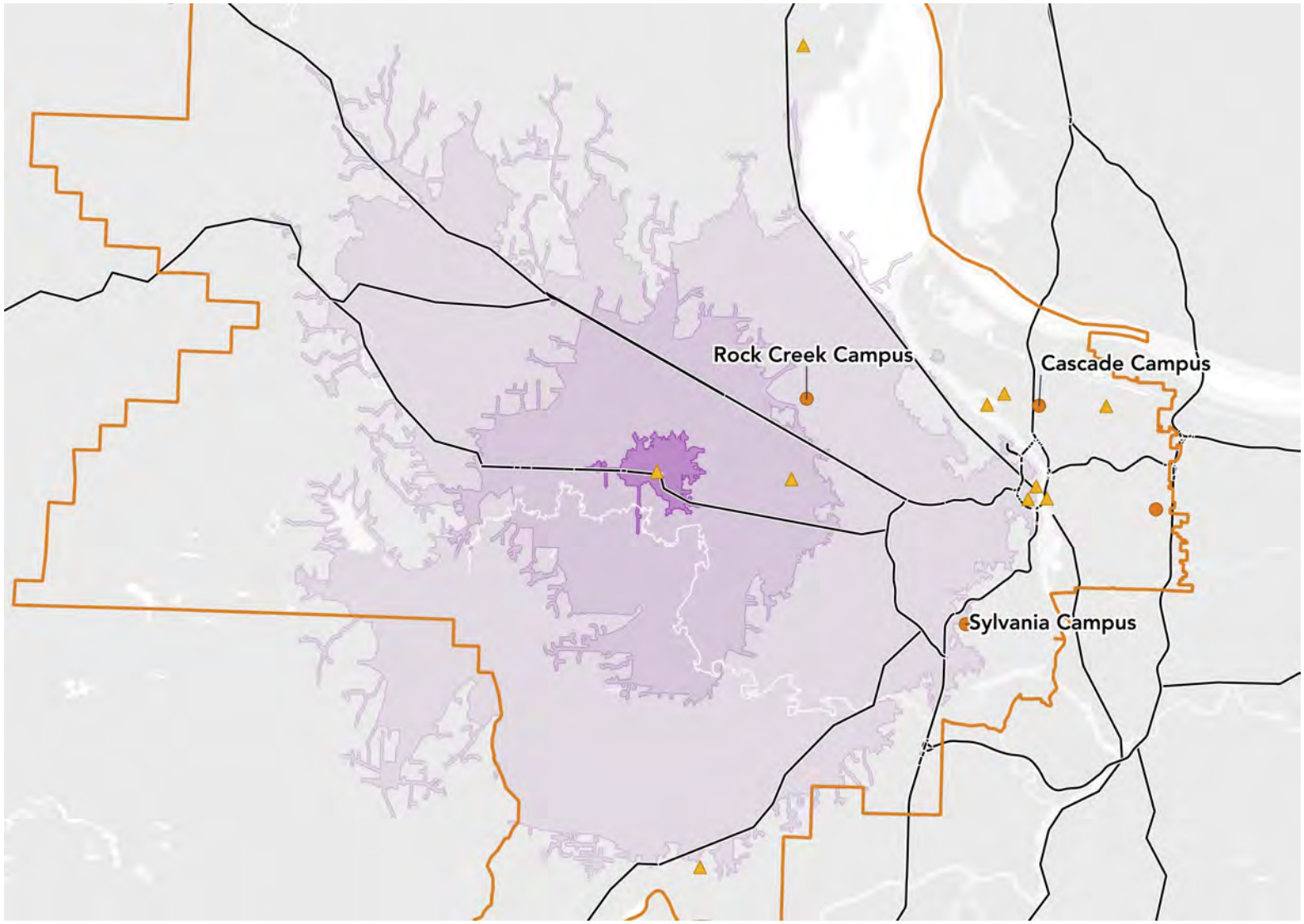
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Fourth and Montgomery



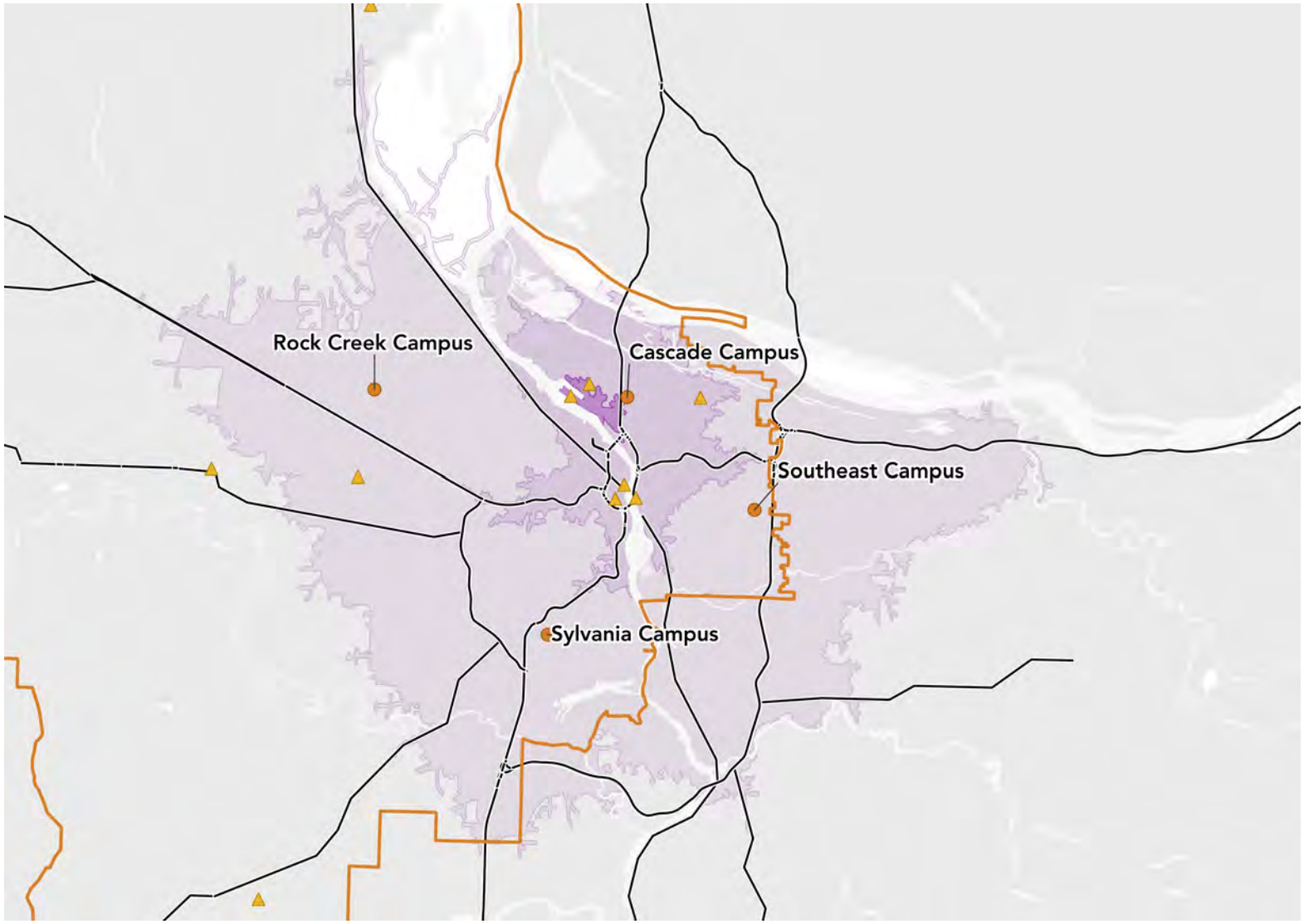
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Hillsboro Center



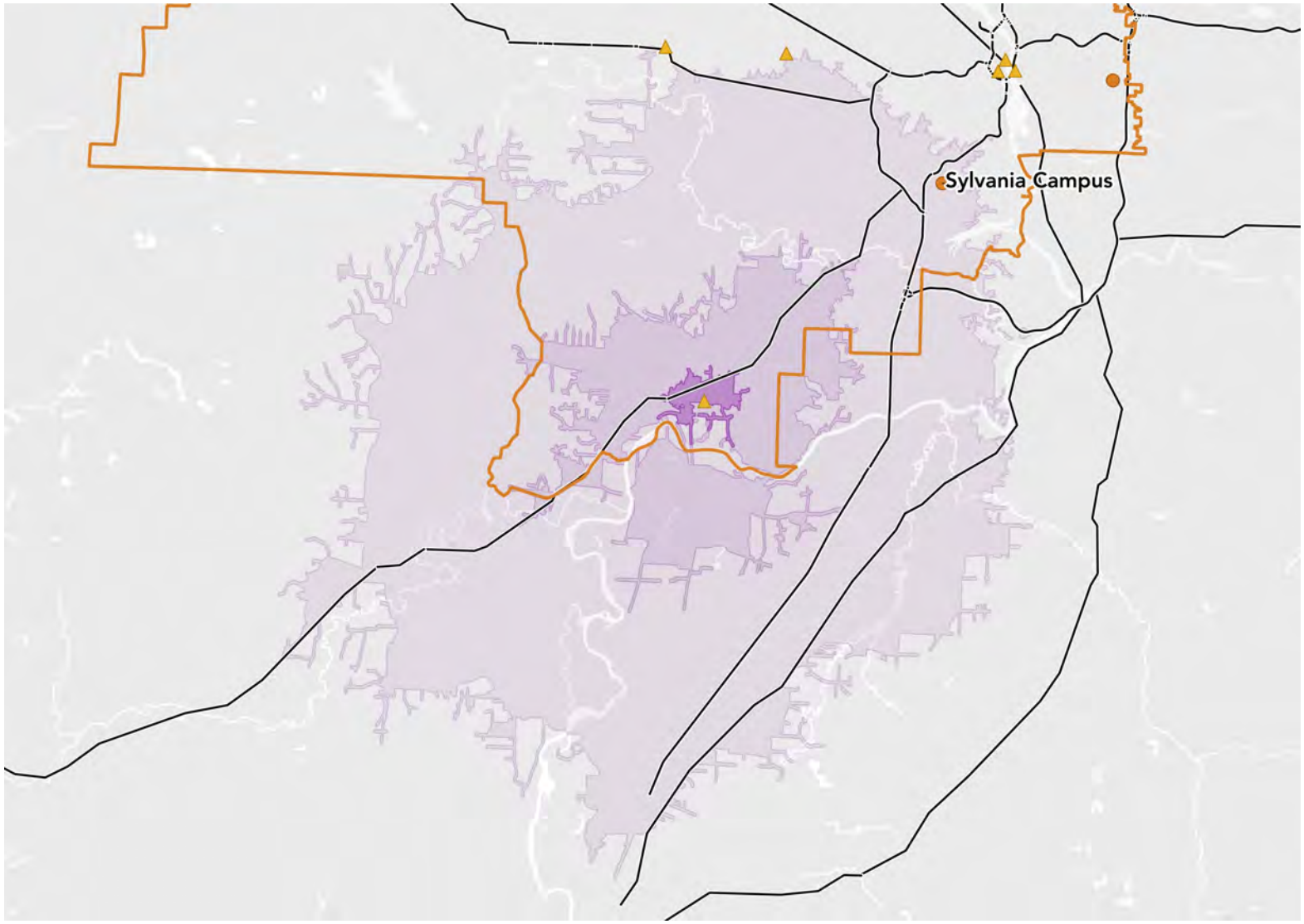
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Maritime Welding Training Center



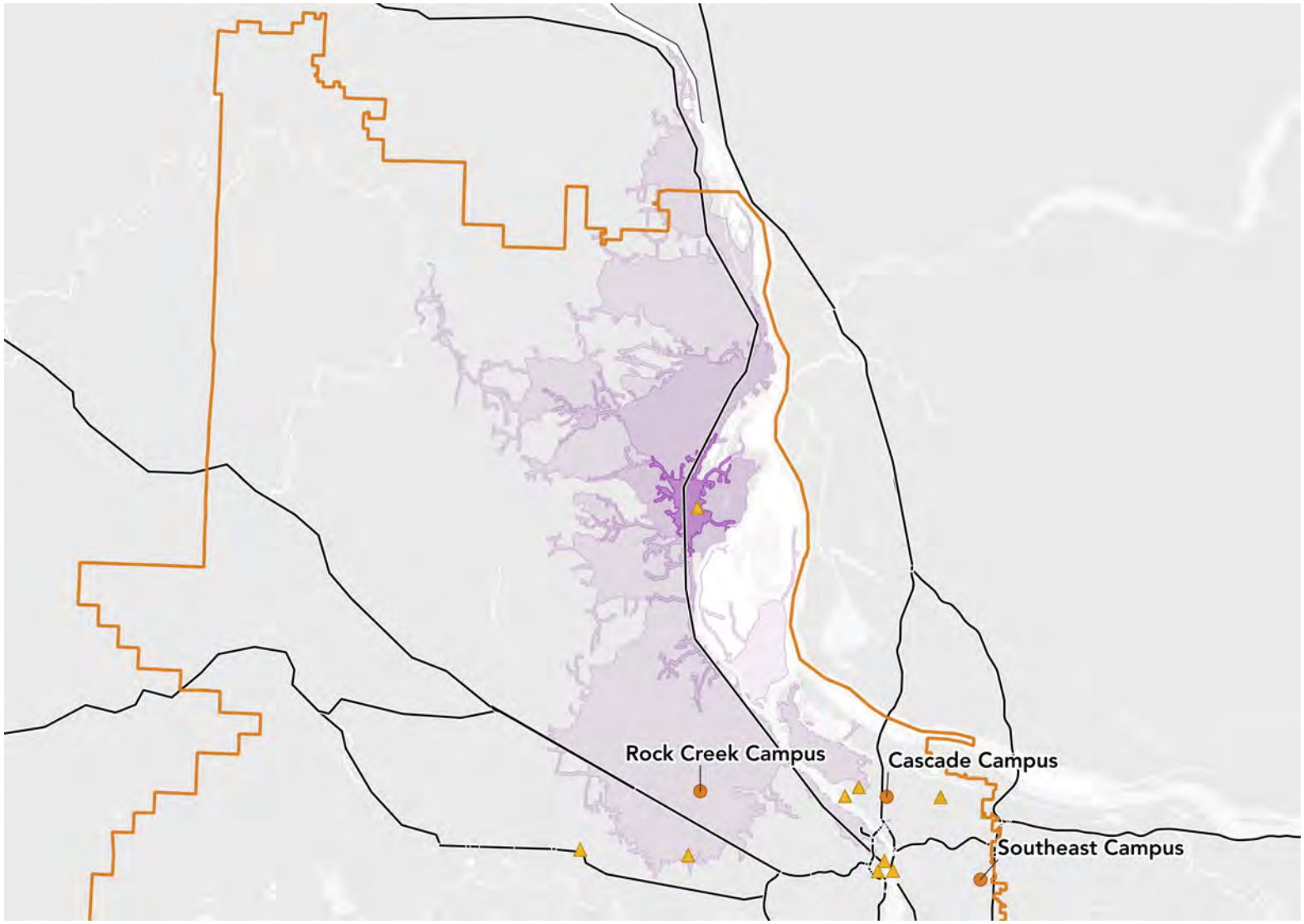
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Newberg Center



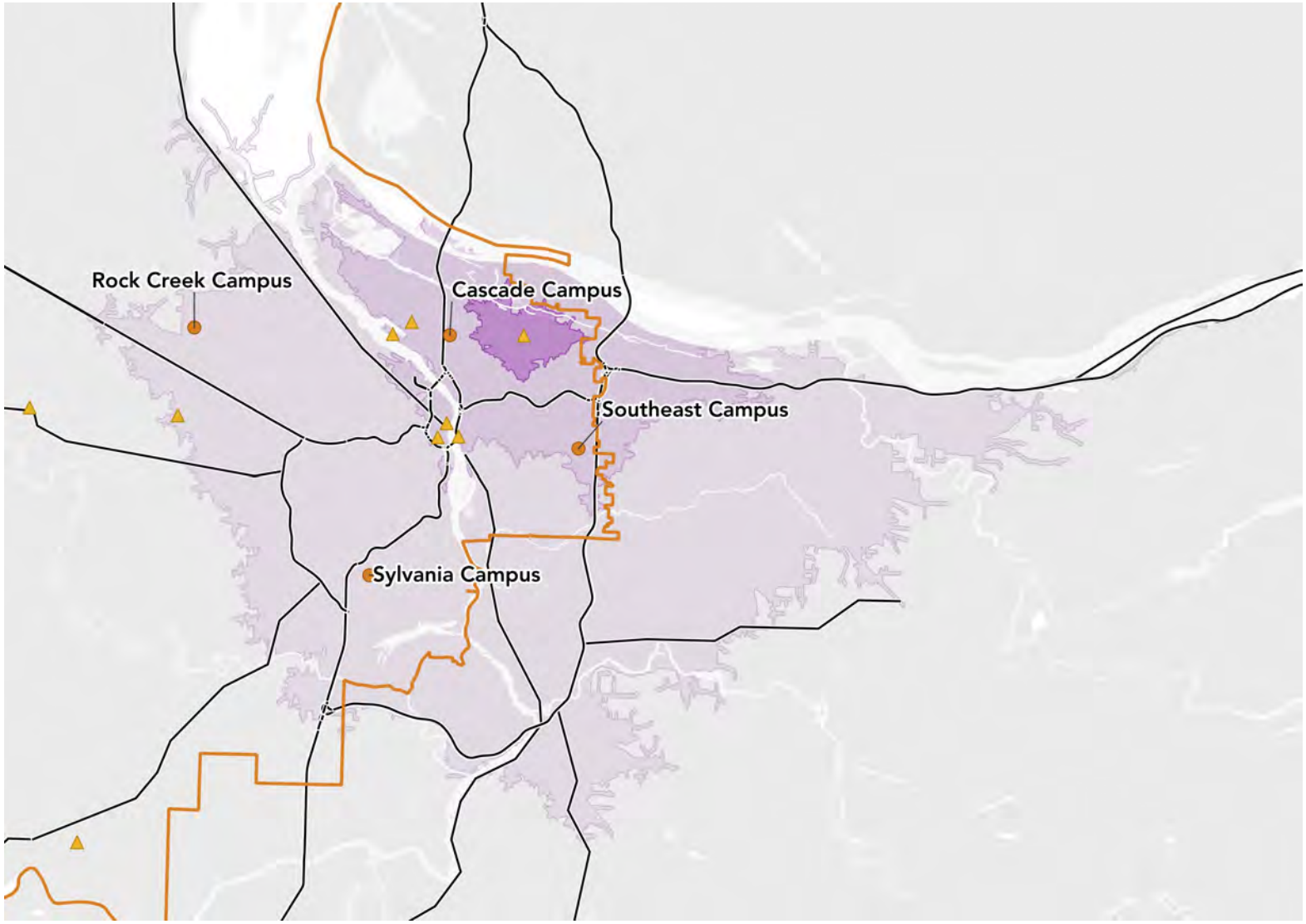
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Oregon Manufacturing Innovation Training Center



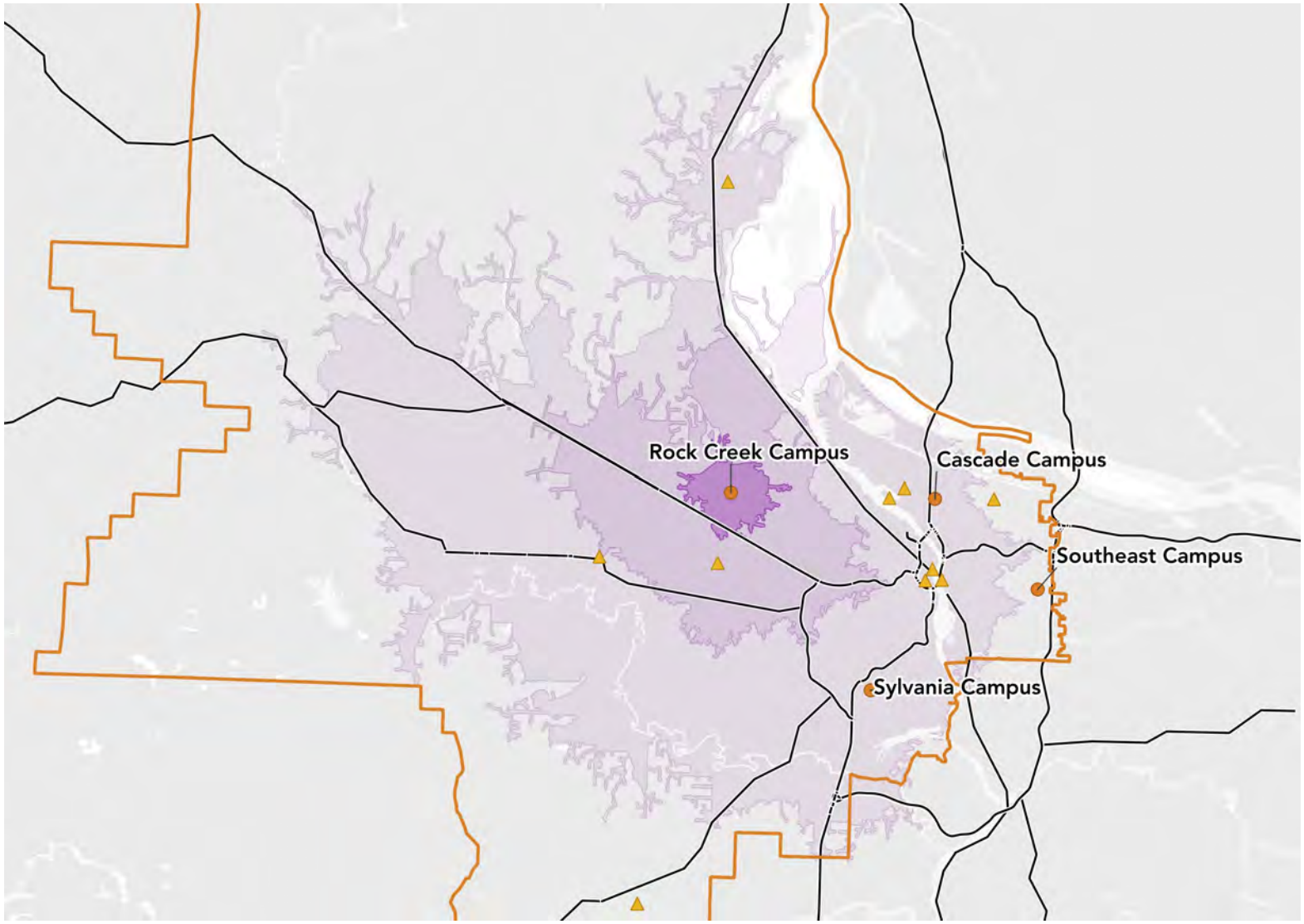
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Portland Metropolitan Workforce Training Center



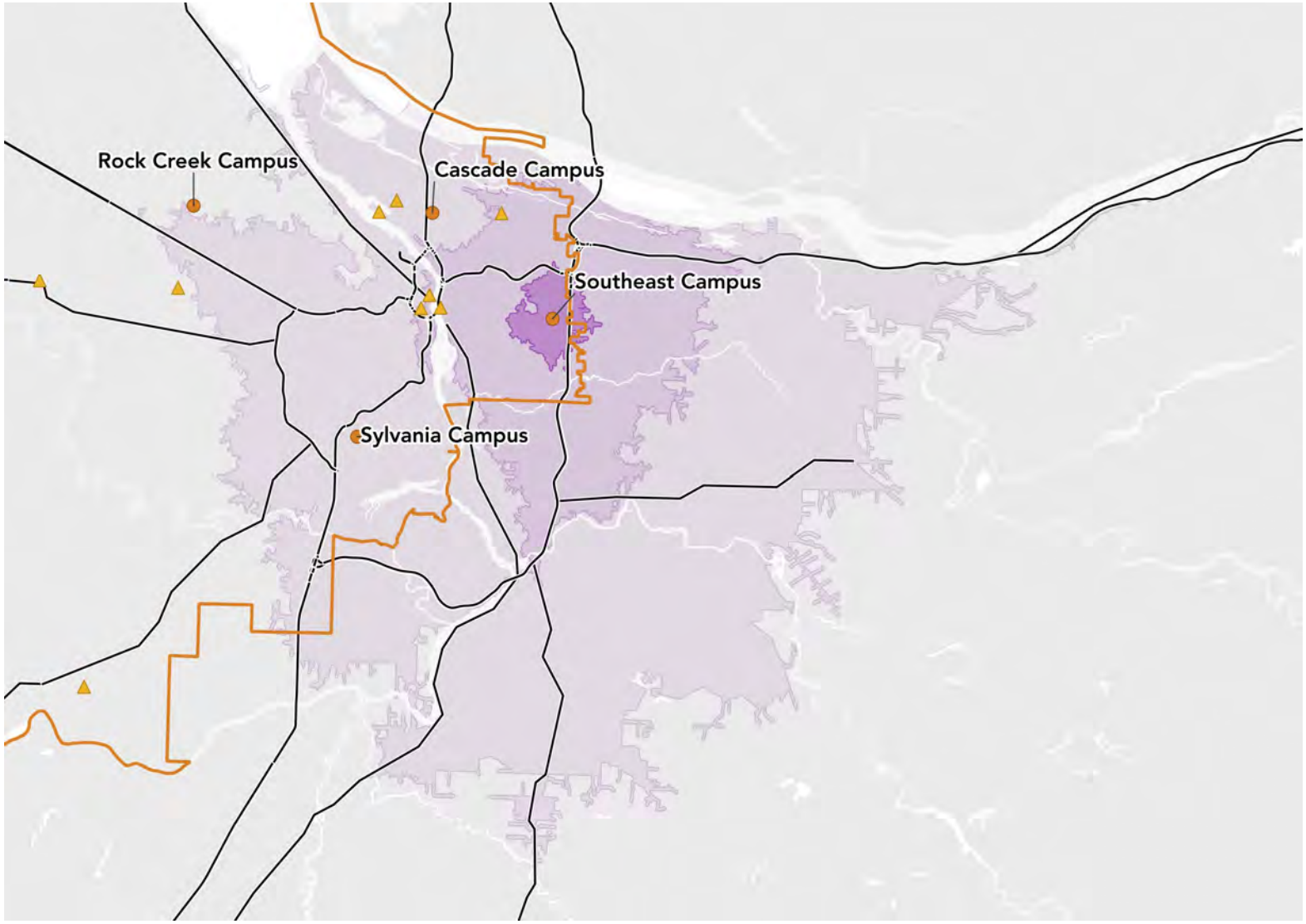
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Rock Creek Campus



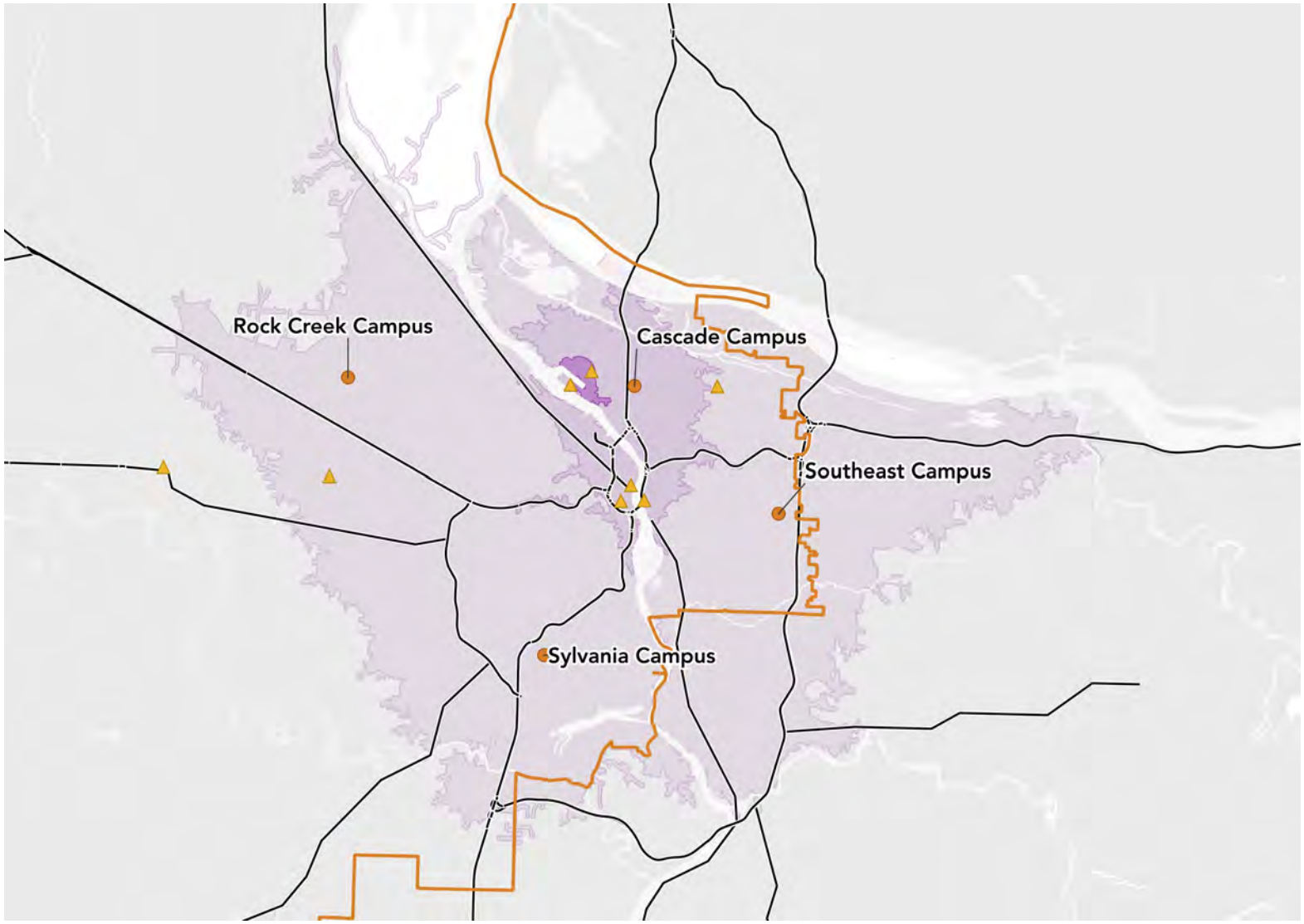
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Southeast Campus



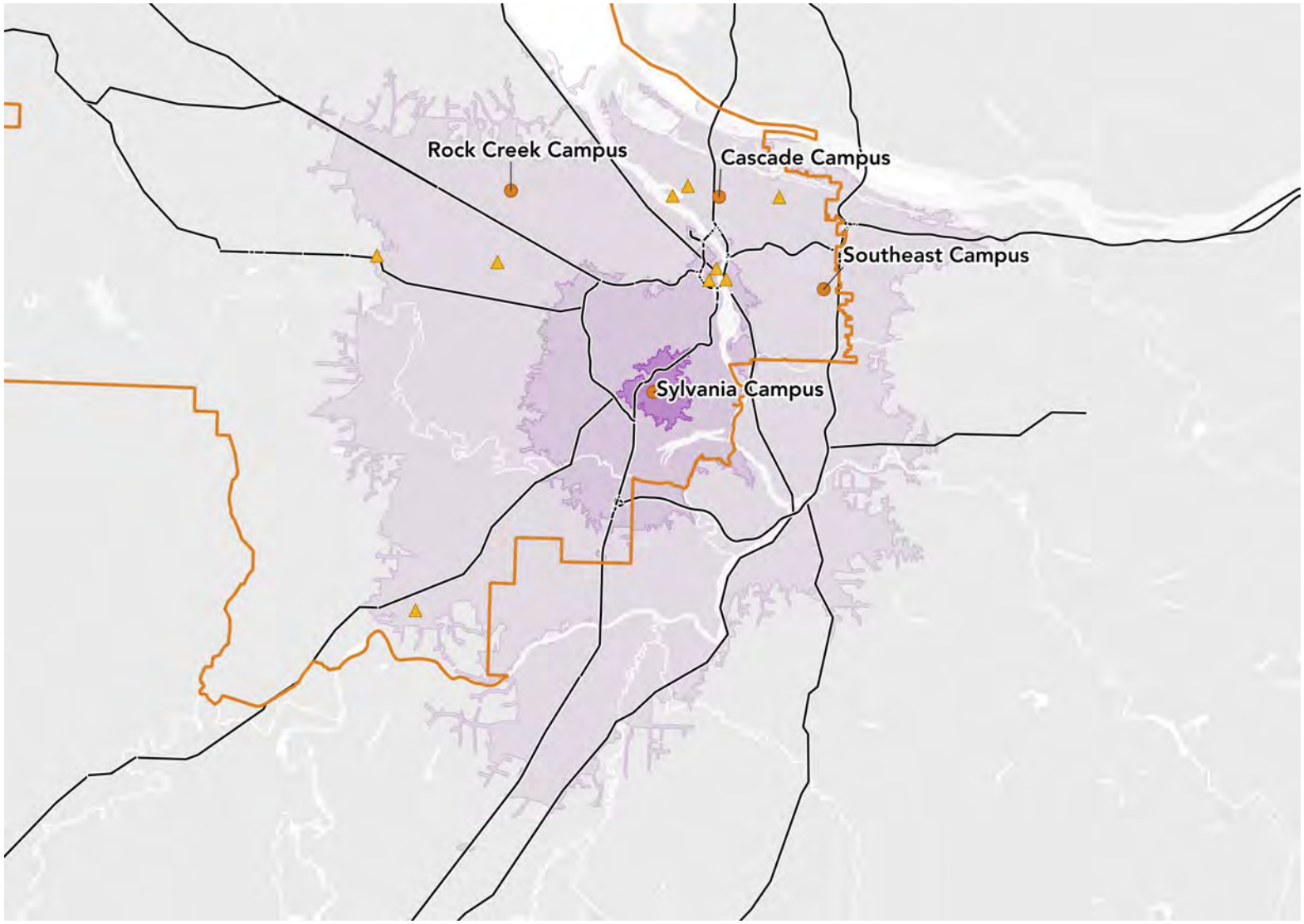
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Swan Island Trades Center



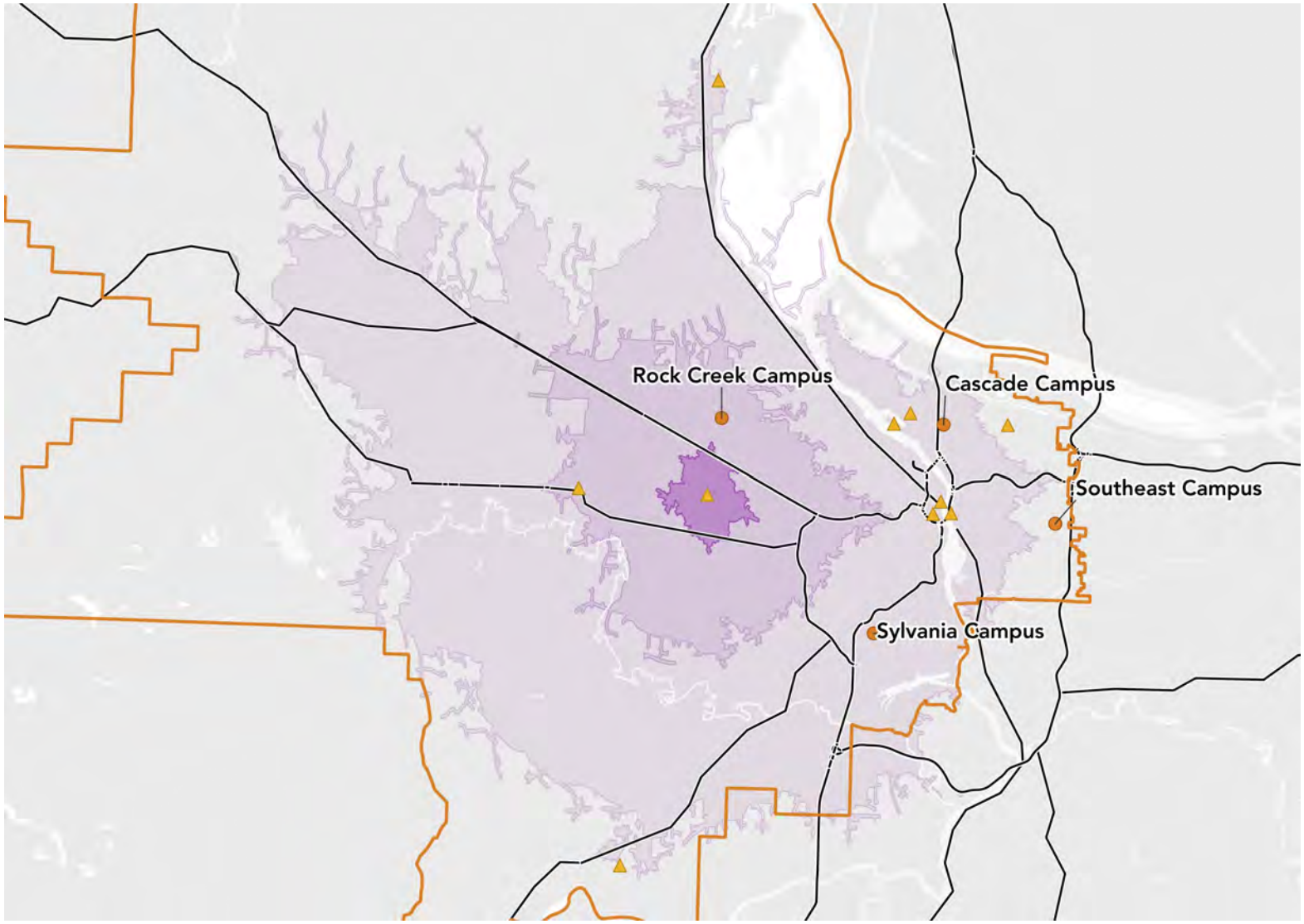
Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Sylvania Campus



Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

Willow Creek Center



Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

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PCC Career and Technical Education (CTE) Enrollment Study

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Background and purpose

- For selected Career and Technical Education (CTE) pathways at Portland Community College (PCC), ECONorthwest conducted a study of enrollment patterns by geography and prepared enrollment projections using PCC-provided student-level data.

- These analyses can help guide planning for future space needs and other College initiatives.

Selected CTE pathways

For facilities planning purposes, PCC asked ECONorthwest to identify and focus on the following pathways:

- Healthcare and Emergency Professions
- Construction, Manufacturing Tech, and Transportation (CMTT)
  - Automotive Service
  - Diesel Service
  - Building Construction Technology

Takeaways

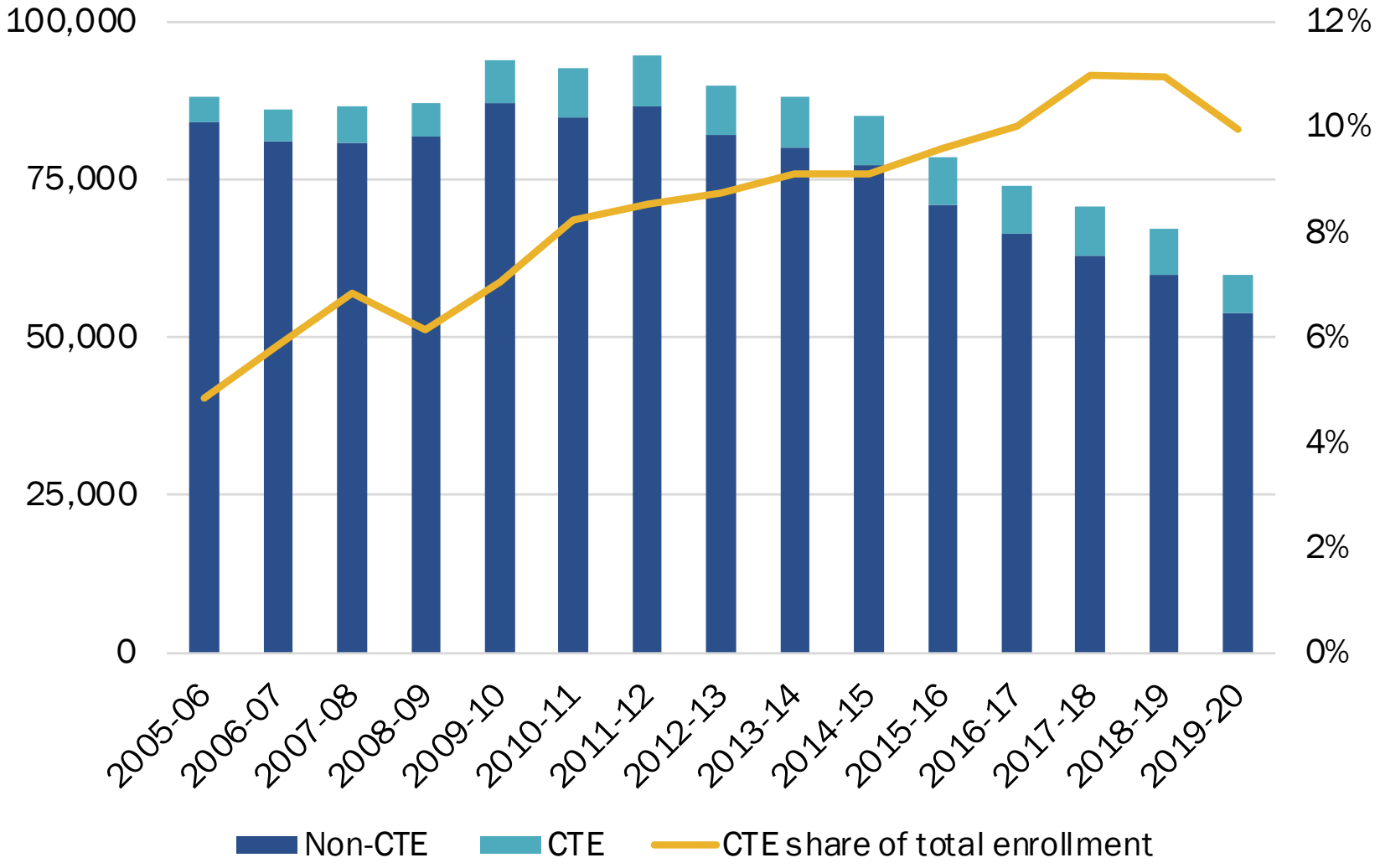
- Enrollment in the selected CTE pathways has risen since the mid-2000s and remained relatively steady until the 2019-20 academic year
- The selected CTE pathways make up about 10 percent of total enrollment, increasing from 5 percent in 2005-06
- The distribution of enrollment across the selected pathways has been stable over time
- Enrollees in the selected CTE pathways, and jobs relevant to these pathways, are distributed across the region
- Pathway-specific enrollment projections and the gap analysis suggest room for PCC programs to grow, through increased enrollment as well as higher completion rates

PCC data

- PCC provided ECONorthwest with anonymized student- and course-level data for academic years 2005-06 through 2019-20.
- These data included all courses students had taken as well as student demographic characteristics, including the zip code (either 5- or 9-digit, also known as zip+4) of the student's residence.
- Pathways were identified using program information available on PCC's website and were refined to exclude general education and other less relevant courses.
- Enrollees were assigned to pathways based on the pathway to which most of their credits were assigned.
- Enrollment projections are based on credit-hour based FTE, which differs from the clock-hour based FTE that PCC reports to the state.[1]

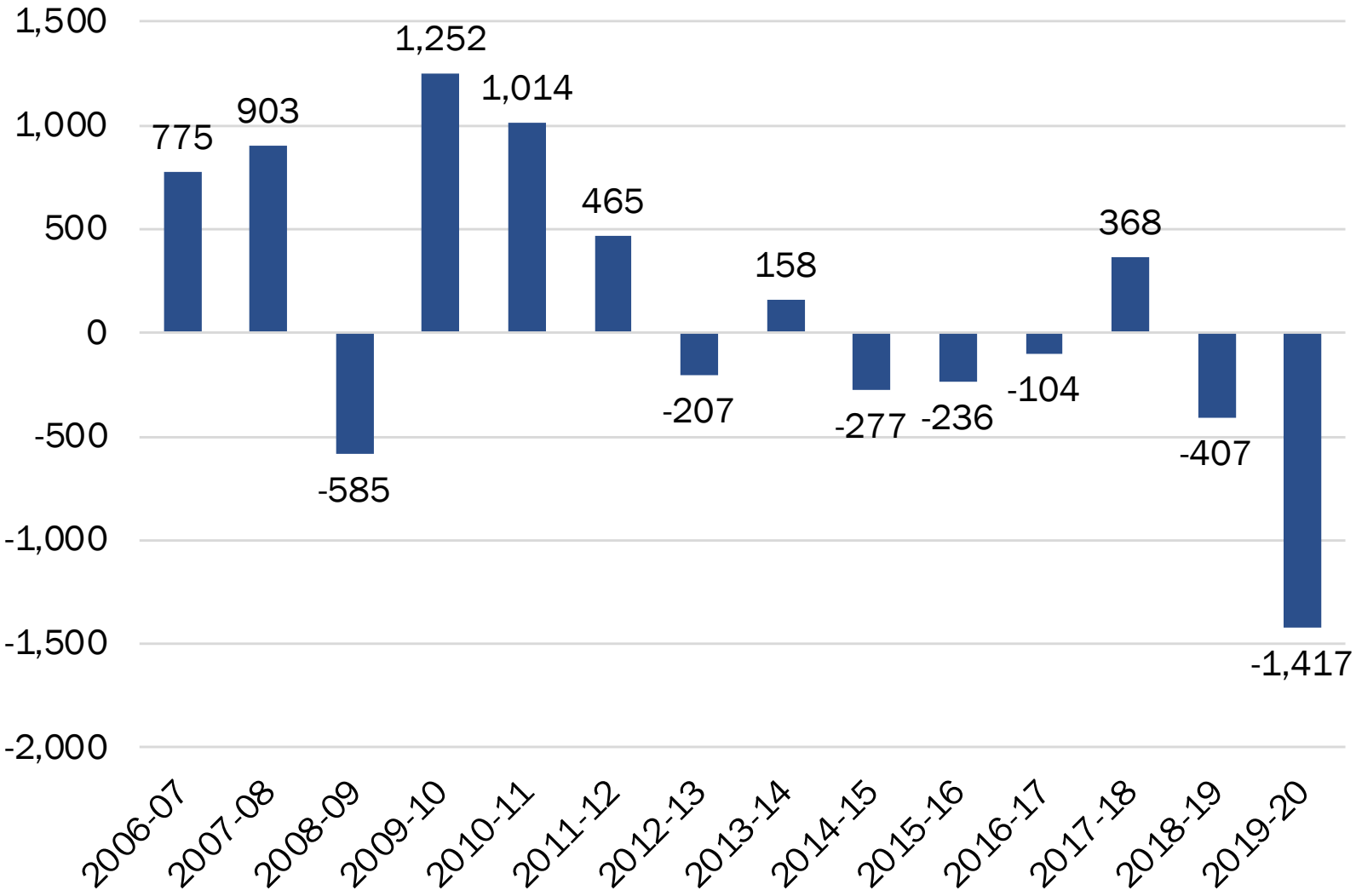
Career and Technical Education Enrollment and Completions

Selected CTE enrollment compared to total



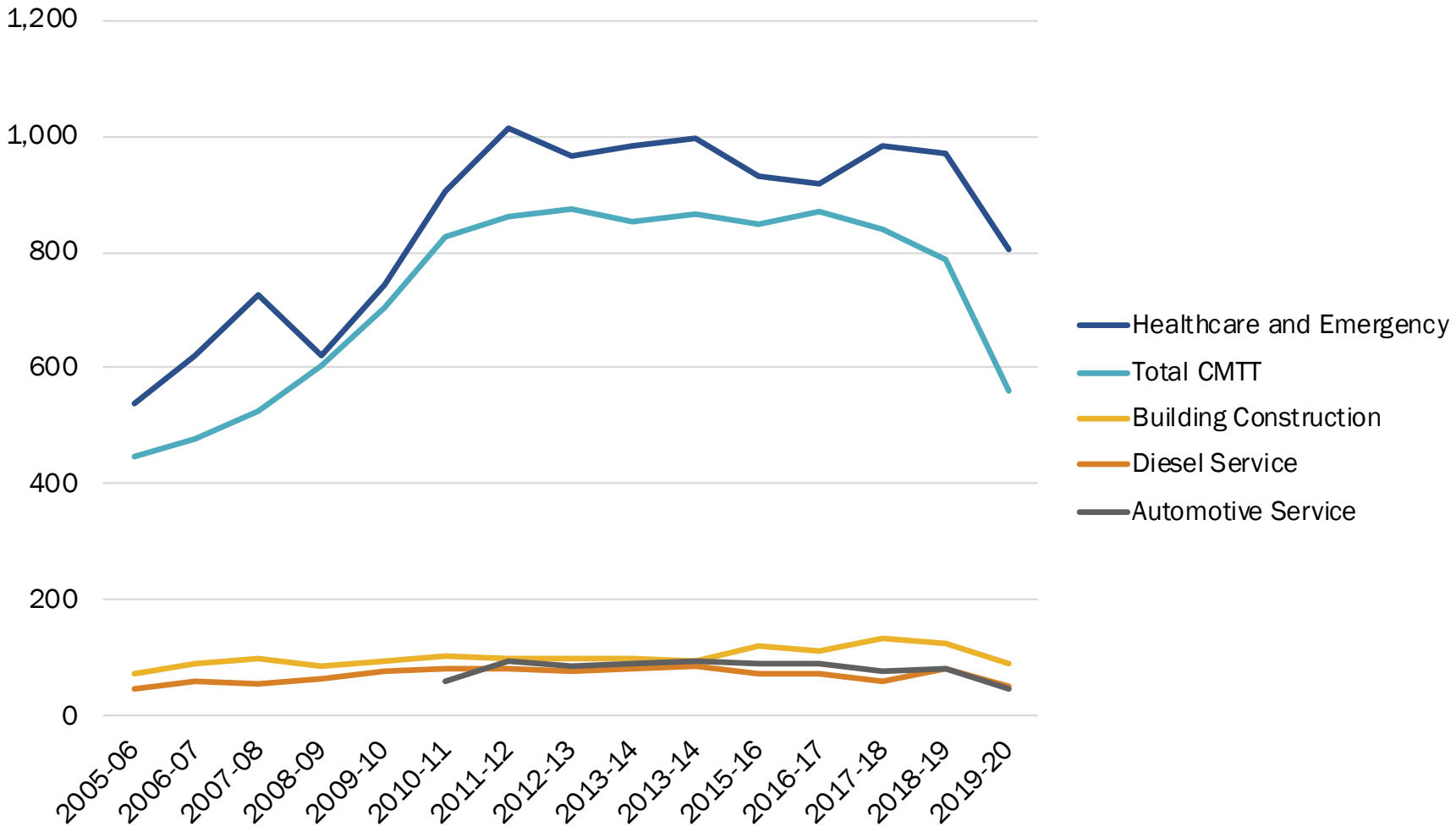
"CTE" encompasses the selected pathways of interest and is not inclusive of all CTE enrollment at PCC.
Source: ECONorthwest analysis of PCC student-level data.

Absolute change in selected CTE enrollment



Source: ECONorthwest analysis of PCC student-level data.

Selected pathway FTE over time

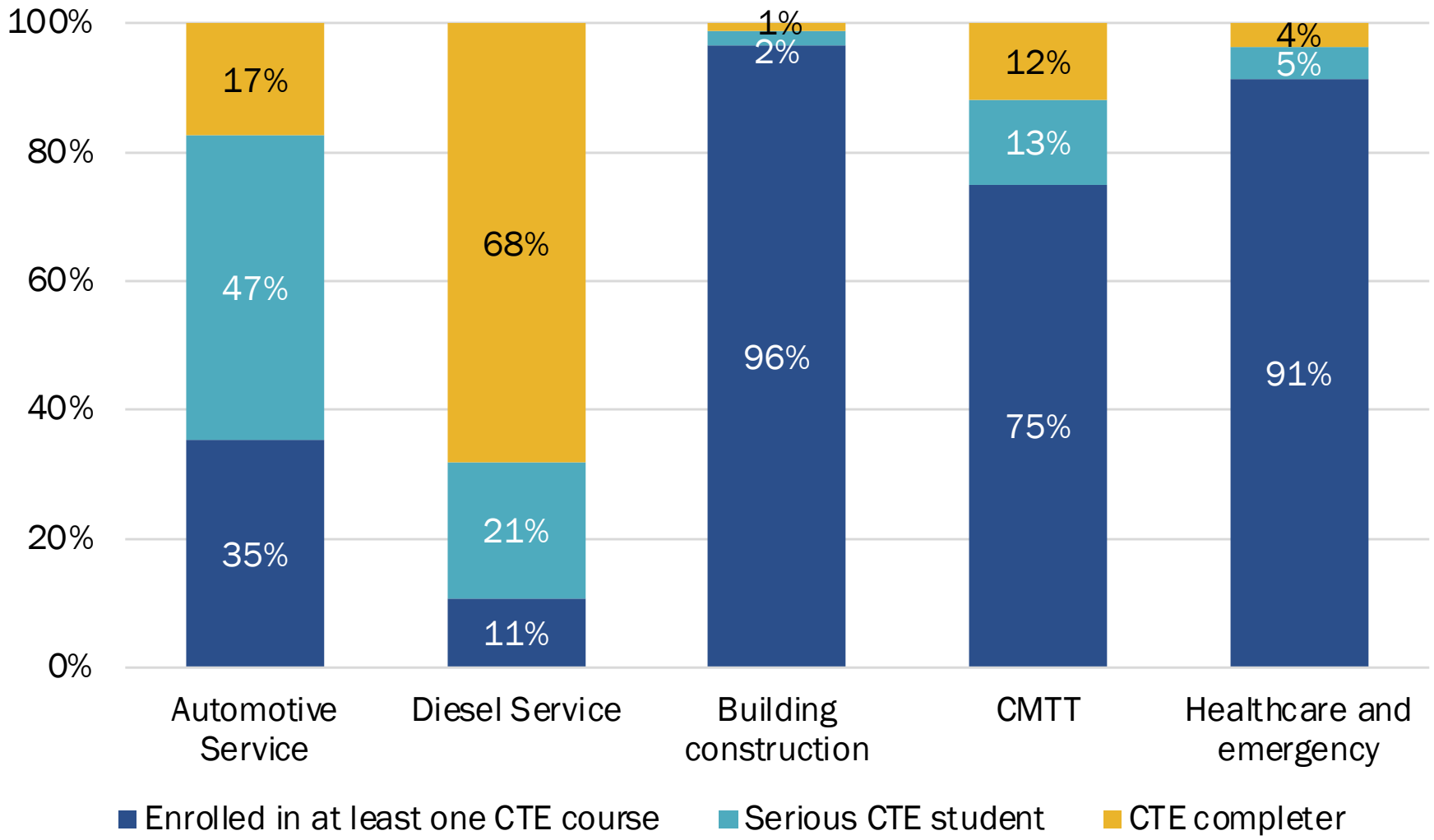


Source: ECONorthwest analysis of PCC student-level data

CTE enrollment intensity

- We defined three levels of CTE intensity
  1. CTE enrollee – Student enrolled in at least one CTE course within the academic year
  2. Serious CTE enrollee – Student enrolled in at least the median number of credits (pooled for 2013-14 through 2018-19) for certificate completers within each relevant pathway
  3. CTE completer – Student completed in a selected CTE pathway within the academic year

CTE enrollment intensity by pathway, 2018-19



Source: ECONorthwest analysis of PCC student-level data

Pathway Enrollment Geography and Projections

Roadmap for each pathway

1. Geography of enrollment
2. Jobs distribution
3. Projections and gaps

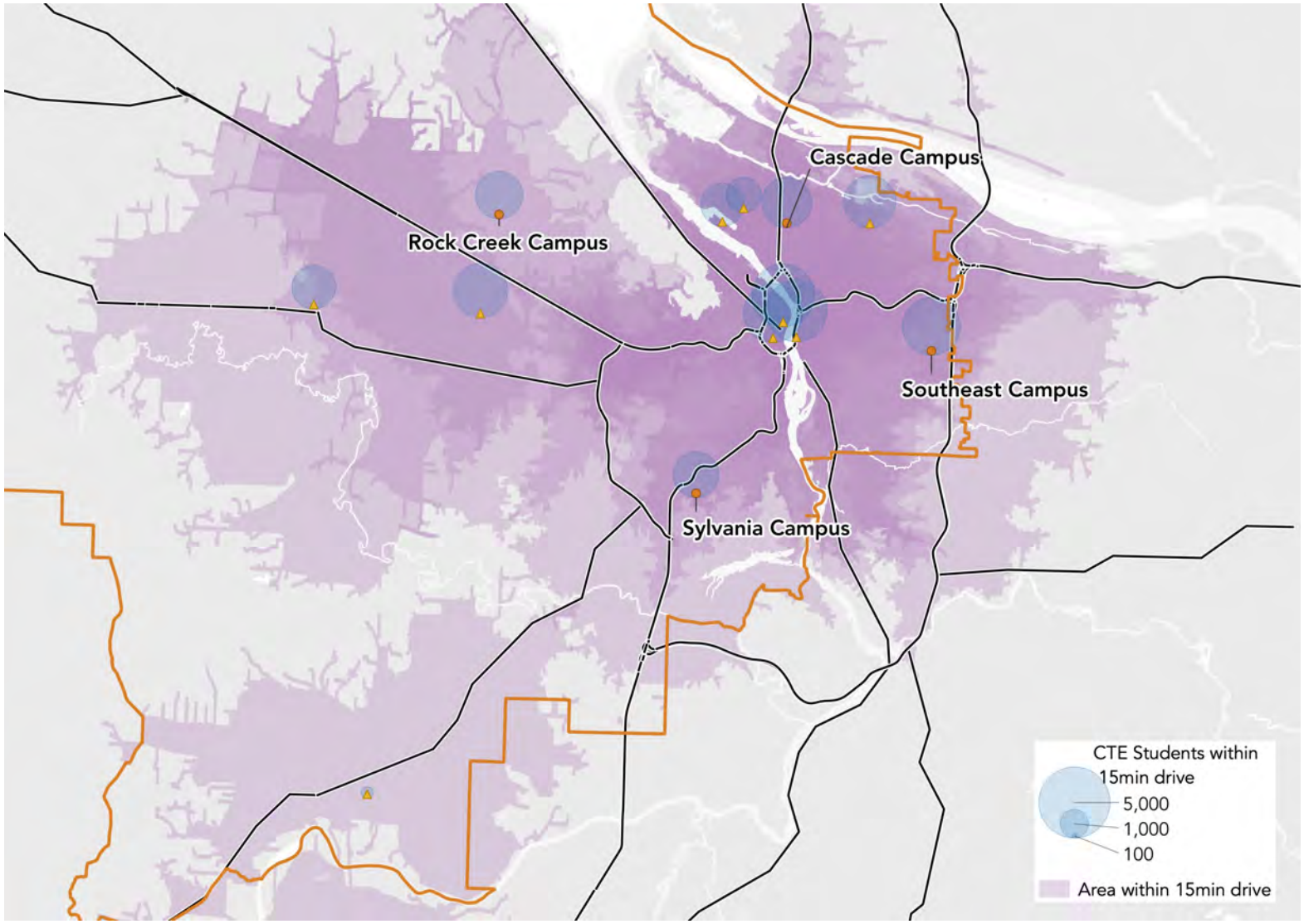
Note about the enrollment projections

- We produced high and low projections based on historical CTE enrollment and the growth rate derived from our previously completed enrollment projections.

- The high and low projections provide a potential range for how CTE enrollment may perform in the future. Future enrollment will depend on many things, including recovery from the COVID-19 pandemic.
  - **High projections:** High projections were produced using CTE enrollment in 2018-19 as the base and applying growth rates from previously completed enrollment projections.
  - **Low projections:** Low projections were produced using CTE enrollment in 2019-20 as the base and applying growth rates from previously completed enrollment projections.

Healthcare and Emergency

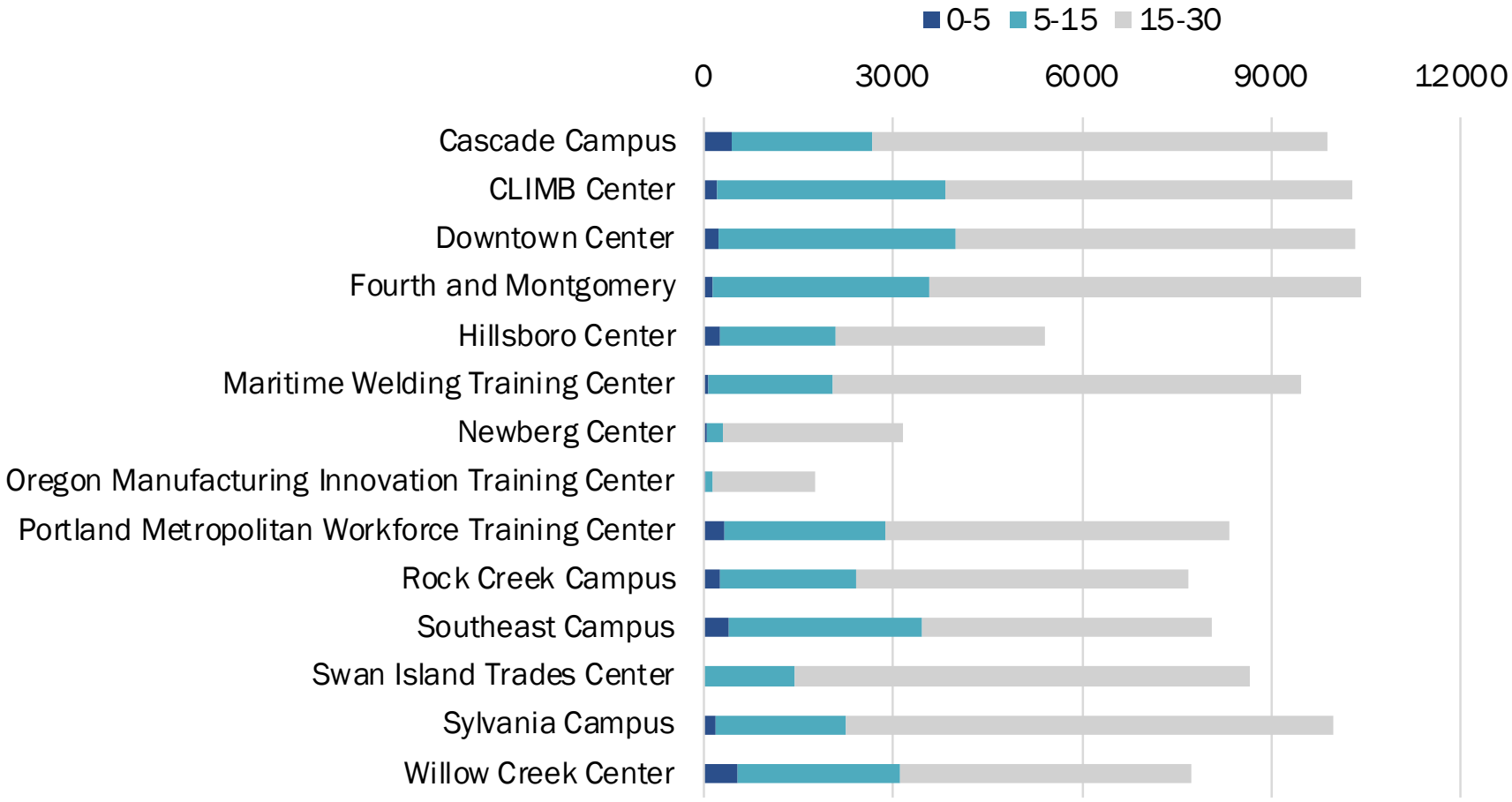
Healthcare and Emergency enrollees, by drive time



Enrollees in 2016-19 (three academic years). Source: ECONorthwest

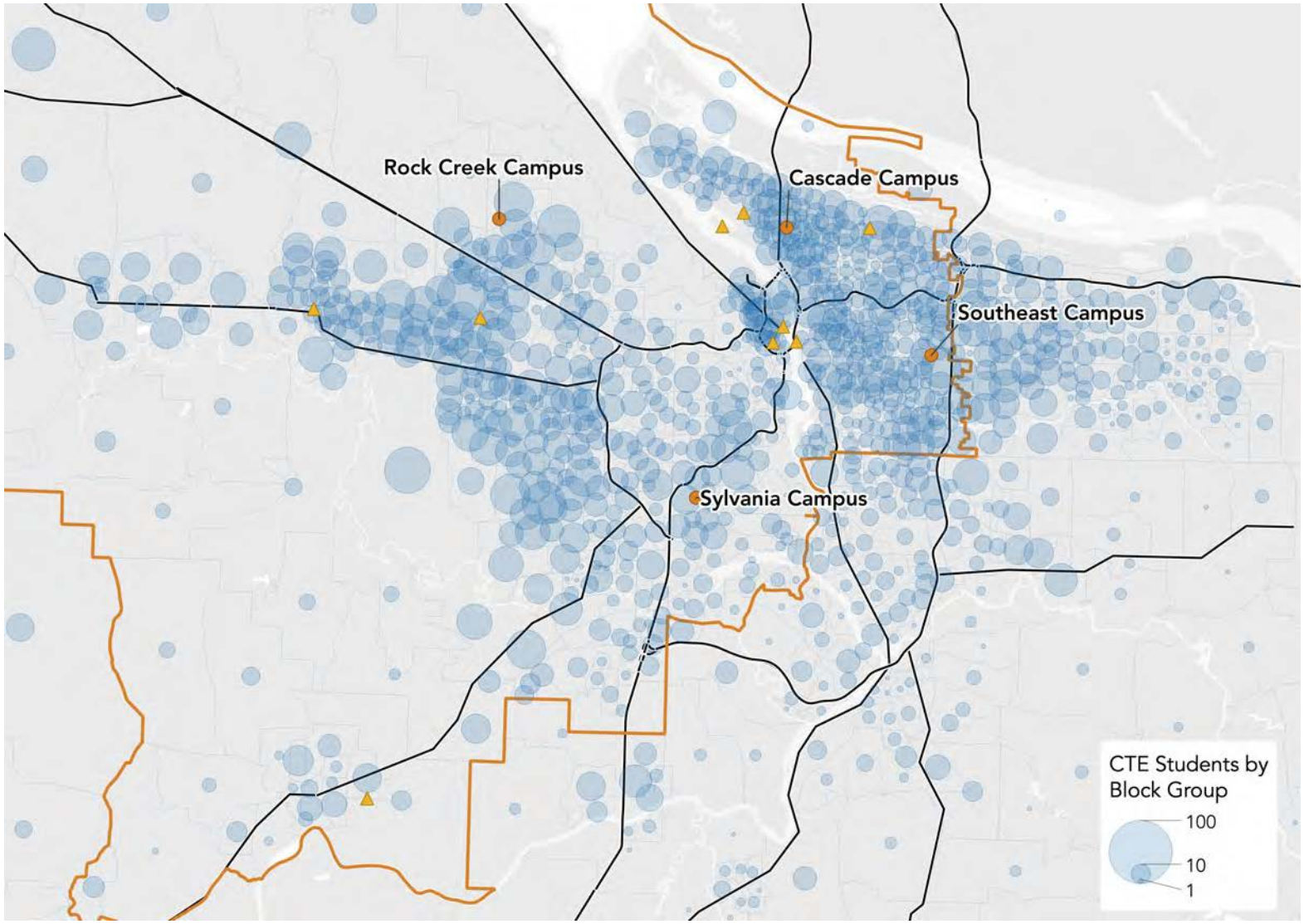
Drive times: Healthcare and Emergency

Drive time to each PCC campus/center (in minutes) for Healthcare enrollees



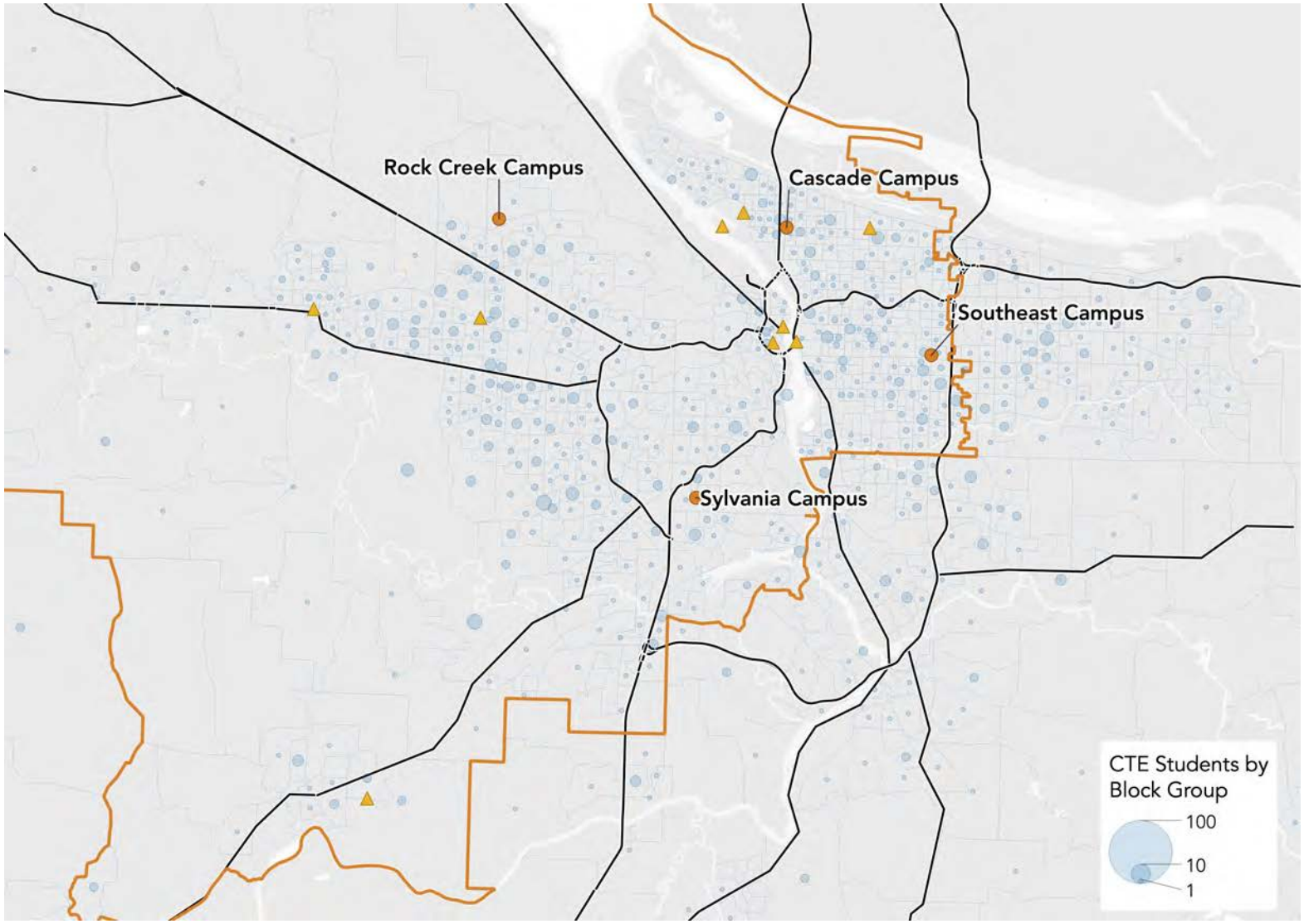
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency, all enrollees



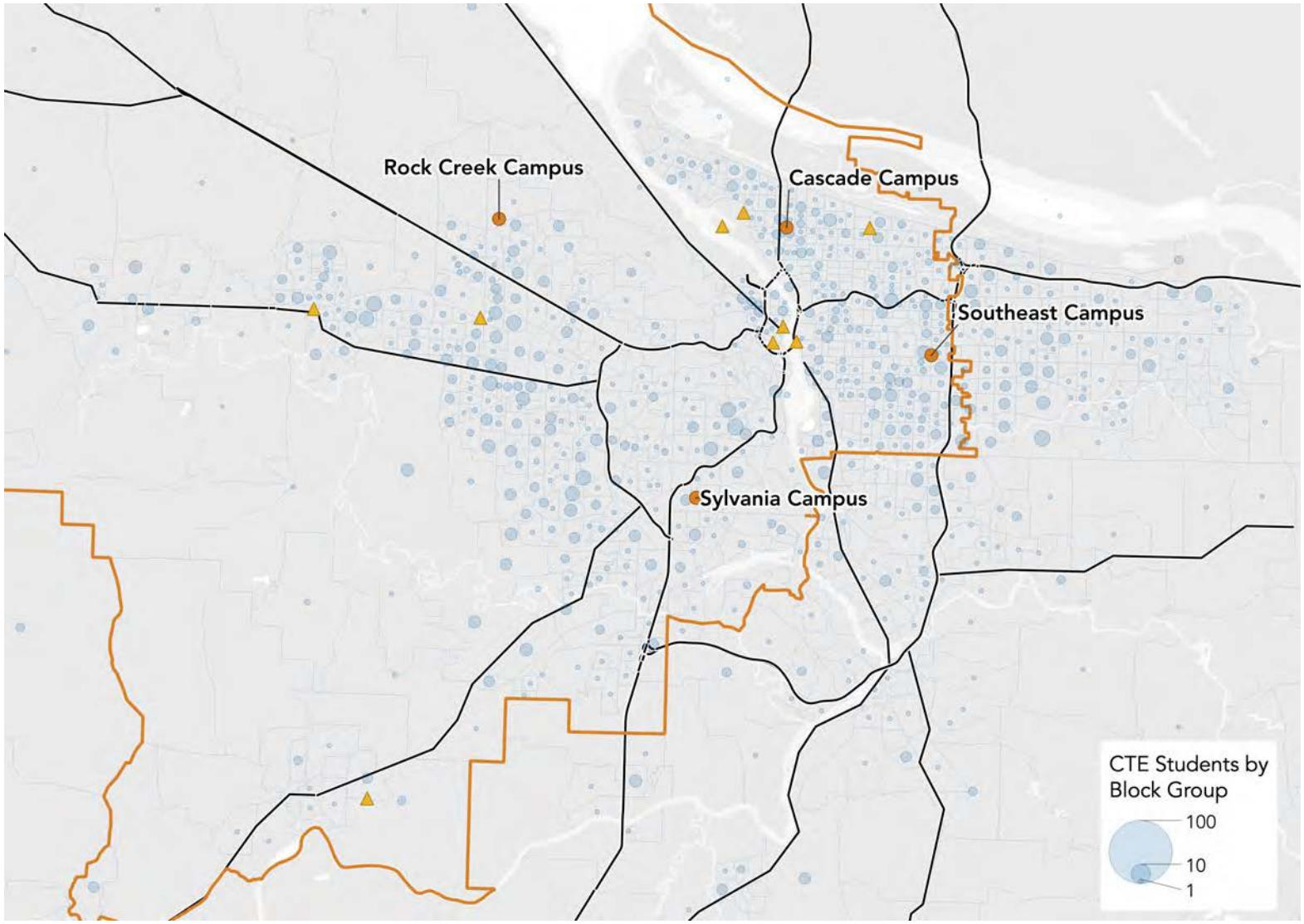
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency, serious enrollees



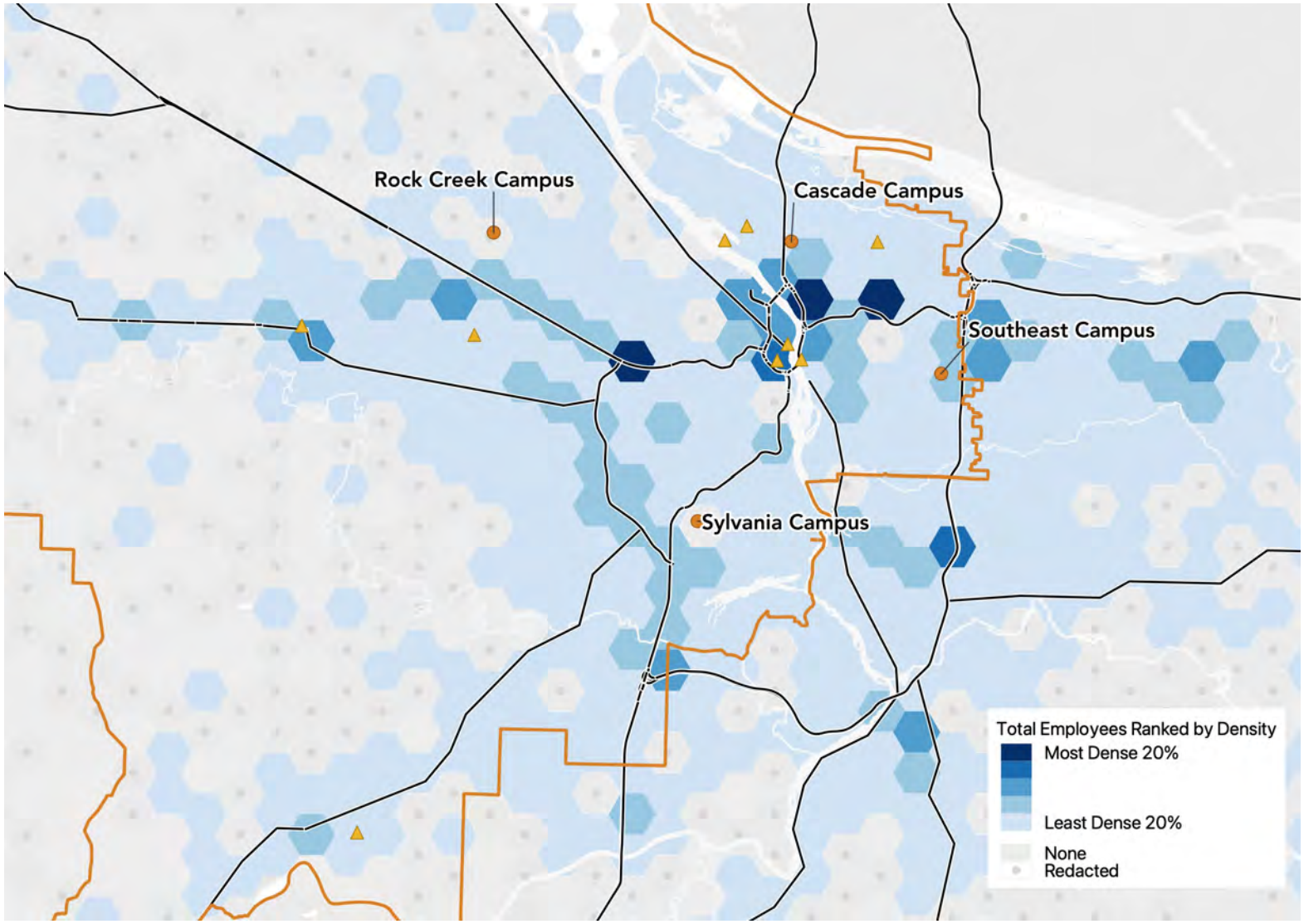
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency, completers



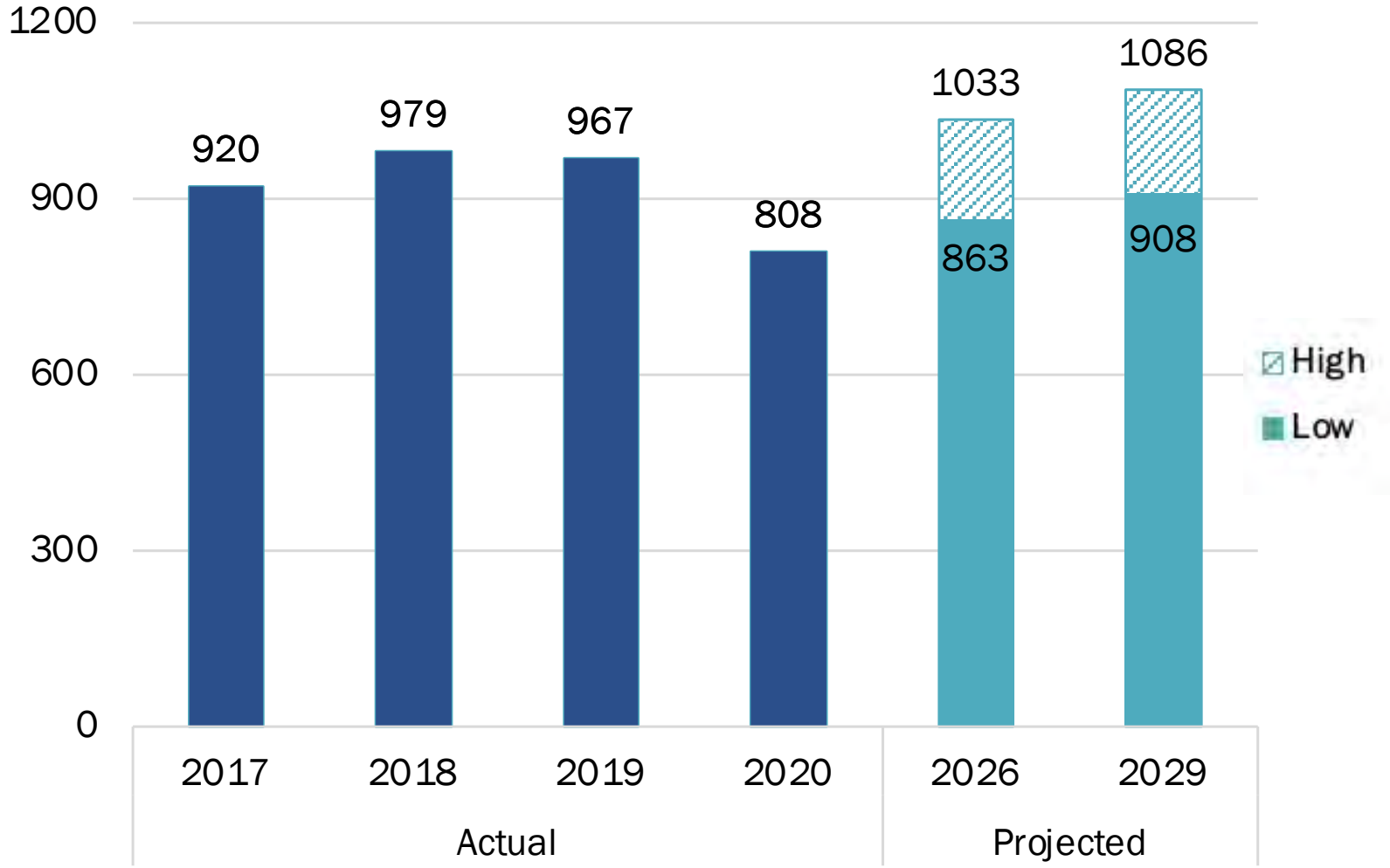
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Healthcare and Emergency jobs



Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

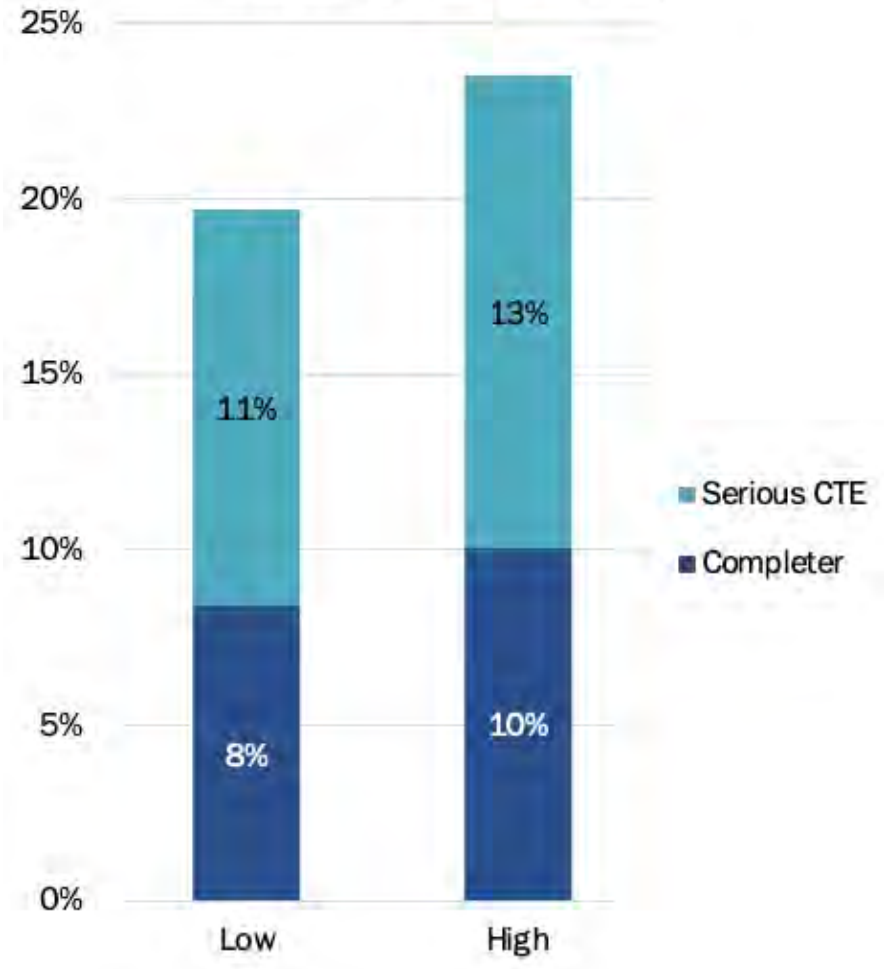
Projection of enrolled FTE: Healthcare and Emergency



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Healthcare and Emergency

Serious PCC Healthcare and Emergency enrollees as a share of average annual job openings, 2029



- 4,779 healthcare and emergency job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Healthcare and Emergency takeaways

- We expect Healthcare and Emergency enrollment to be at the high end of our projected enrollment and completion estimates due to high existing demand and turnover related to the COVID-19 pandemic.

- In 2029, we expect about 1,000 enrolled Healthcare and Emergency FTE and around 500 completers.

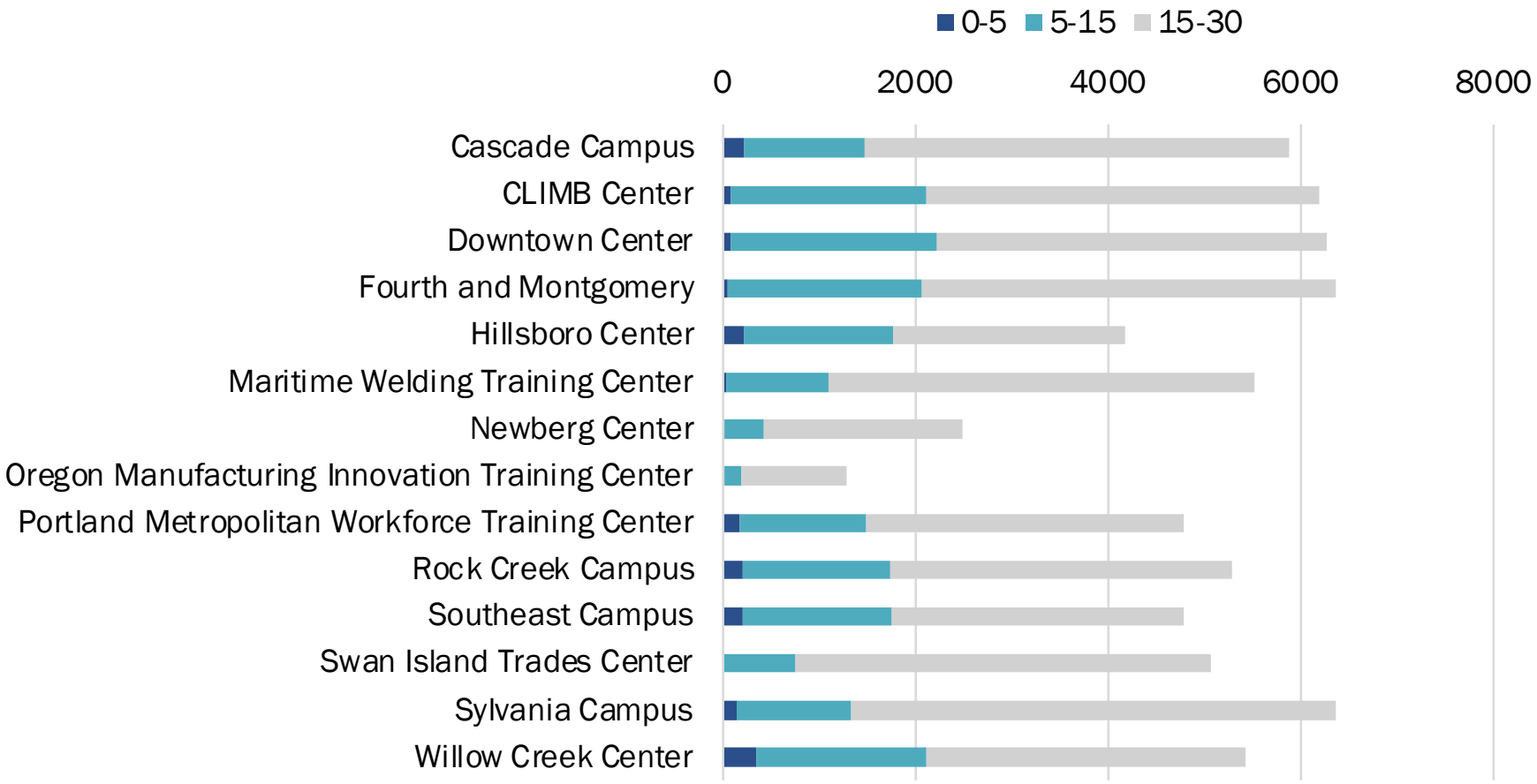
- At this level, serious PCC enrollees and completers could potentially fill between 10 and 23 percent of Healthcare and Emergency job openings in 2029.

- The largest concentration of Healthcare and Emergency jobs is in the downtown area and along major roads and thoroughfares. About 30 percent of enrollees lived within 15 minutes of the Downtown Center and CLIMB Center, respectively.

Construction, Manufacturing Tech, and Transportation (CMTT)

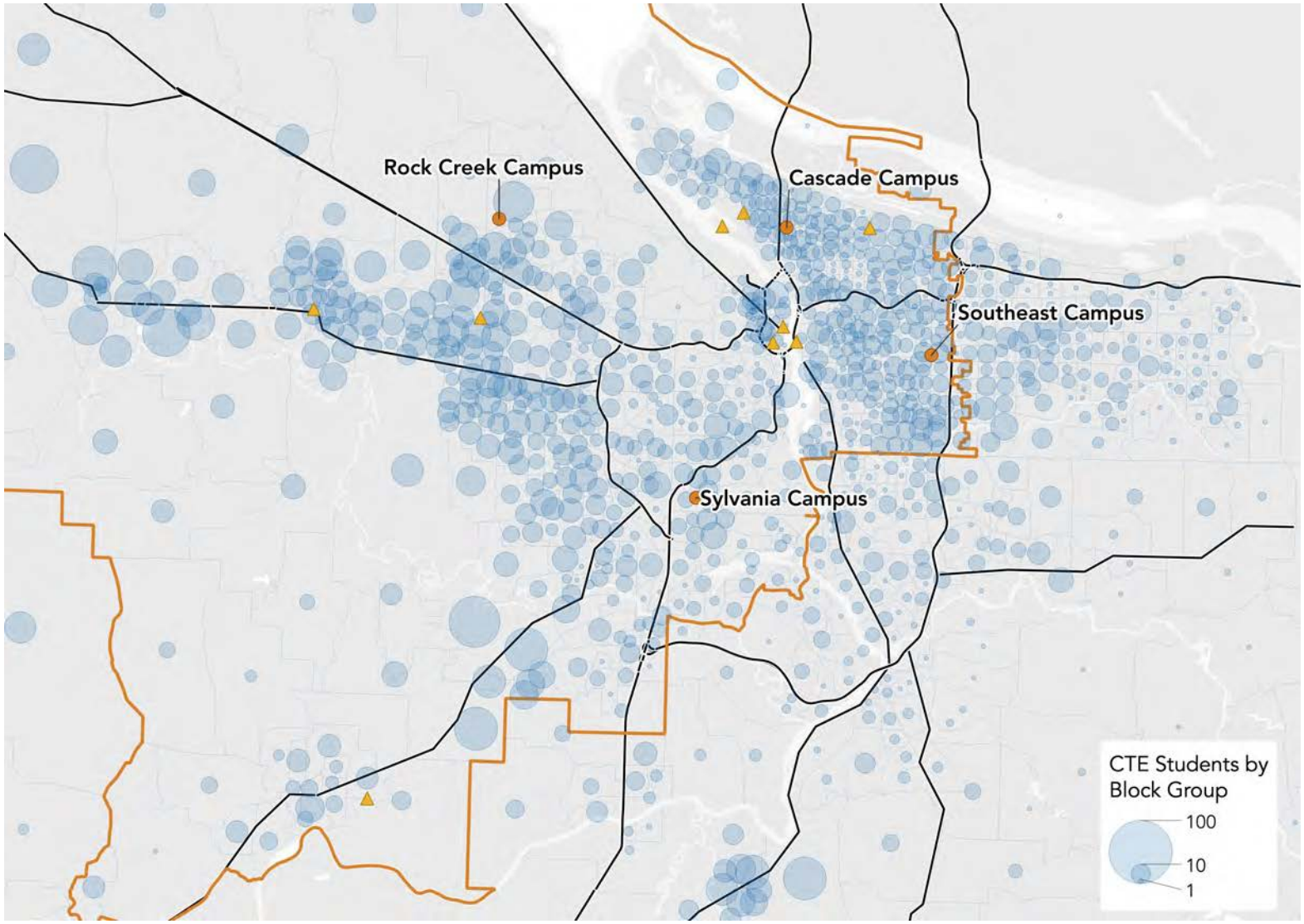
Drive time: CMTT

Drive time to each PCC campus/center (in minutes) for CMTT enrollees



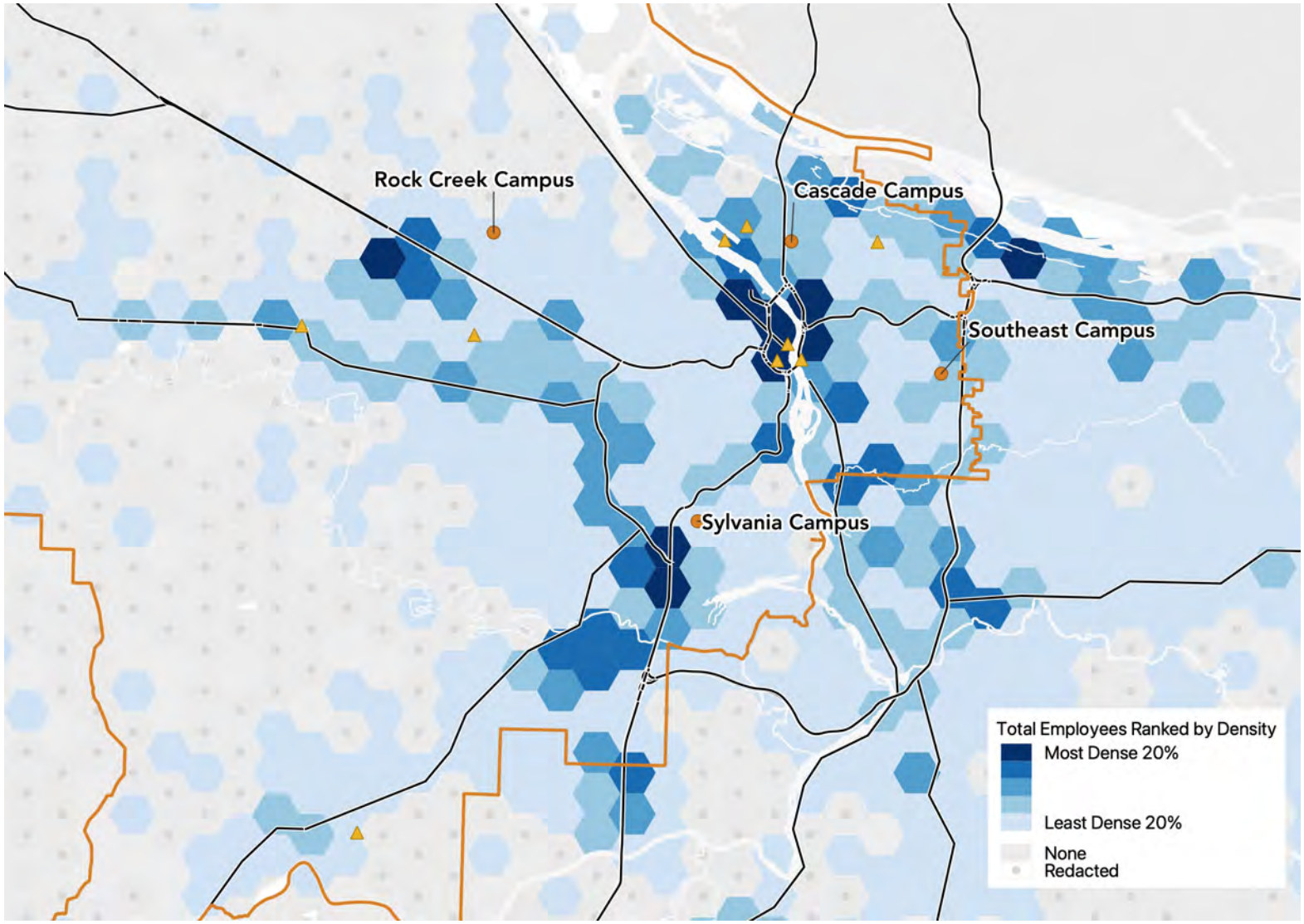
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

CMTT, all enrollees



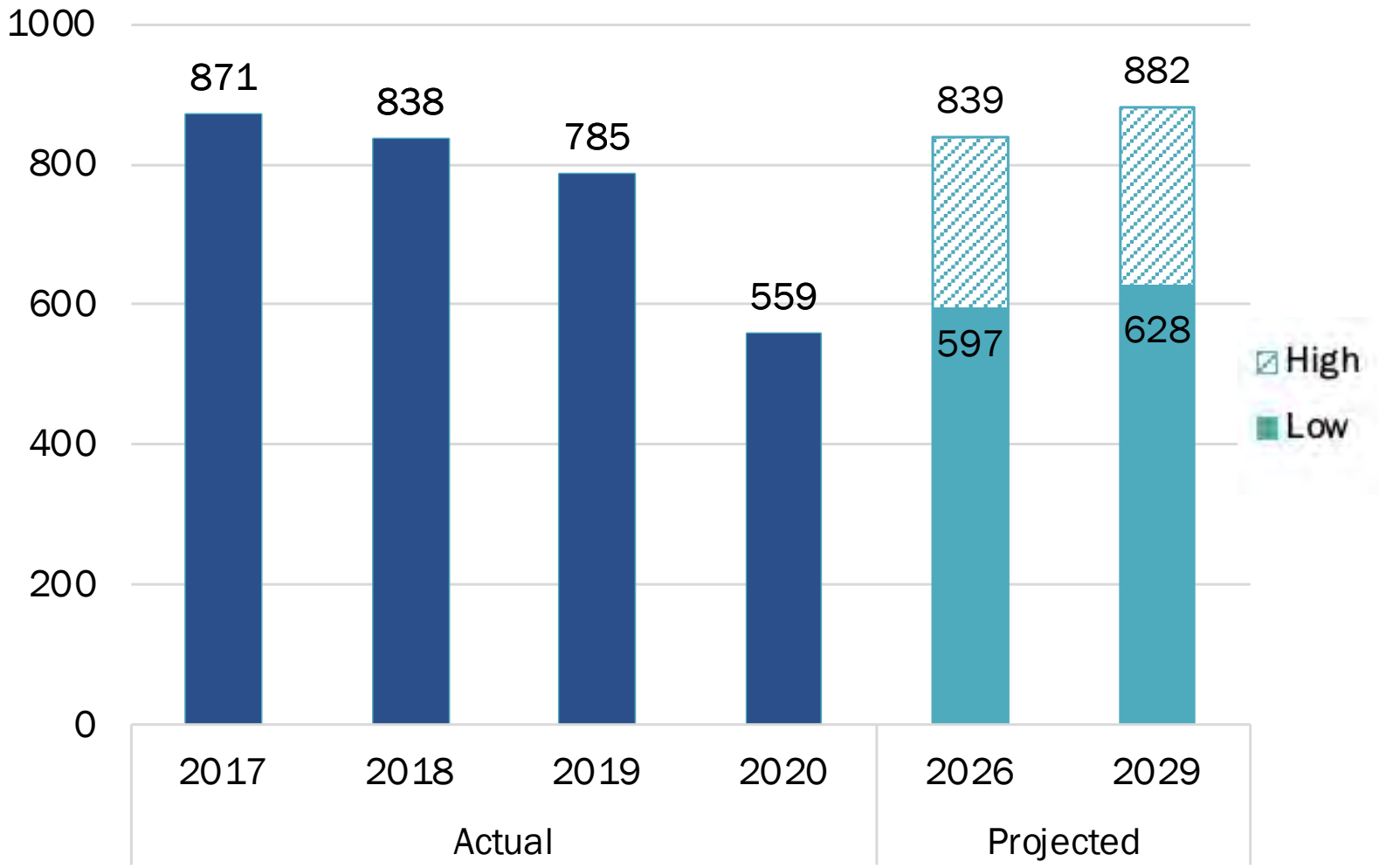
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

CMTT jobs



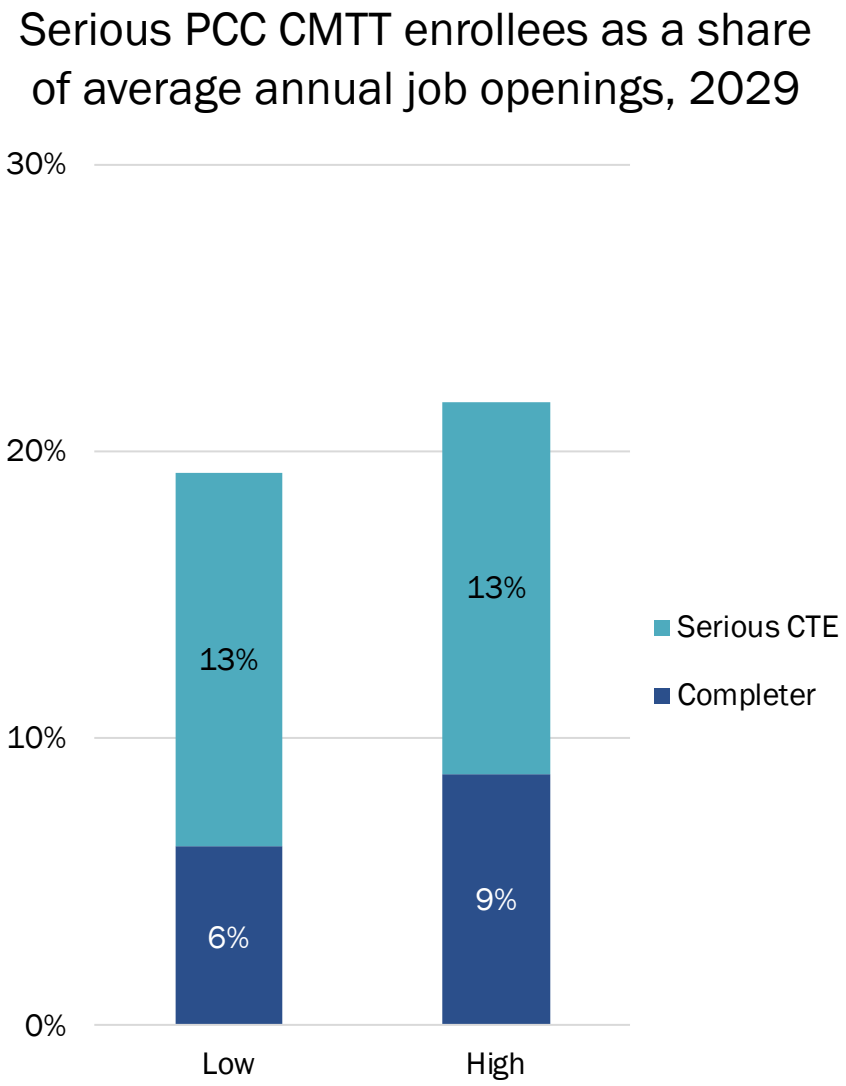
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: CMTT



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: CMTT



- 3,360 CMTT job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

CMTT takeaways

- We expect the CMTT enrollment to be toward the mid to high end of our projected enrollment and completion based on pre-existing trends.

- In 2029, we expect around 900 enrolled CMTT FTE and around 300 completers at the high end.

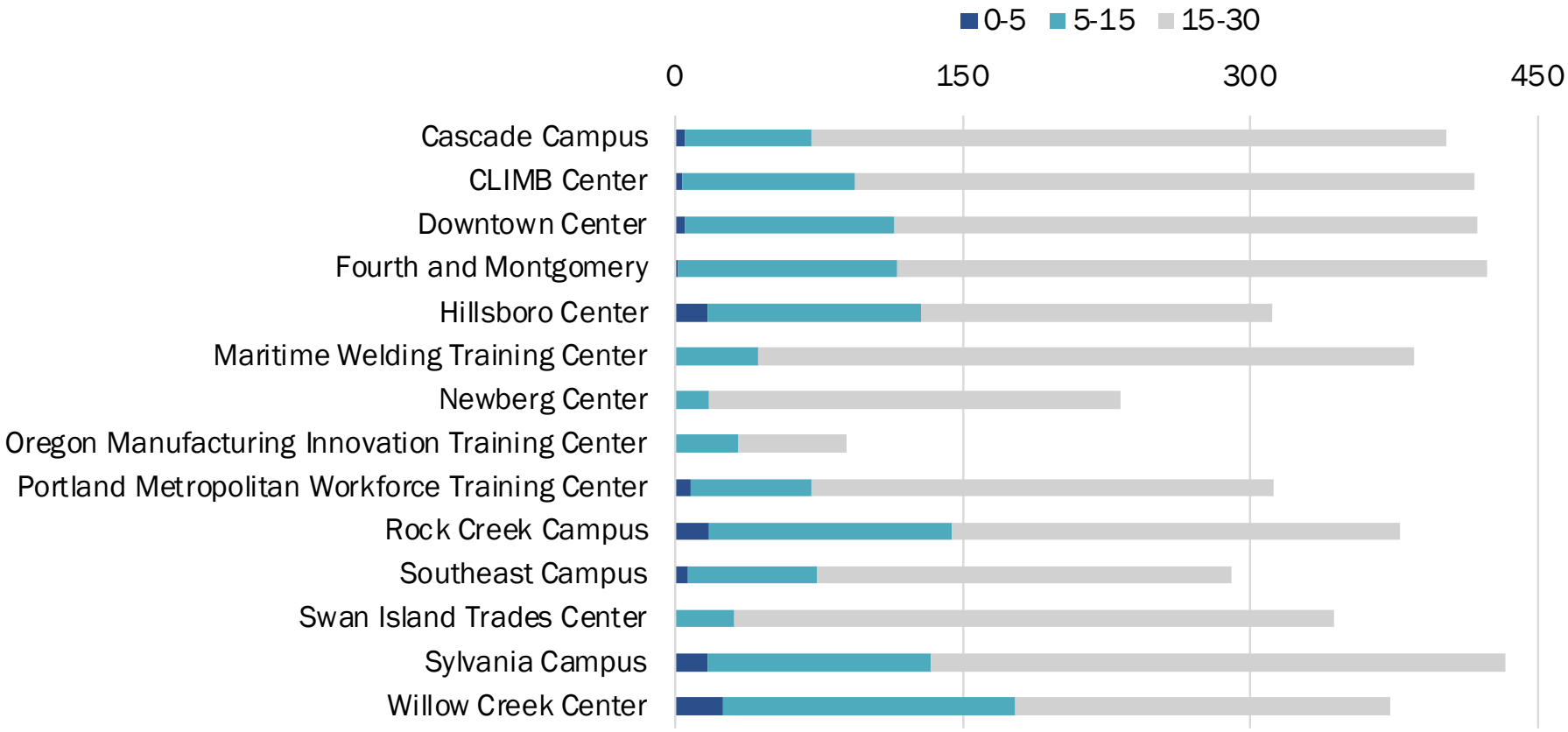
- At this level, serious PCC enrollees and completers could potentially fill between 9 and 22 percent of CMTT job openings in 2029.

- The largest concentrations of CMTT jobs are in the downtown area, toward North Plains, Tigard, and in north Portland. The Downtown Center has the highest share of enrollees (24 percent) living within 15 minutes.

Automotive Service

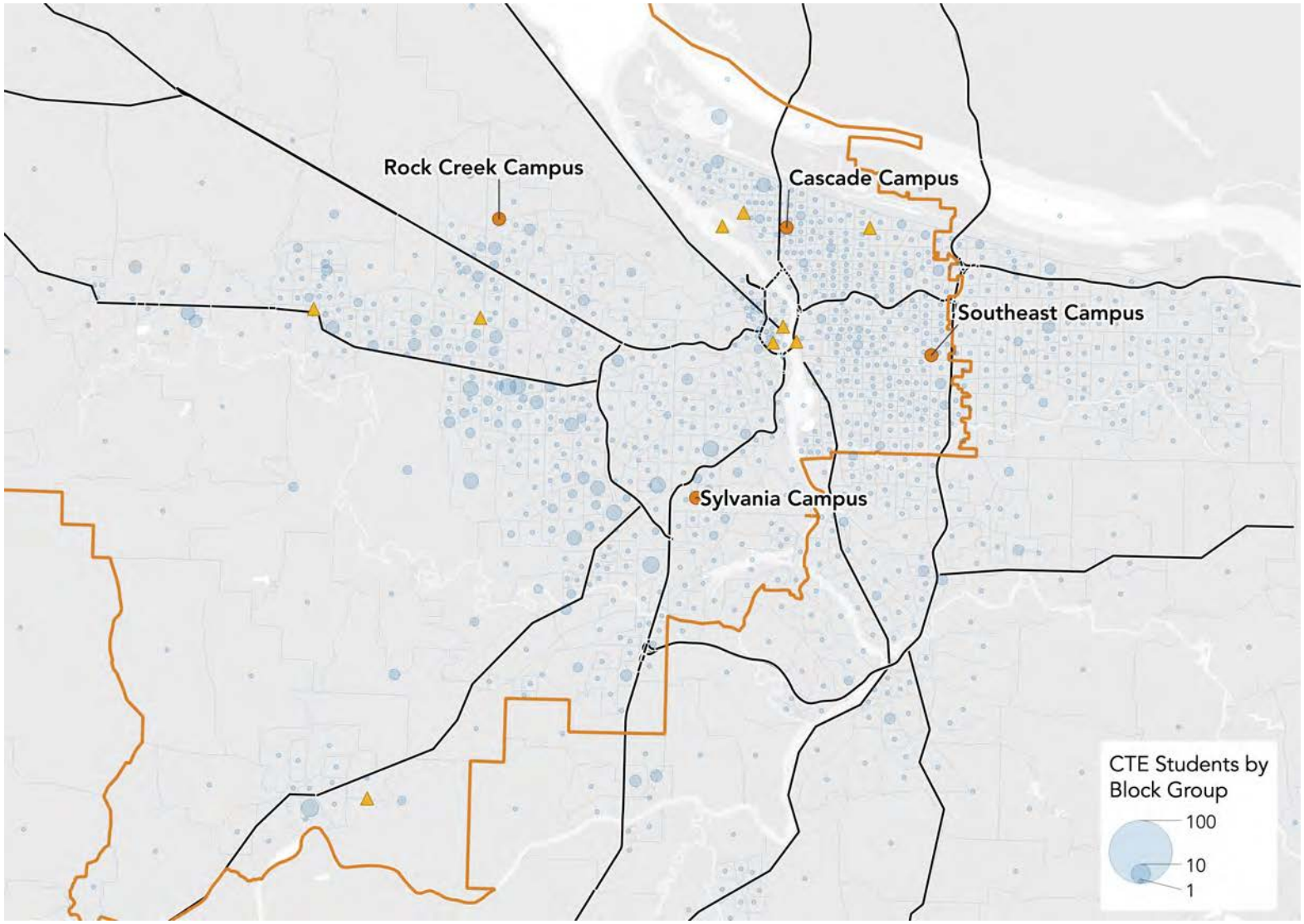
Drive time: Automotive Service

Drive time to each PCC campus/center (in minutes) for Automotive Service enrollees



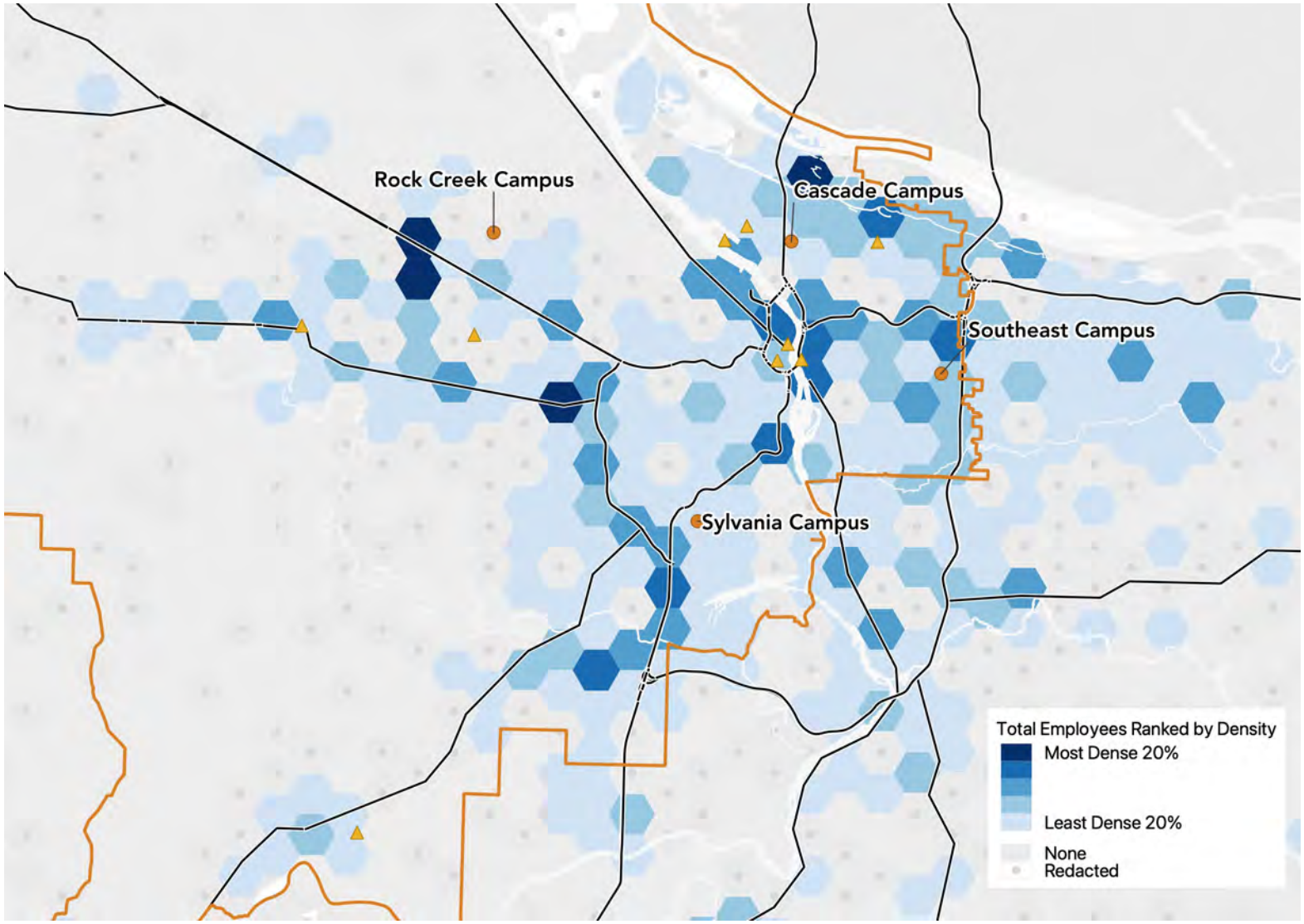
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Automotive Service, all enrollees



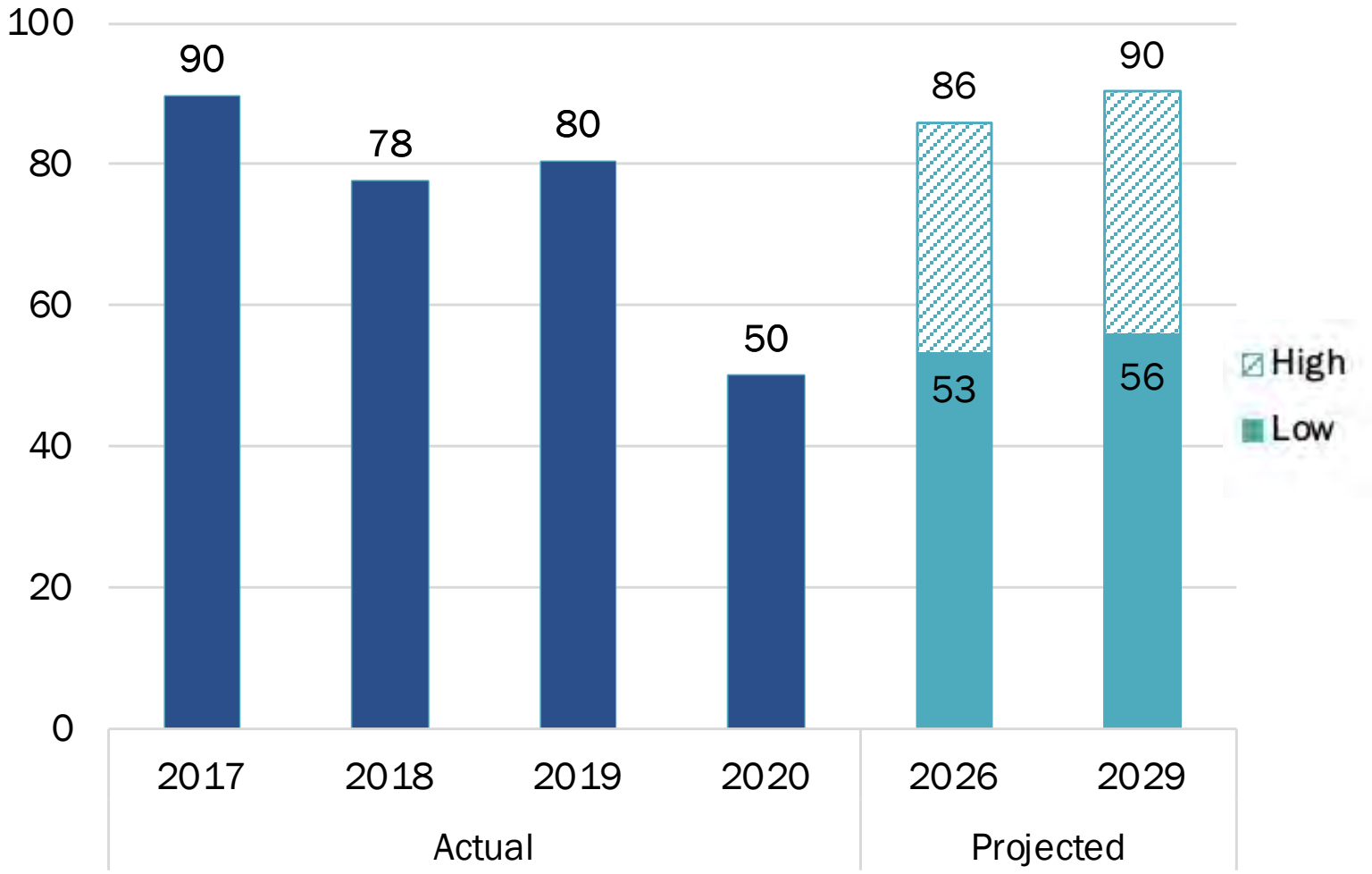
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Automotive Service jobs



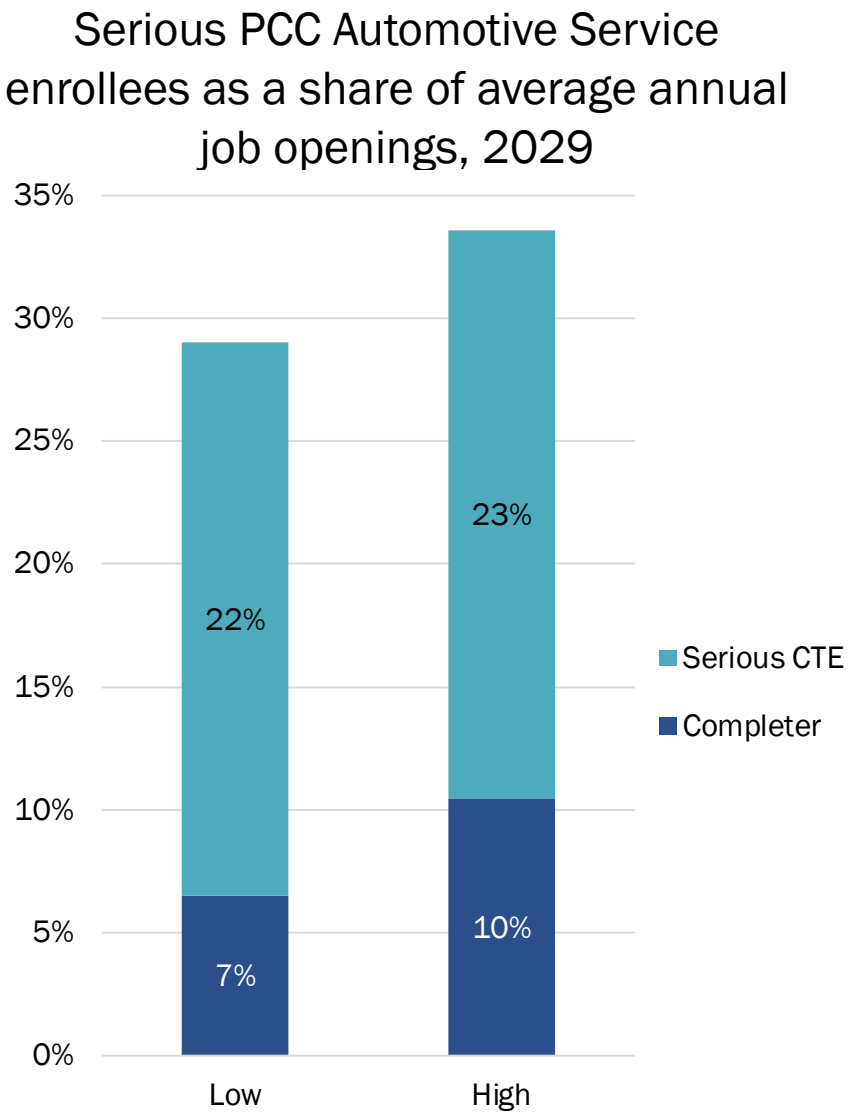
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: Automotive Service



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Automotive Service



- 358 Automotive Service job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Automotive Service takeaways

- We expect Auto Service enrollment to be toward the low end of our projected enrollment and completion estimates based on pre-existing trends.

- In 2029, we expect around 56 enrolled Auto Service FTE and around 23 completers.

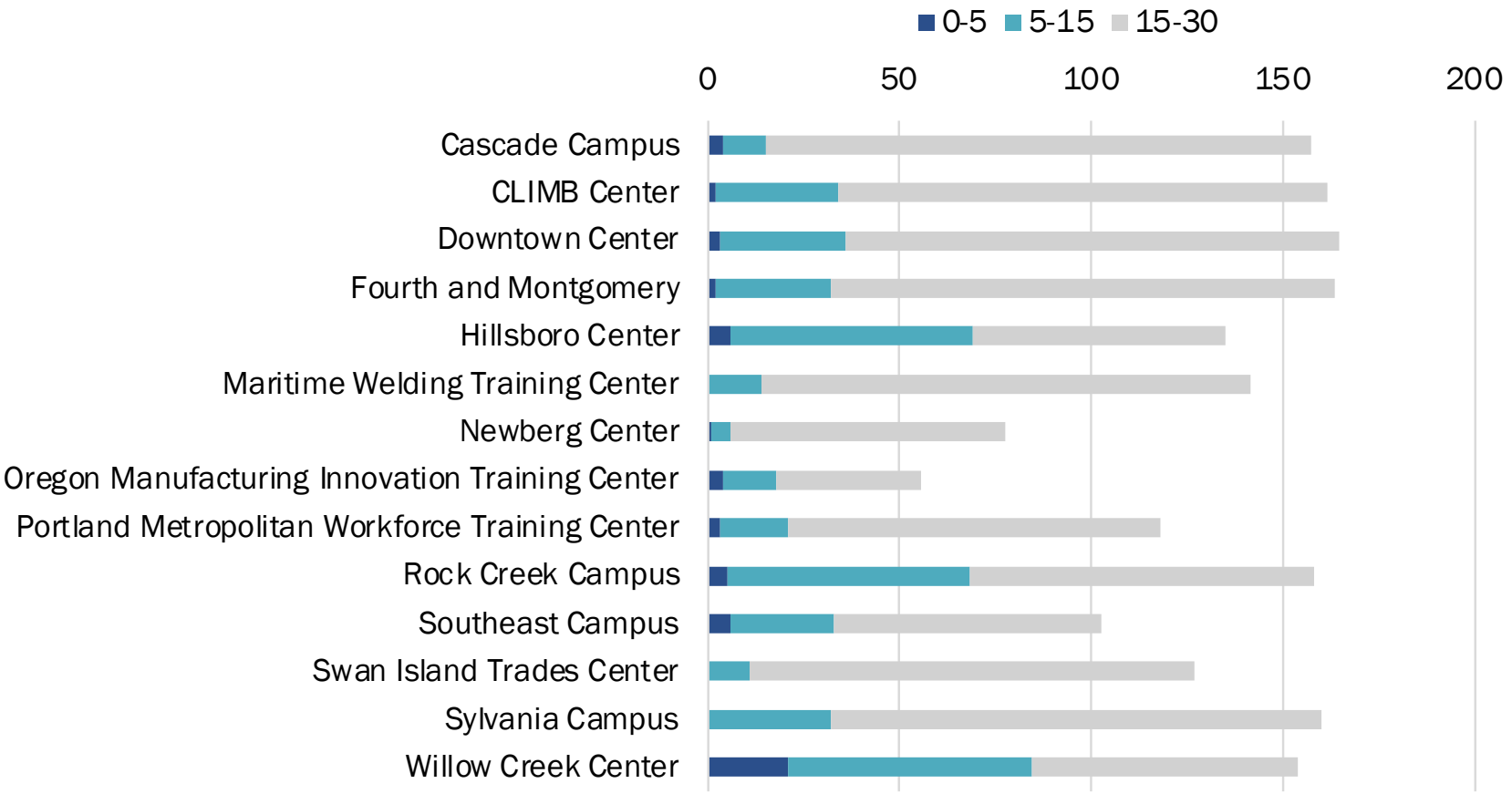
- At this level, we estimate serious PCC enrollees and completers could fill between 10 and 33 percent of Auto Service job openings in 2029.

- The largest concentrations of Auto Service jobs are on the west side of the river along Highway 217 and west of Rock Creek Campus. There is also a concentration of jobs in north Portland. Approximately the same number of enrollees live near Rock Creek (within 15 minutes) as Sylvania (26 percent and 24 percent, respectively).

Diesel Service

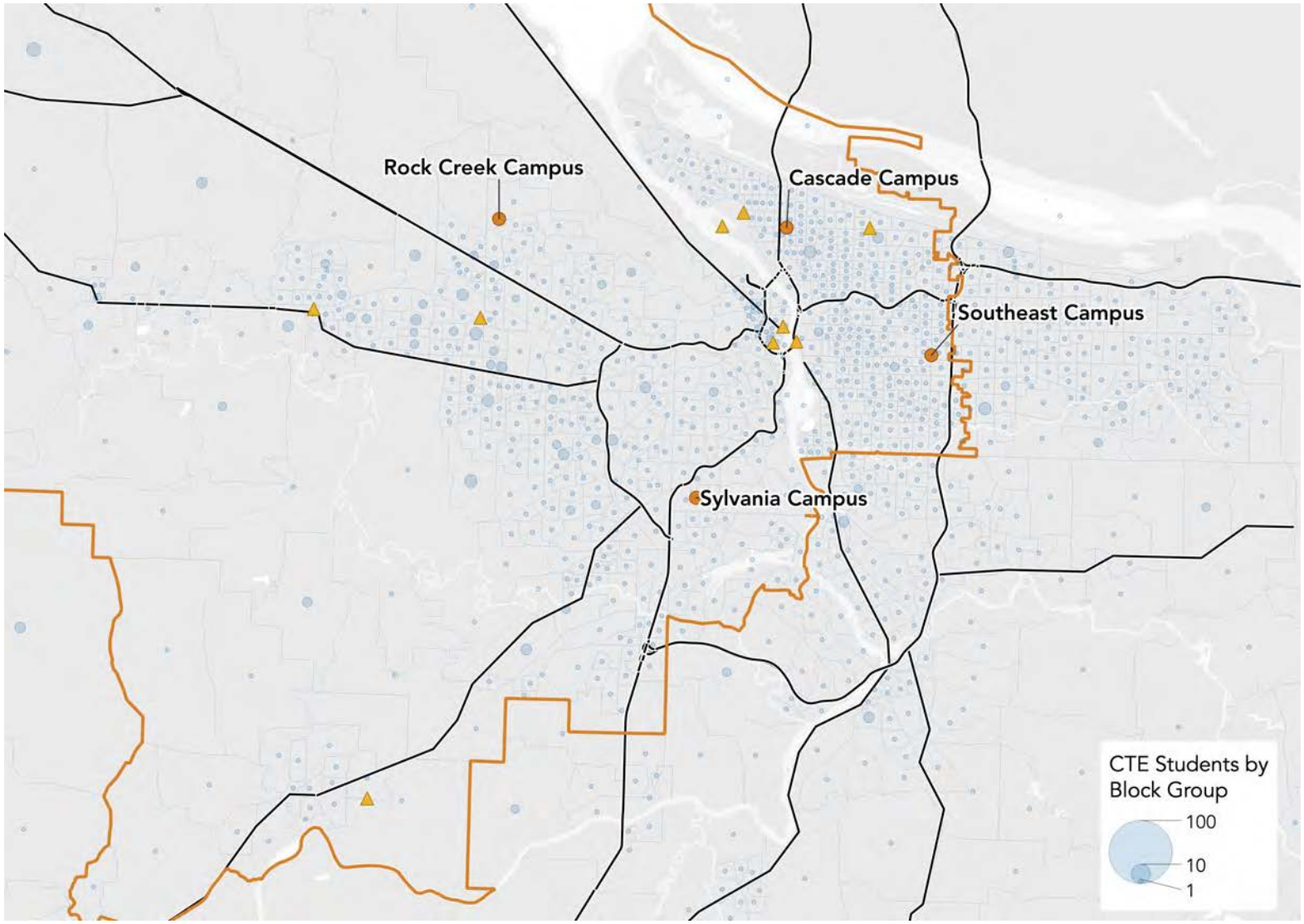
Drive time: Diesel Service

Drive time to each PCC campus/center (in minutes) for Diesel Service enrollees



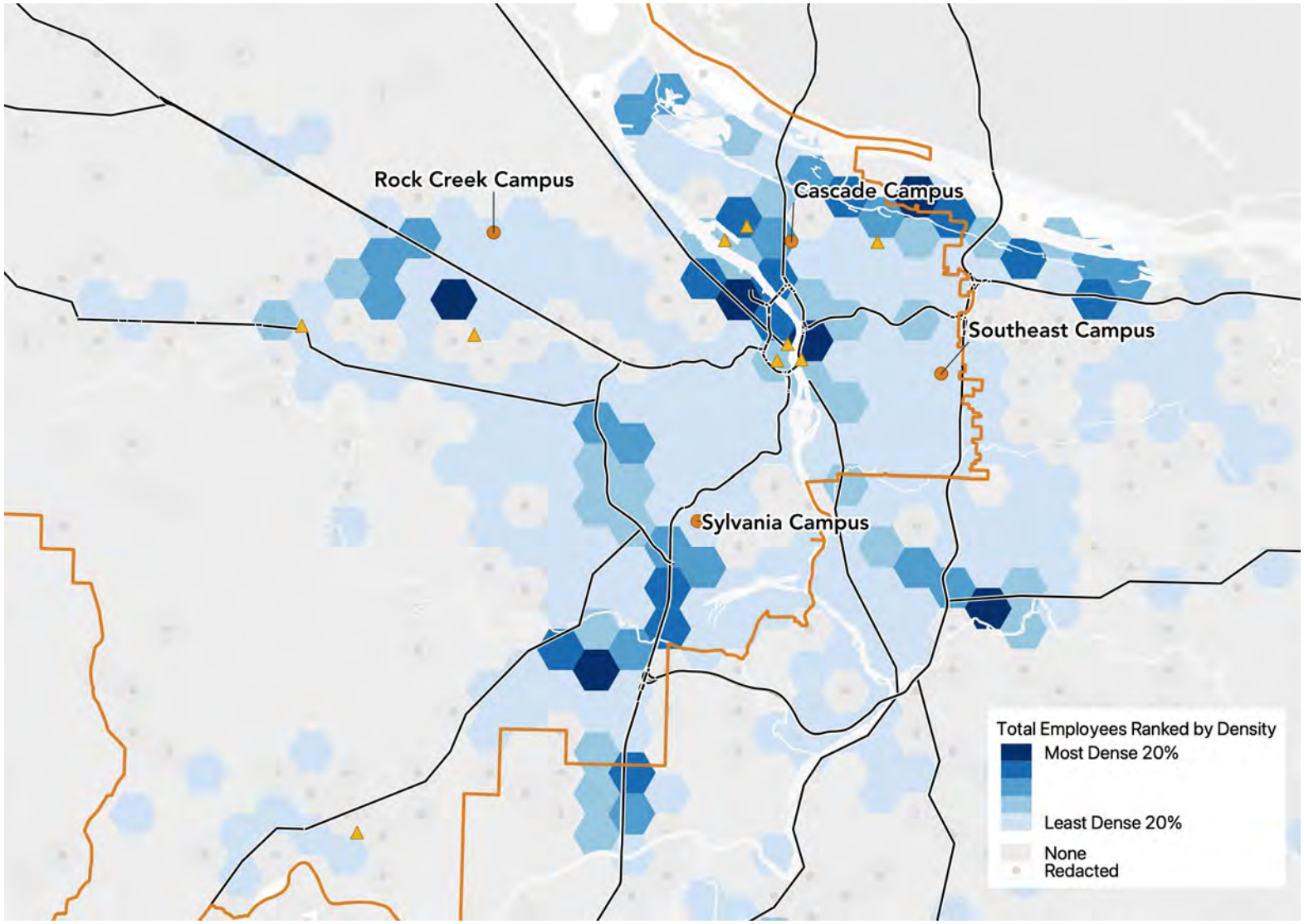
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Diesel Service, all enrollees



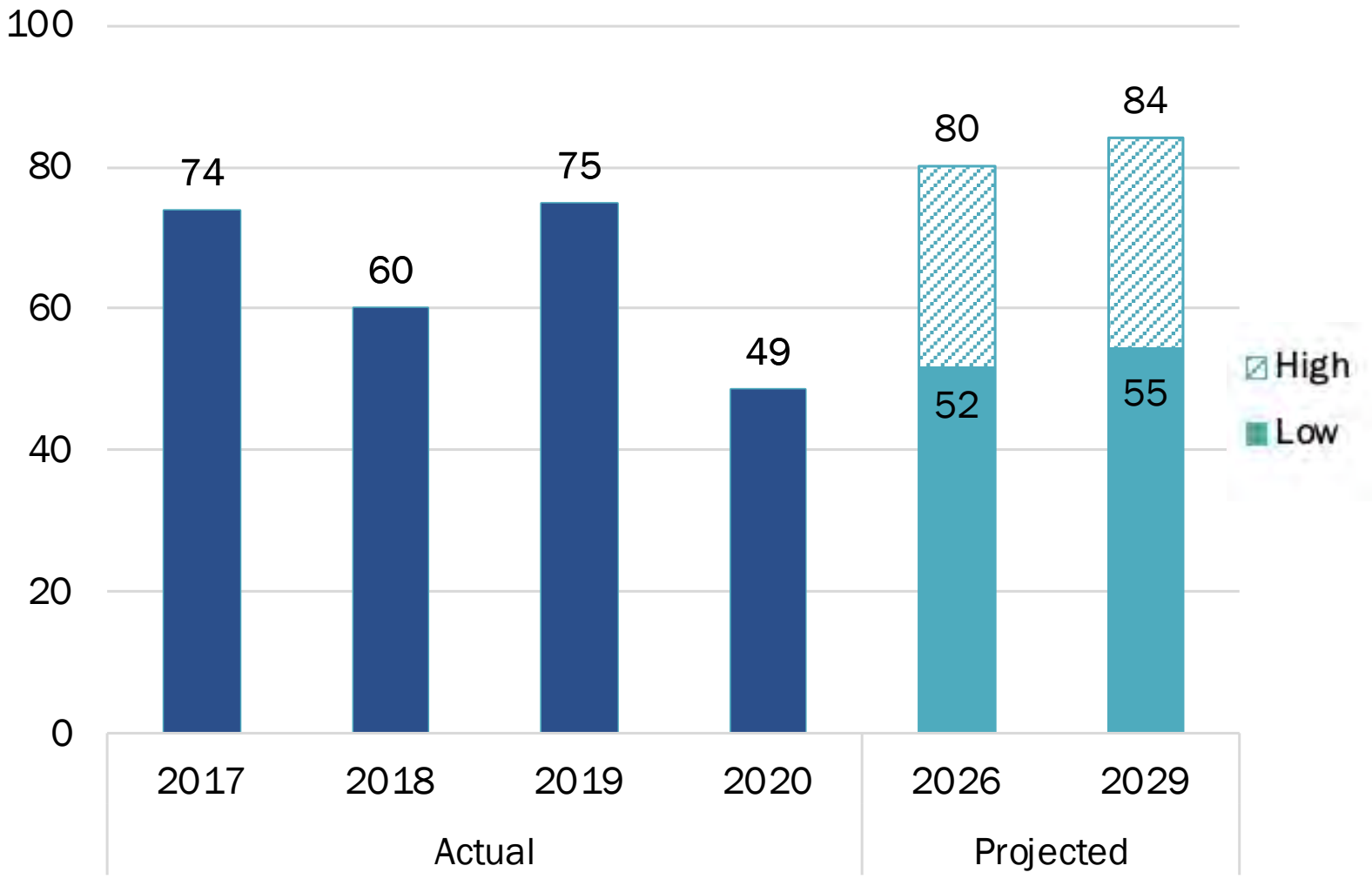
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Diesel Service jobs



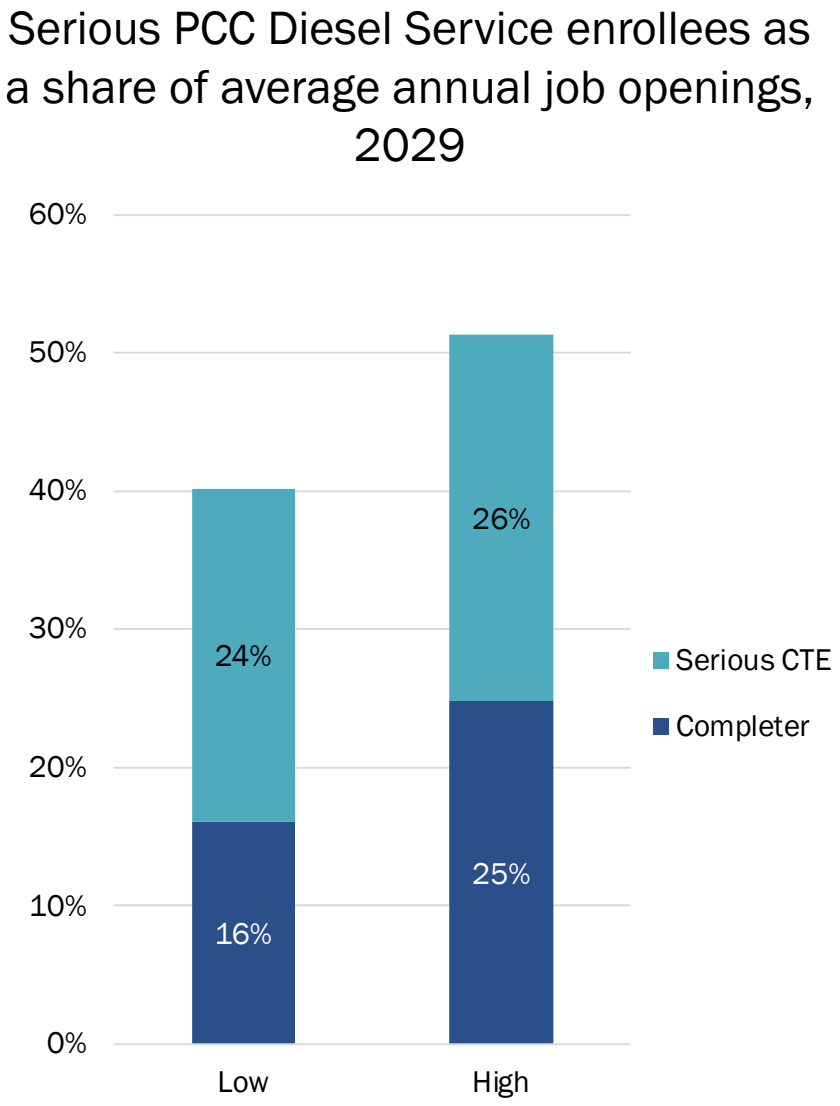
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: Diesel Service



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Diesel Service



- 191 Diesel Service job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Diesel Service takeaways

- We expect Diesel Service enrollment to fall midway between our projected high and low enrollment and completion estimates based on pre-existing trends.

- In 2029, we expect around 70 enrolled Diesel Service FTE and around 40 completers.

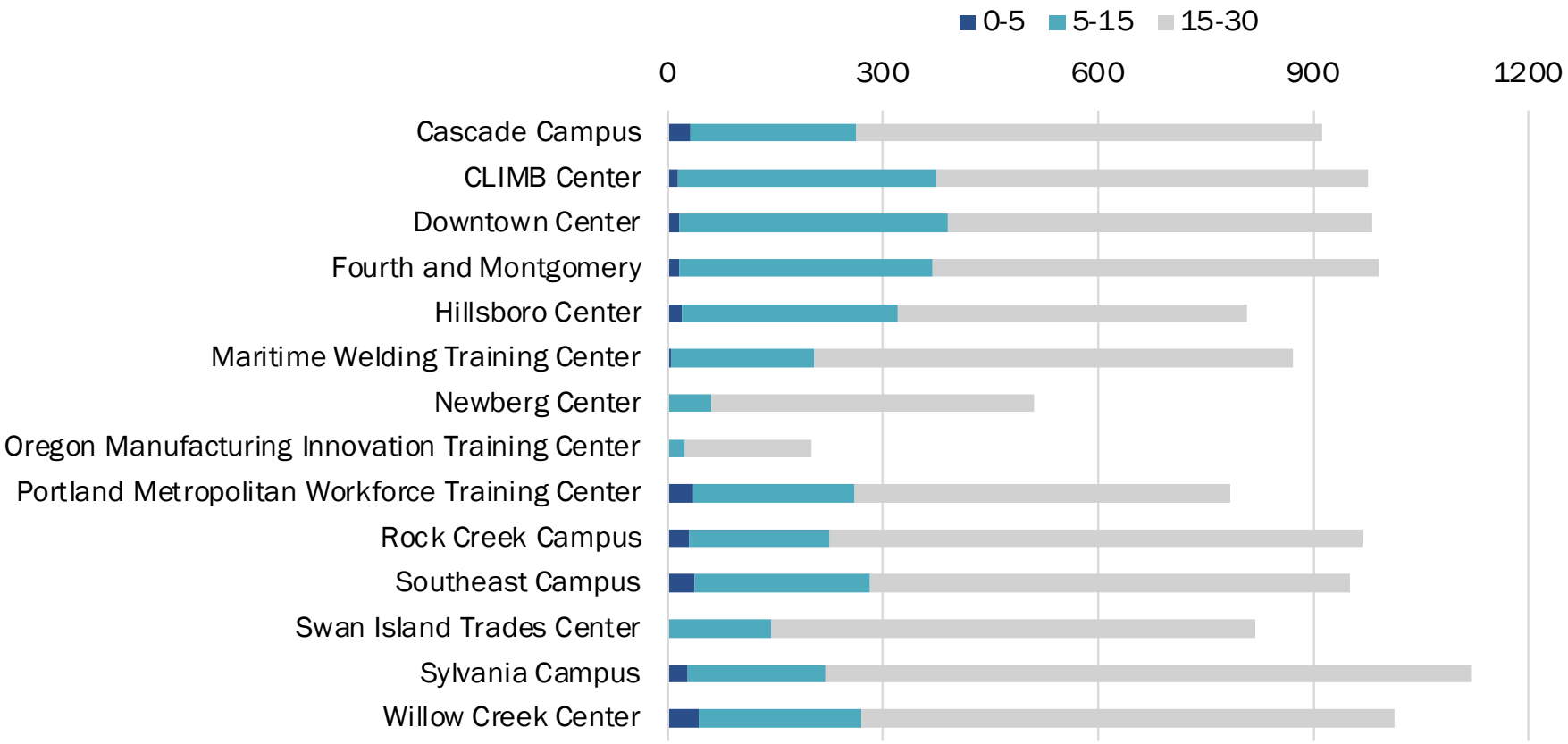
- At this level, we estimate serious PCC enrollees and completers could fill between 20 and 51 percent of Diesel Service job openings in 2029.

- The largest concentrations of Diesel Service jobs are around North Portland, Clackamas, and Tualatin. About one quarter (26 percent) of enrollees lived within 15 minutes of the Willow Creek Center and 21 percent lived within 15 minutes of the Rock Creek Campus and the Hillsboro Center, respectively.

Building Construction Technology

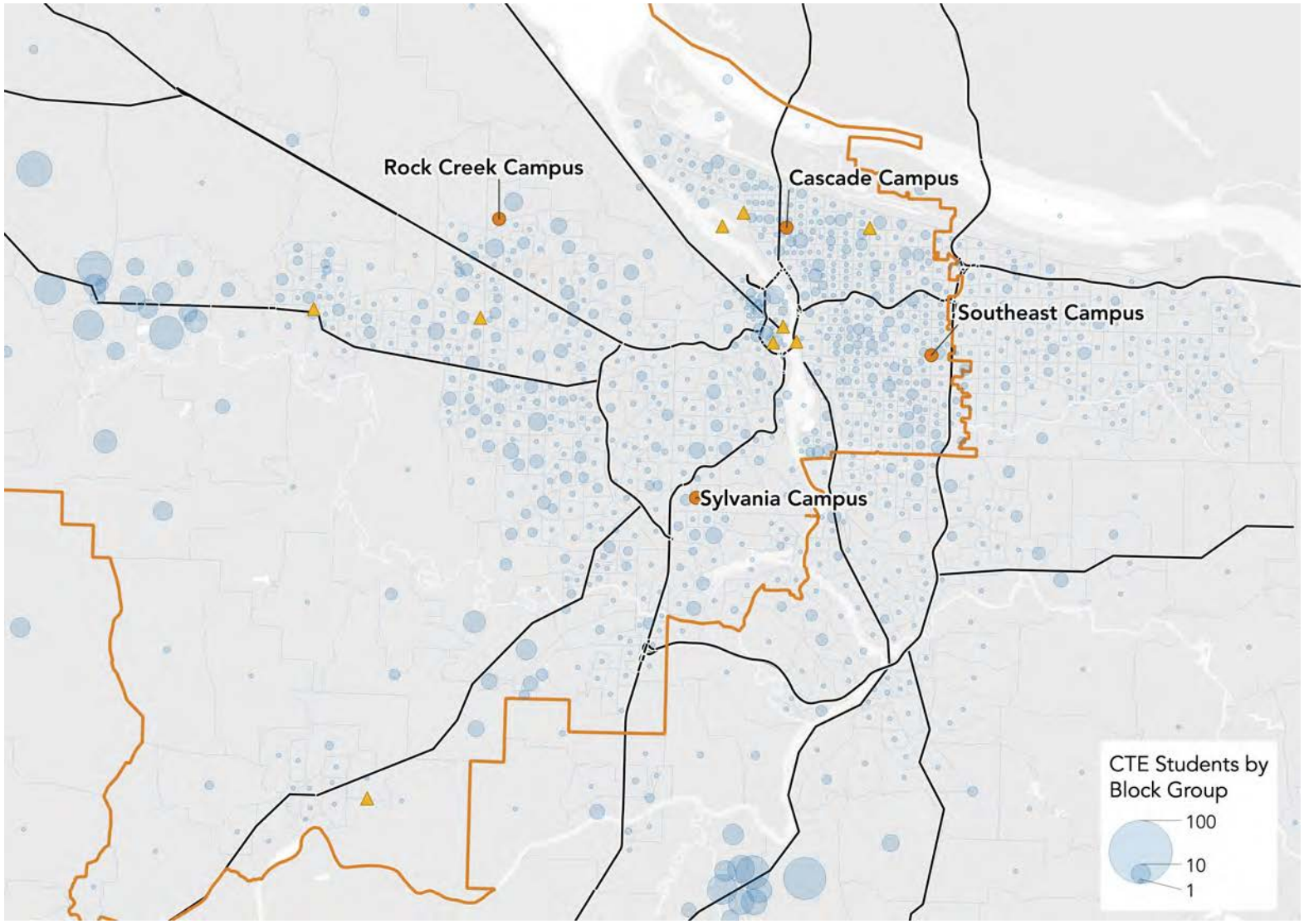
Drive time: Building Construction

Drive time to each PCC campus/center (in minutes) for Building Construction enrollees



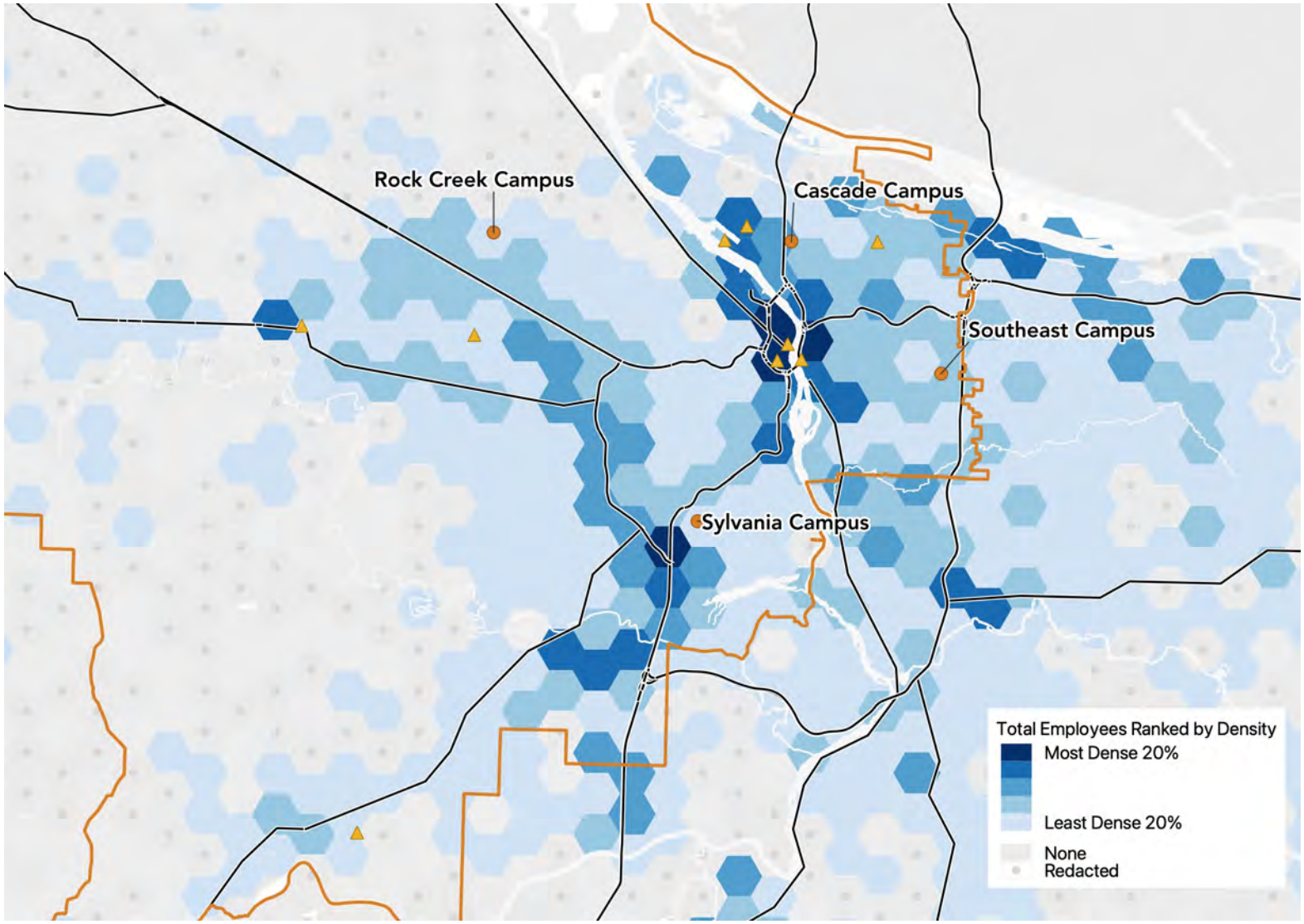
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Building Construction, all enrollees



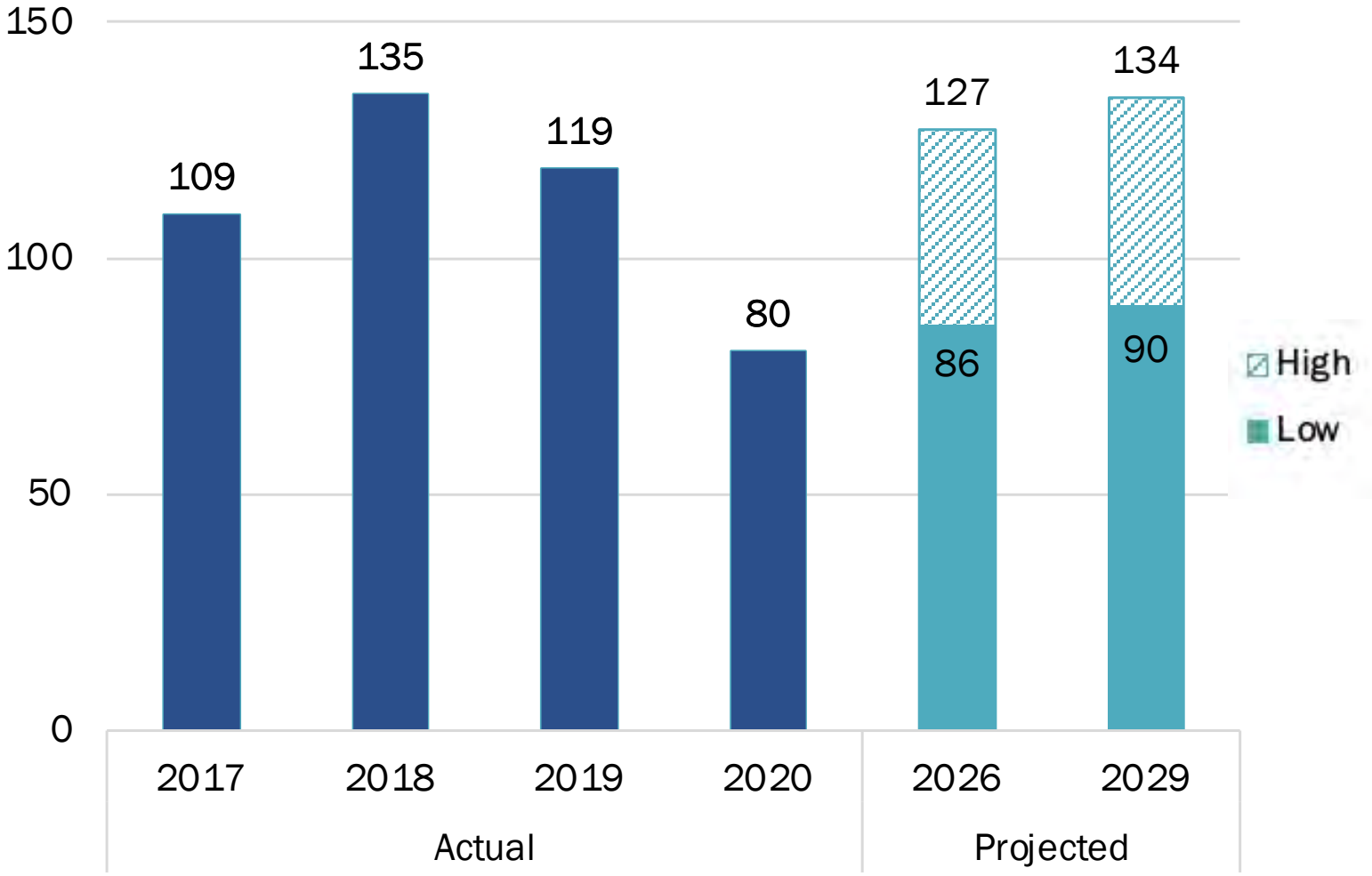
Enrollees in 2016-19 (three academic years). Source: ECONorthwest

Building Construction jobs



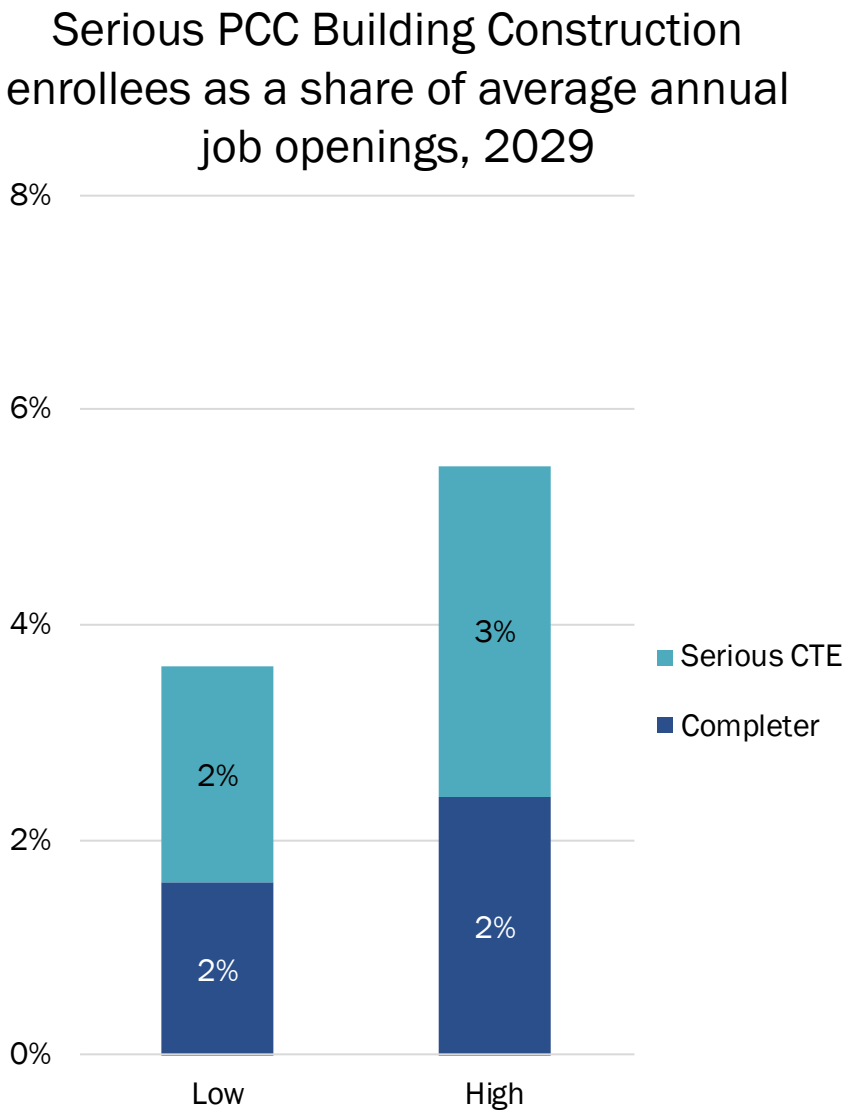
Redacted hexbins are those that did not meet disclosure requirements. A redacted hexbin has fewer than three firms and/or a firm that represents 80 percent or more of the hexbin's reported employment. Source: ECONorthwest analysis of OED QCEW data.

Projection of enrolled FTE: Building Construction



Source: ECONorthwest analysis of PCC student-level data

Gap analysis: Building Construction



- 507 Building Construction Technology job openings projected in Portland in 2029
- Student projections based on person counts rather than FTE

Source: ECONorthwest analysis of PCC student-level and Oregon Employment Department data

Building Construction takeaways

- Enrollment in the Building Construction pathway has grown in recent years. Whether this growth continues will depend on economic conditions; the recently passed infrastructure bill may support additional enrollment.

- In 2029, we expect between 90 and 134 enrolled Building Construction FTE and between 8 and 12 completers.

- There are few completions relative to enrollment in the Building Construction pathway.

- The largest concentrations of Building Construction jobs are in the downtown area and in Tigard.

Appendix

Methodology

Defining CTE courses

- Programs and their required courses within each relevant pathway were identified manually via a search of PCC's website

- Required courses within CTE pathways were matched to student data using subject and course codes

- The definition of a CTE course was refined further. Remedial, liberal arts, and general studies courses and courses in irrelevant CIP codes were identified and removed

Defining CTE completions

- CTE completers were identified using CIP codes derived from the list of CTE courses we identified earlier in the analysis

- The CIP code list was hand-vetted and cross-walked with older CIP codes to ensure accuracy

Assigning students to pathways

- Enrollees
  - Students were given a single, mutually-exclusive pathway assignment based on their enrolled credits within a given academic year
  - Students enrolled in multiple courses that fell into two or more CTE pathways were assigned to the pathway in which they had taken the most credits
- Completers
  - Completers were given a single, mutually-exclusive pathway assignment based on the CIP code of their completion within a given academic year
  - For completers with multiple completions in a single year, associate degree completions were prioritized

Allocating students to zip codes

- Student data were recorded at the end of the last term the student was enrolled in the data set.
- The maps display information about the distribution of students' assumed residences across the PCC district and beyond. We choose 2018-19 and earlier years instead of more-current years to avoid displaying enrollment anomalies related to the COVID-19 pandemic.
- We used the zip code / zip+4 field in the data PCC provided to determine where PCC enrollees were located. Students were assigned to the Census block group that includes the center point of the delivery route.
- Students with missing zip+4 data (about a third of student observations in the 2018-19 academic year) were allocated proportionally across five-digit zip codes.
- This method allowed us to capture 98.4% of completers and 99.5% of enrollees in 2018-19.
- Students who were missing zip codes entirely or who lived outside of Oregon were not mapped.
  - 6.1% percent of selected CTE enrollees and 9.0% of completers in 2018-19 were outside the state or missing geographic data. Of these, 90% of enrollees and 91% of completers were Washington residents.

Drive-time and employment maps

- Drive times calculated using ArcGIS Online. Block groups were assigned to a distance band based on where they had the most overlap. Block groups with less than 25 percent overlap with any distance band were not included.

- The industry job maps are based on QCEW data from 2019 for 5 counties: Multnomah, Clackamas, Washington, Columbia, and Yamhill. Based on the business's NAICS code, a percentage of the total average annual employment was determined to be CTE-relevant for each pathway. This employment was aggregated to 2km hexbins (2km height/width). Hexbins with data that did not meet disclosure requirements are redacted from the maps. To meet disclosure requirements, a hexbin had to have no fewer than 3 firms and one firm could not represent 80 percent of the reported employment. Hexbins were ranked by number of jobs (i.e., ranked by density with constant area) and split into quintiles from most to least dense.

Projections and gap analysis

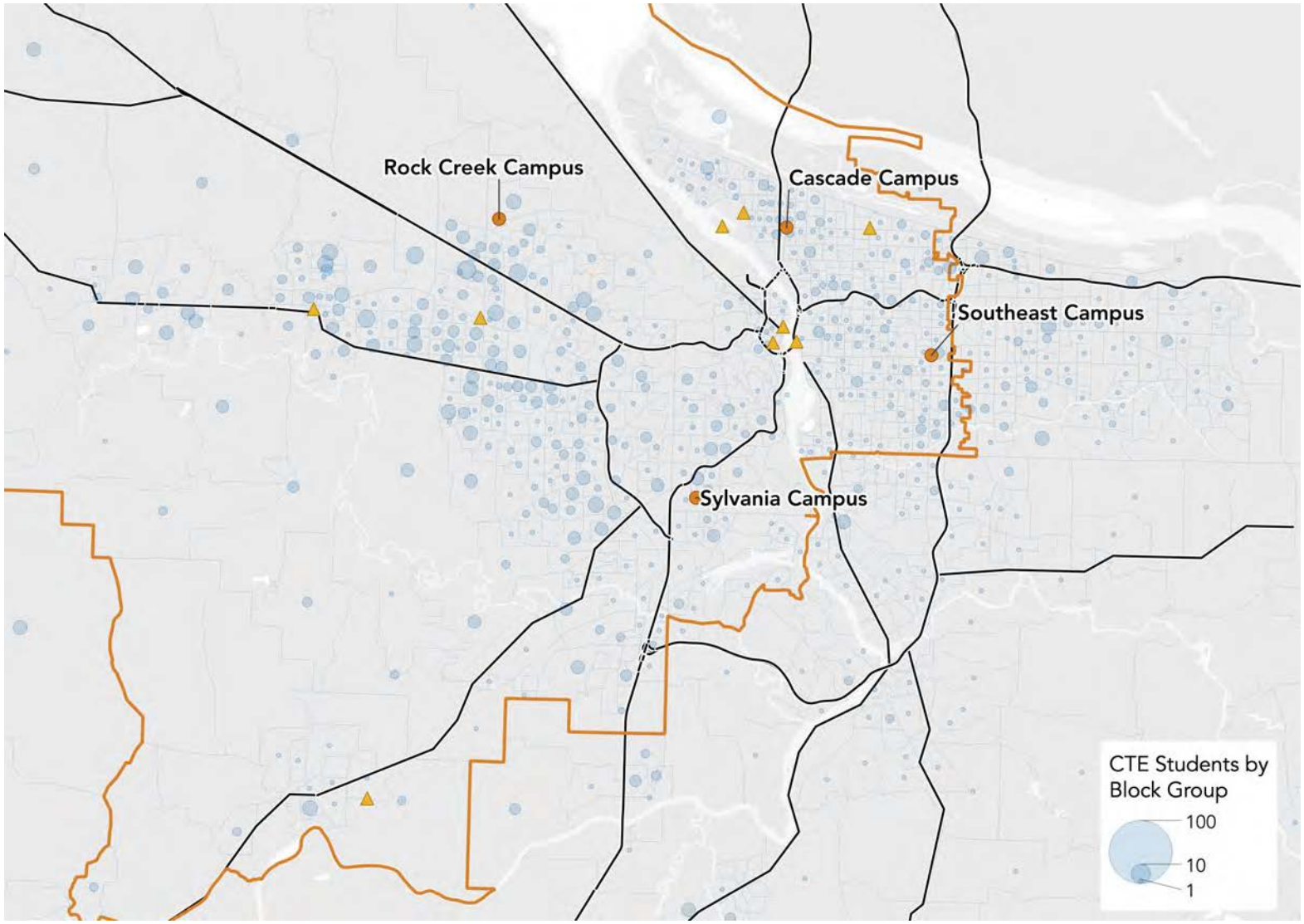
- We applied growth rates from our previously completed enrollment projections in Spring 2021 to estimate FTE enrollment for the selected PCC pathways. We produced high and low projections to provide a potential range for how CTE enrollment may perform in the future. Future enrollment will depend on many things, including recovery from the COVID-19 pandemic.
- **High projections:** High projections were produced using CTE enrollment in 2018-19 as the base and applying growth rates from previously completed enrollment projections.
- **Low projections:** Low projections were produced using CTE enrollment in 2019-20 as the base and applying growth rates from previously completed enrollment projections.
- To project completions, we applied a completion to FTE ratio (pooling completions from the 2014-15 to 2018-19 academic years) for each pathway. Due to an anomaly in the PCC completion data, we averaged 2008-09 through 2012-13 completions for the Diesel pathway. We applied these completion to FTE ratios to the high and low FTE projections to estimate a potential range of completions for the 2022-23 through 2029-30 academic years.

Gap analysis

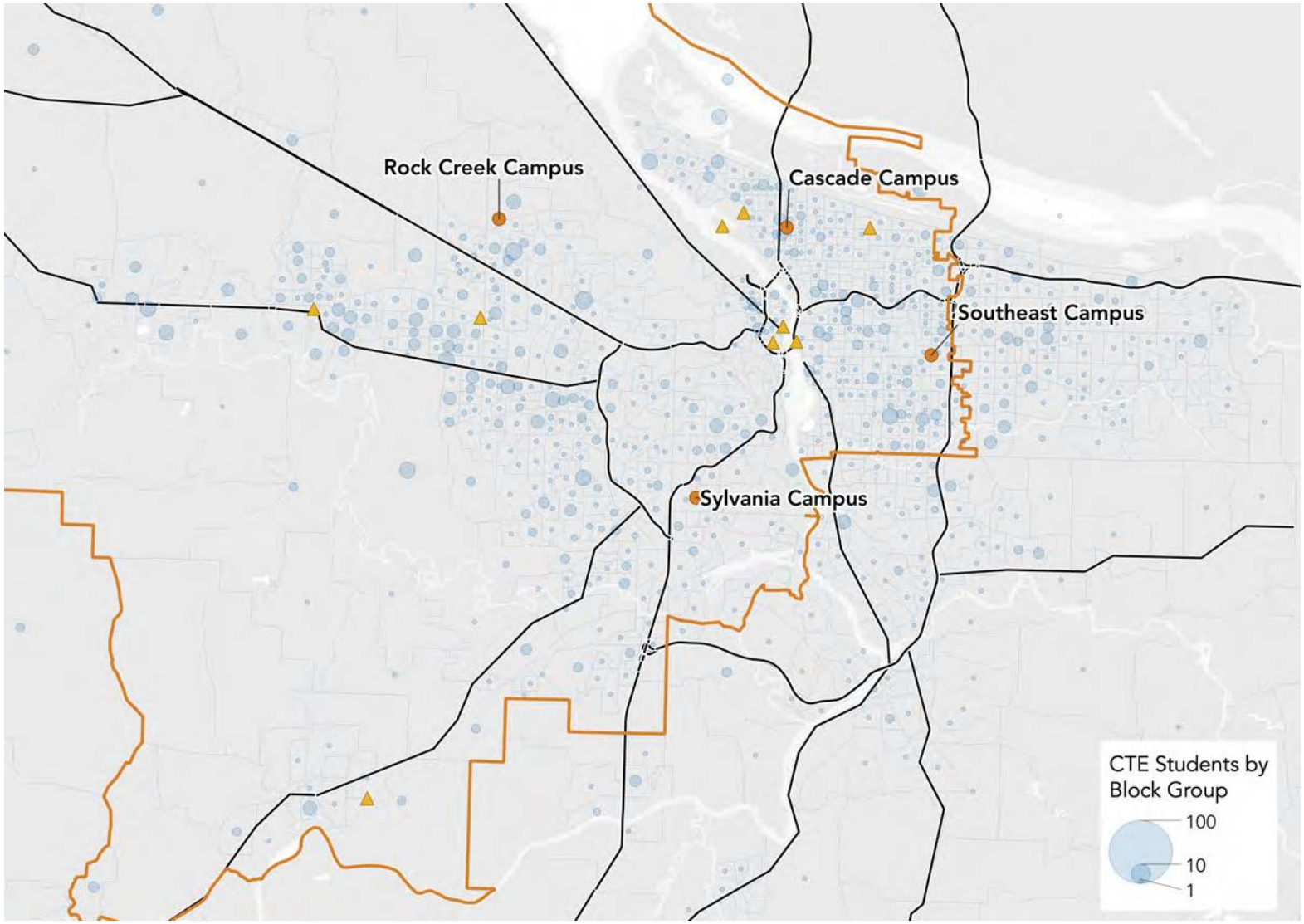
- The gap analysis is based on enrollment projections by pathway and projected job openings (2020-2030) in the tri-county region for occupations relevant to each pathway. CIP codes for PCC pathway coursework are crosswalked to SOC codes to identify relevant occupations.

Additional enrollee maps

CMTT, serious enrollees

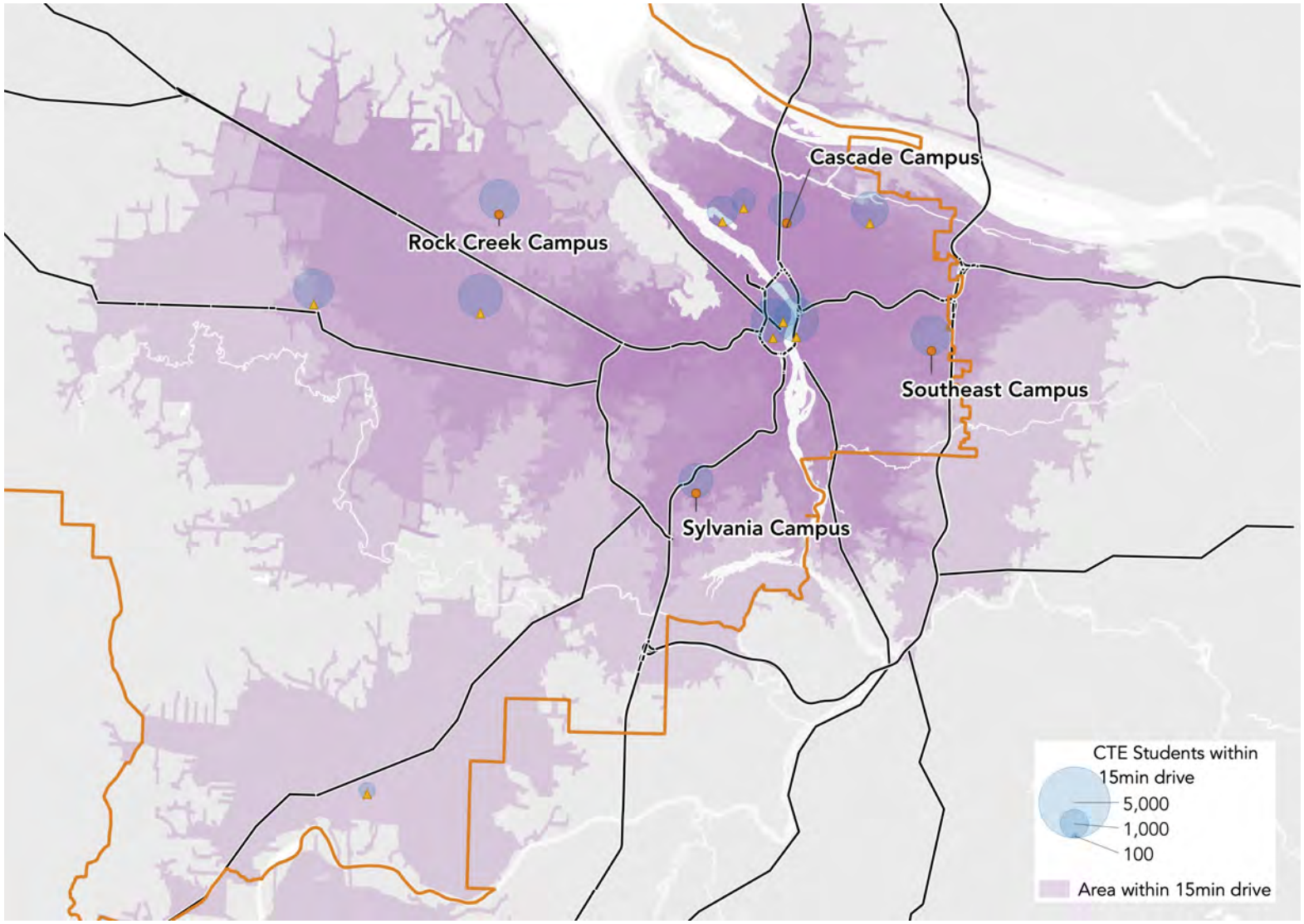


CMTT, completers

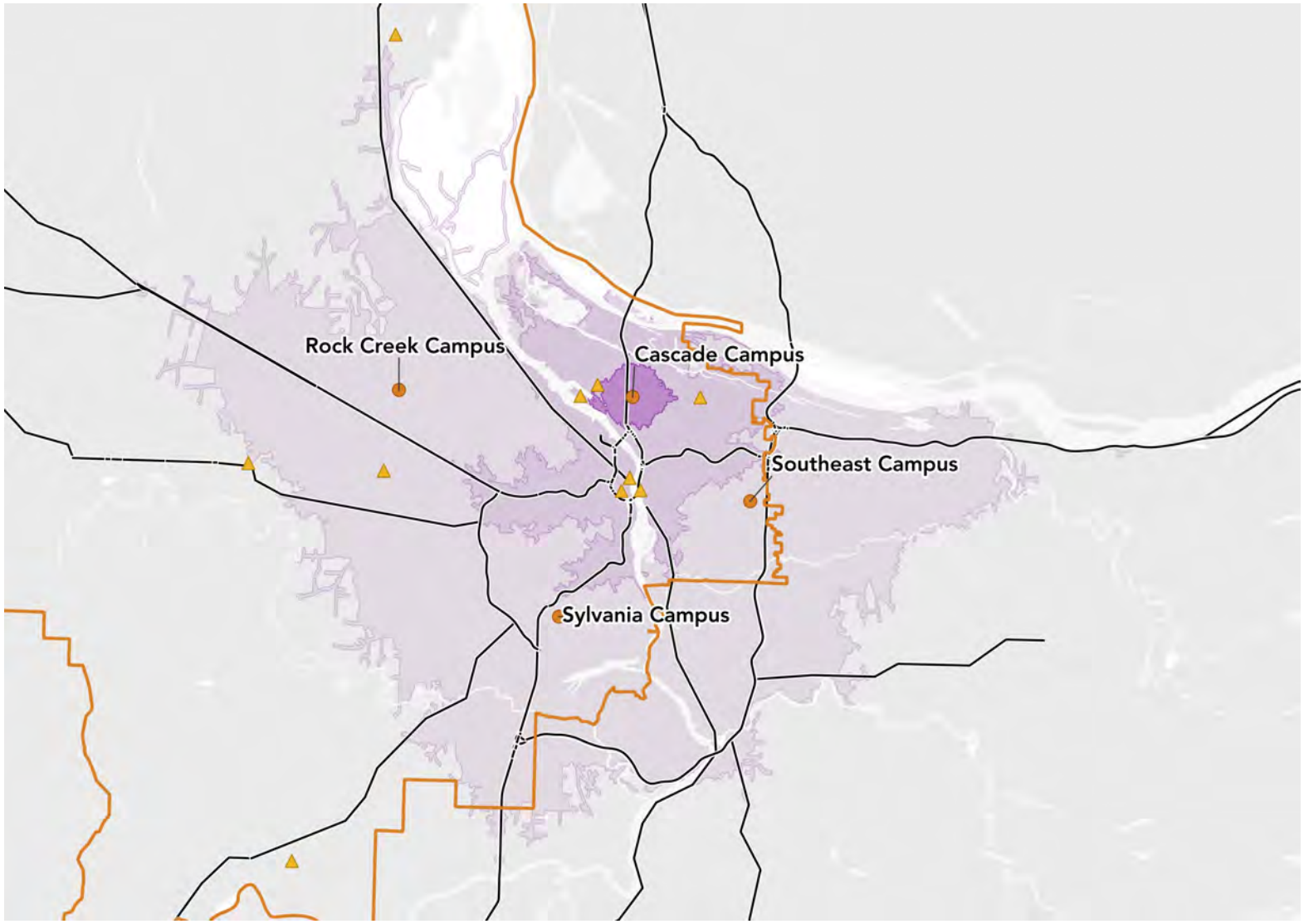


Drive-time reference maps

CMTT enrollees, by drive time

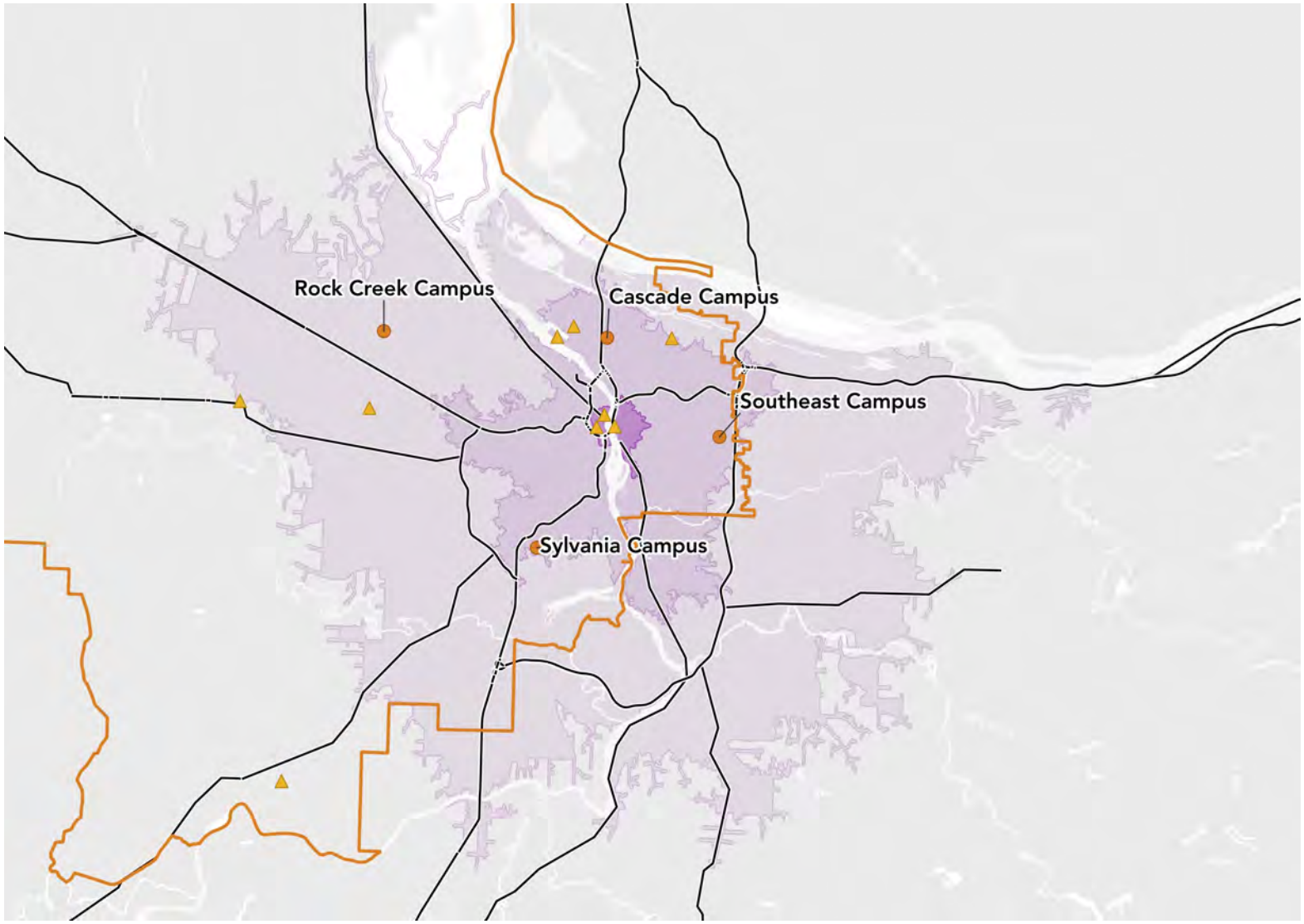


Cascade Campus



Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

CLIMB Center



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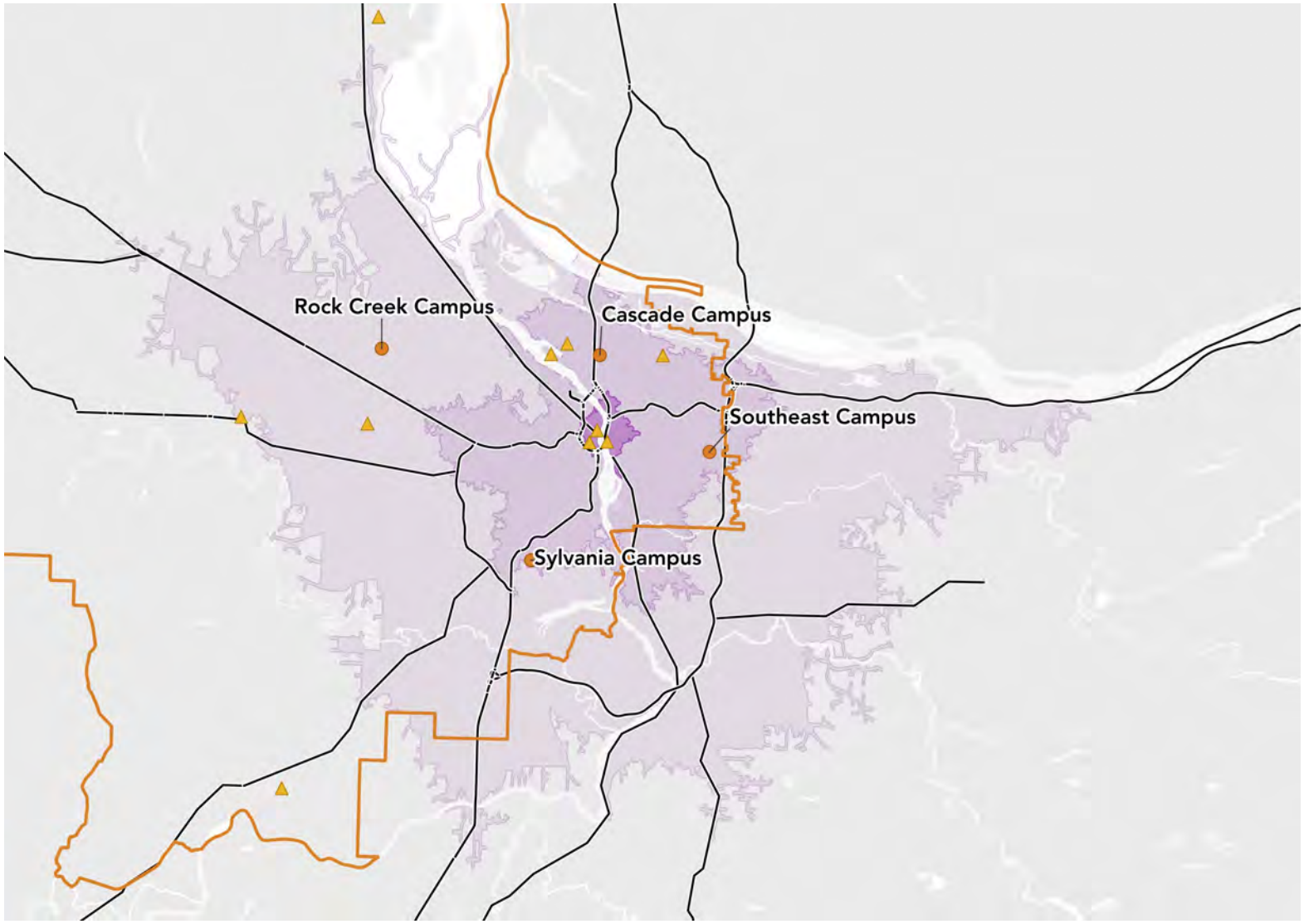
Downtown Center



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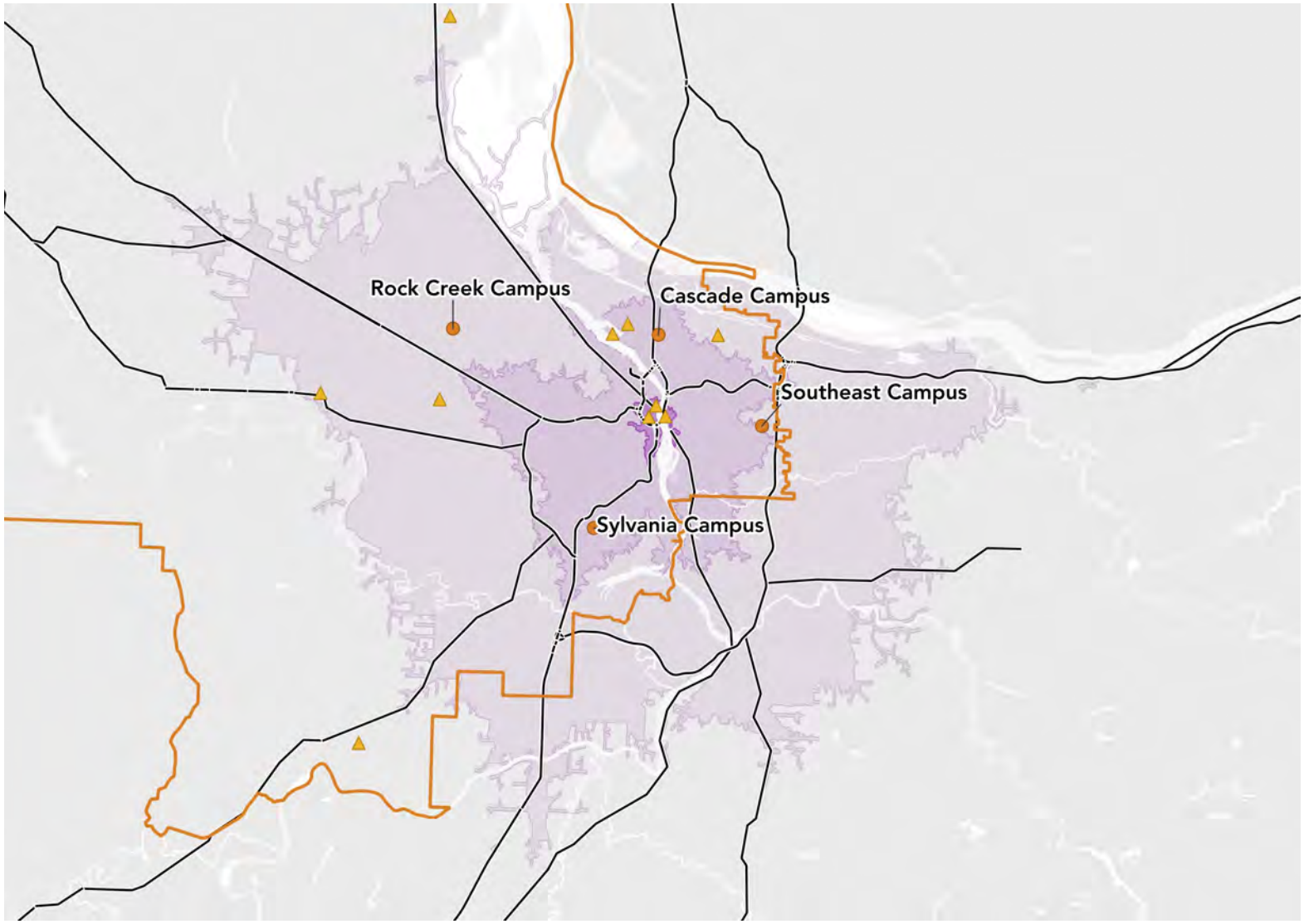
Fourth and Montgomery



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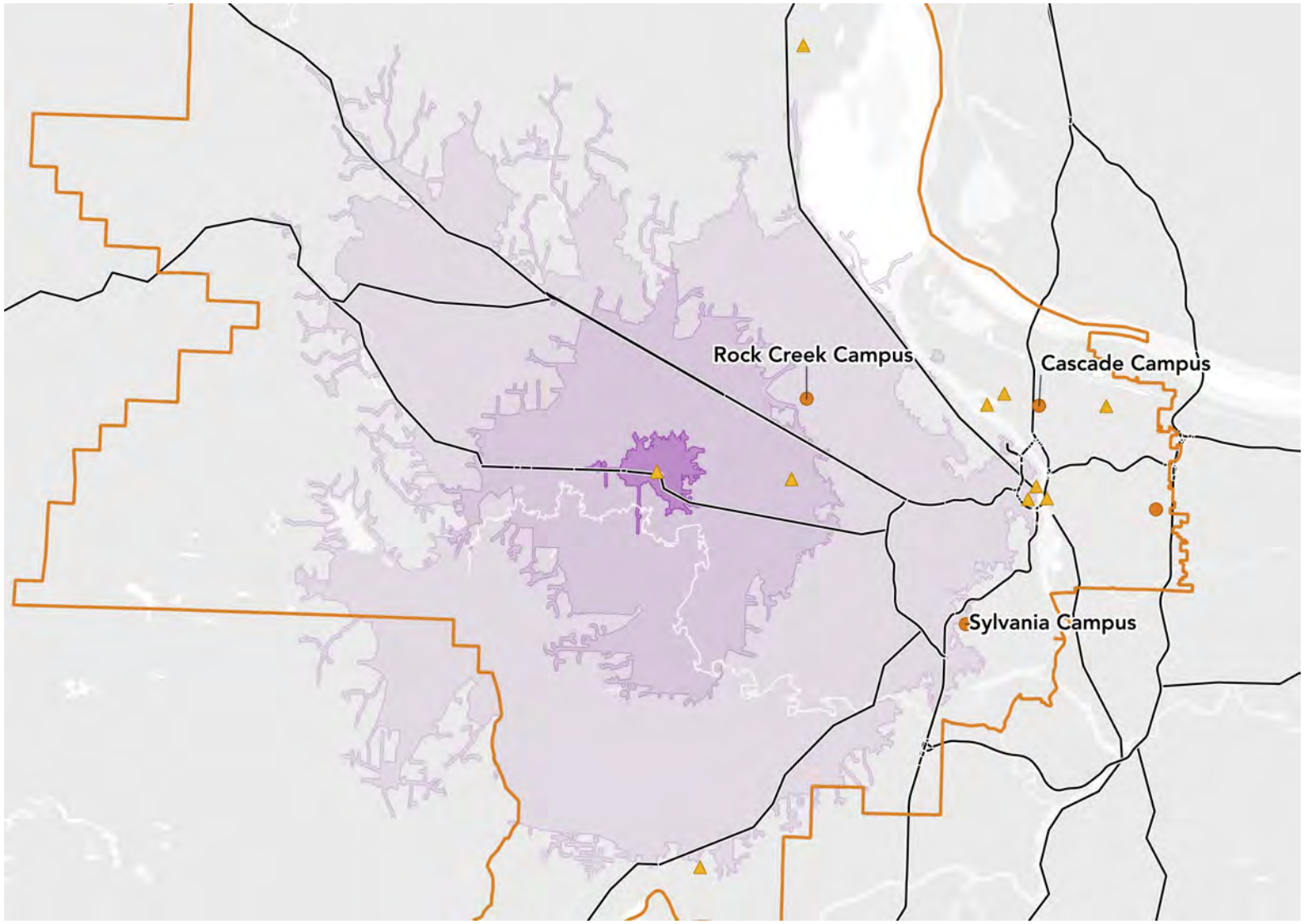
Hillsboro Center



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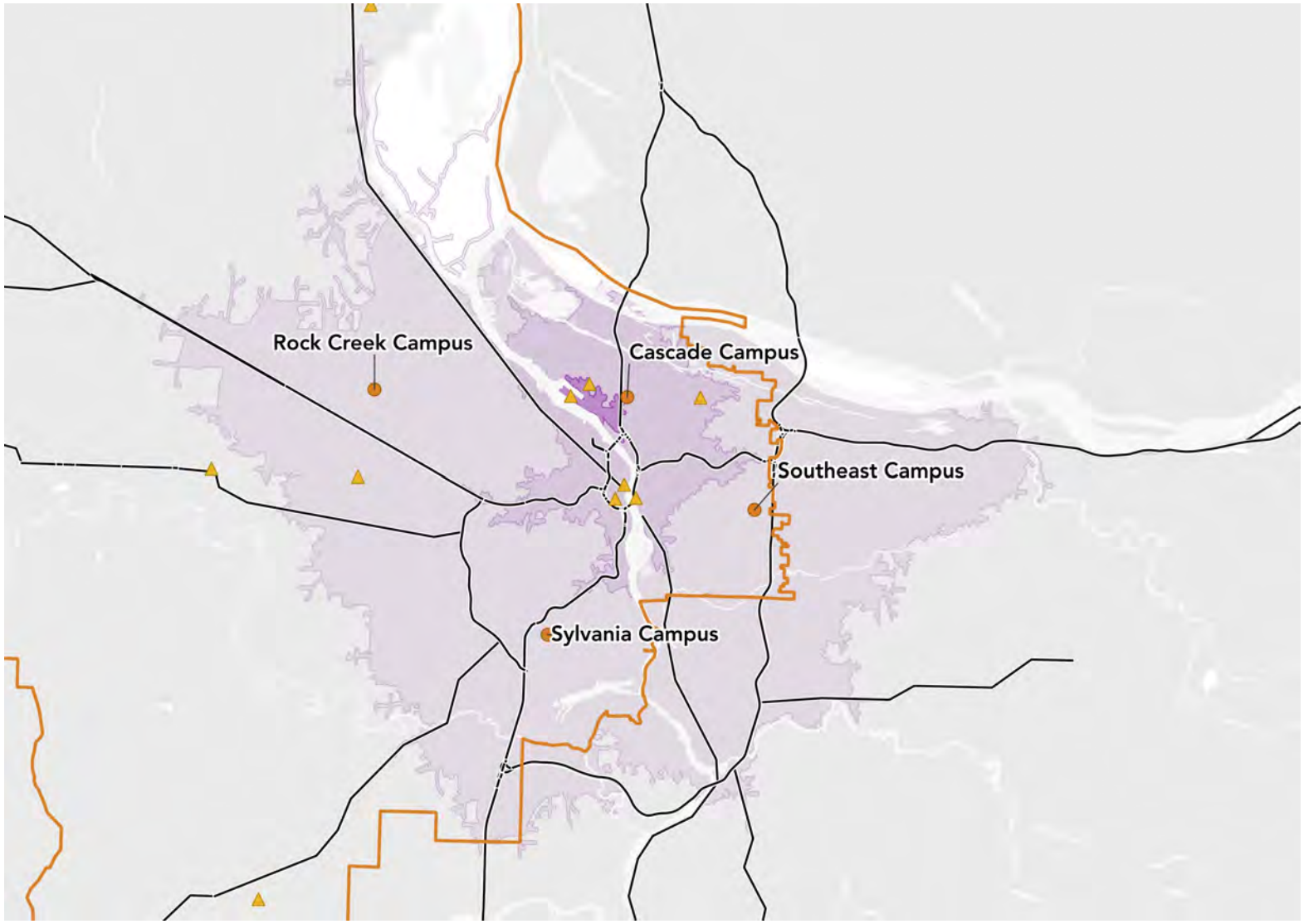
Maritime Welding Training Center



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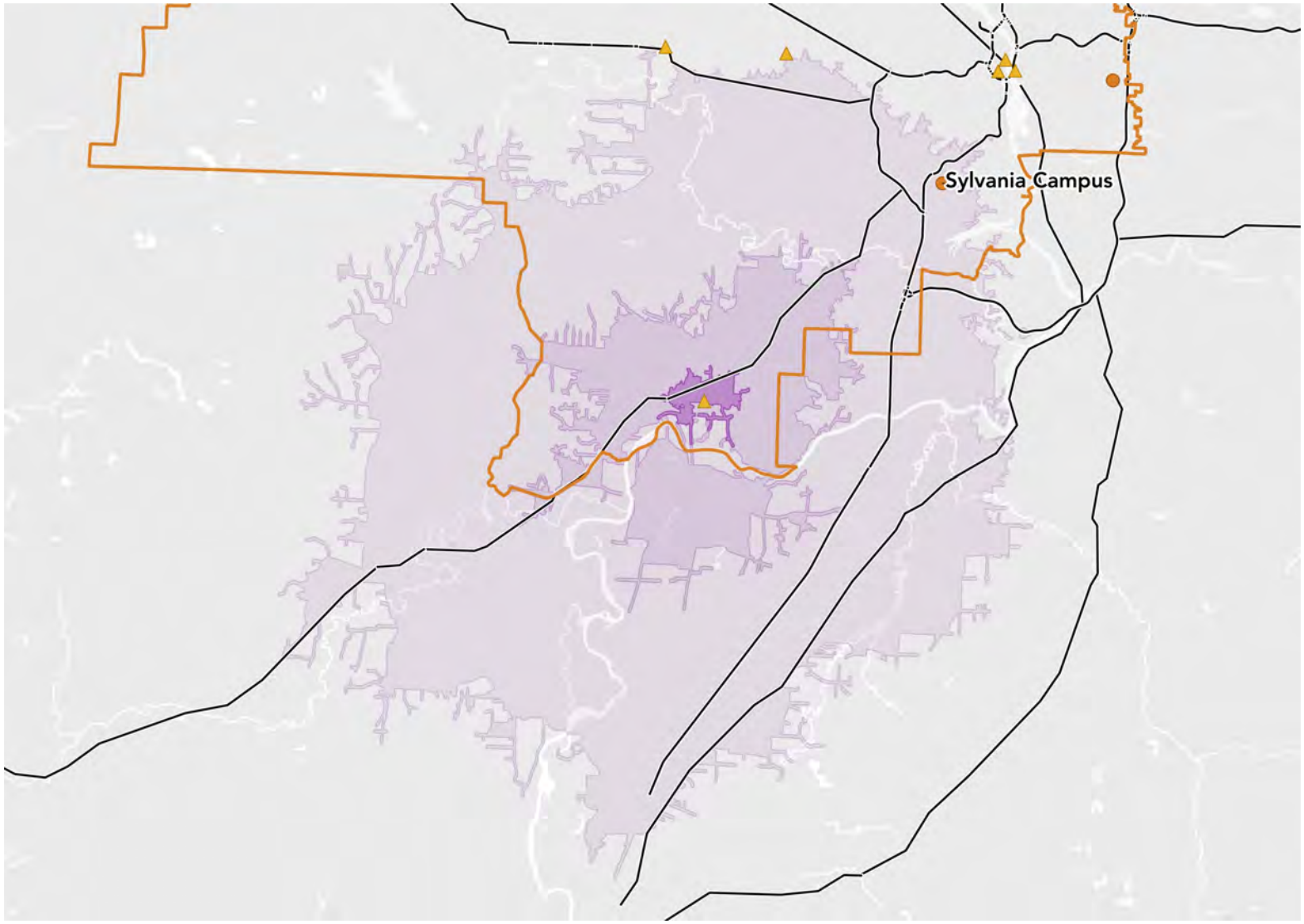
Newberg Center



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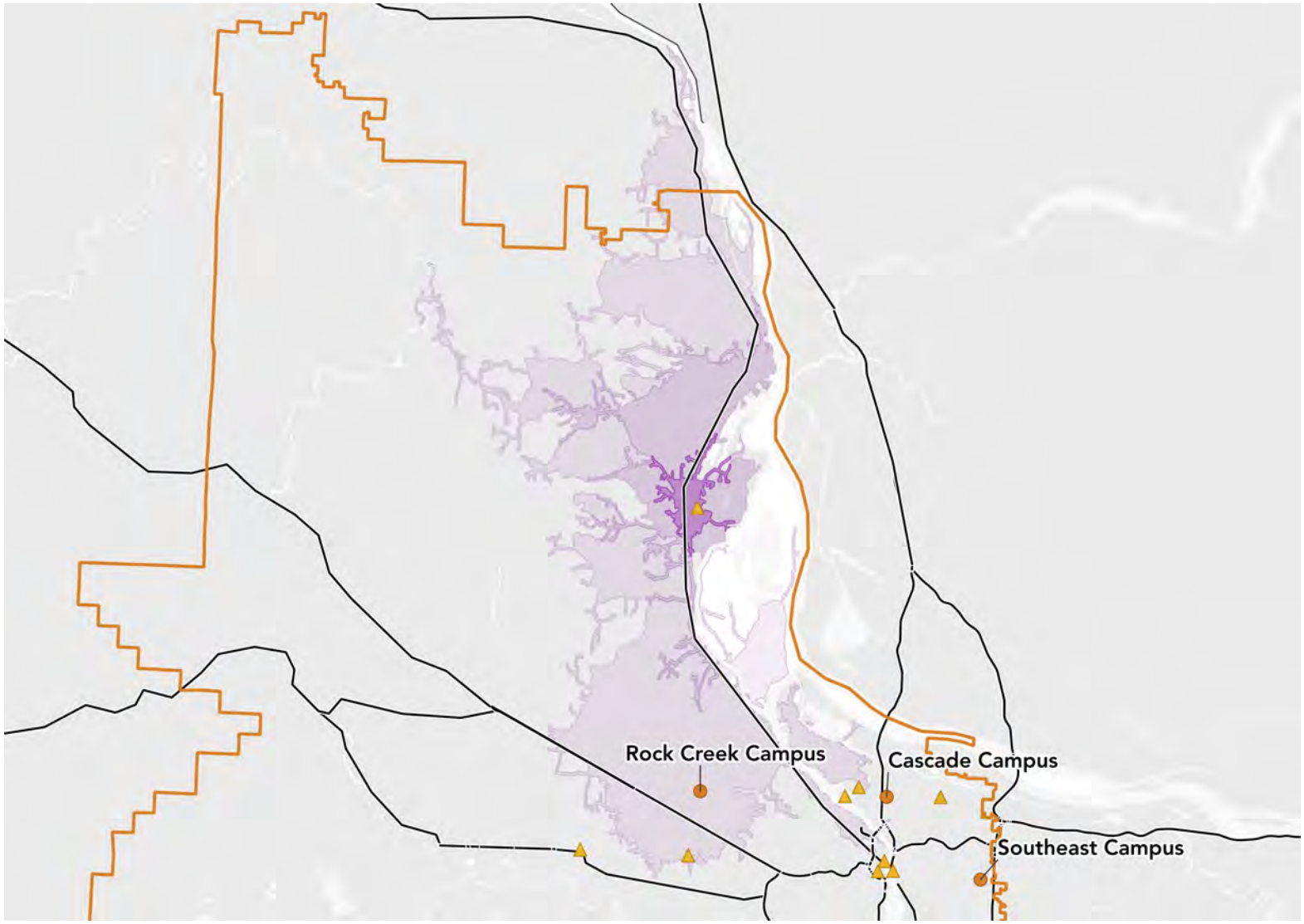
Oregon Manufacturing Innovation Training Center



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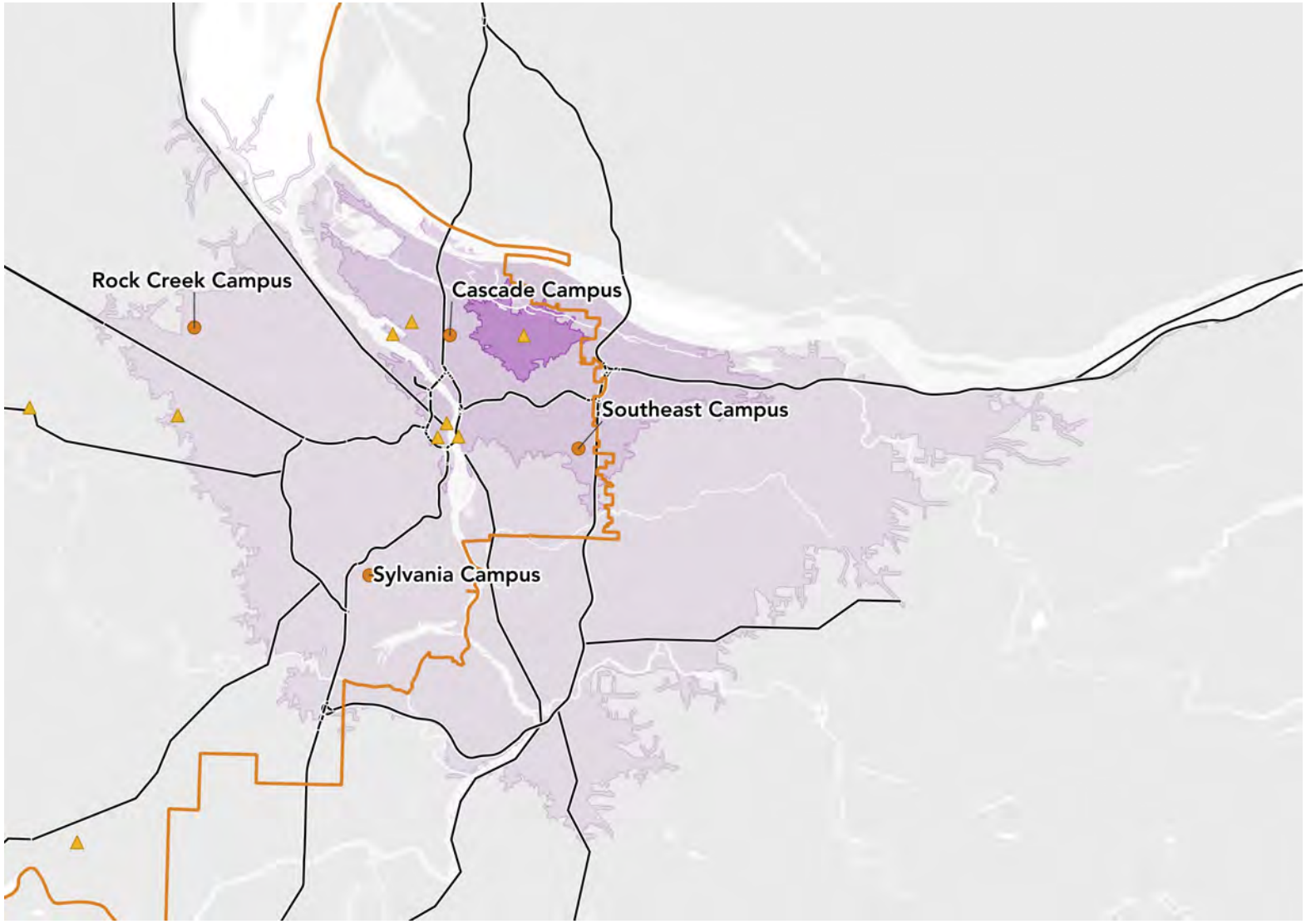
Portland Metropolitan Workforce Training Center



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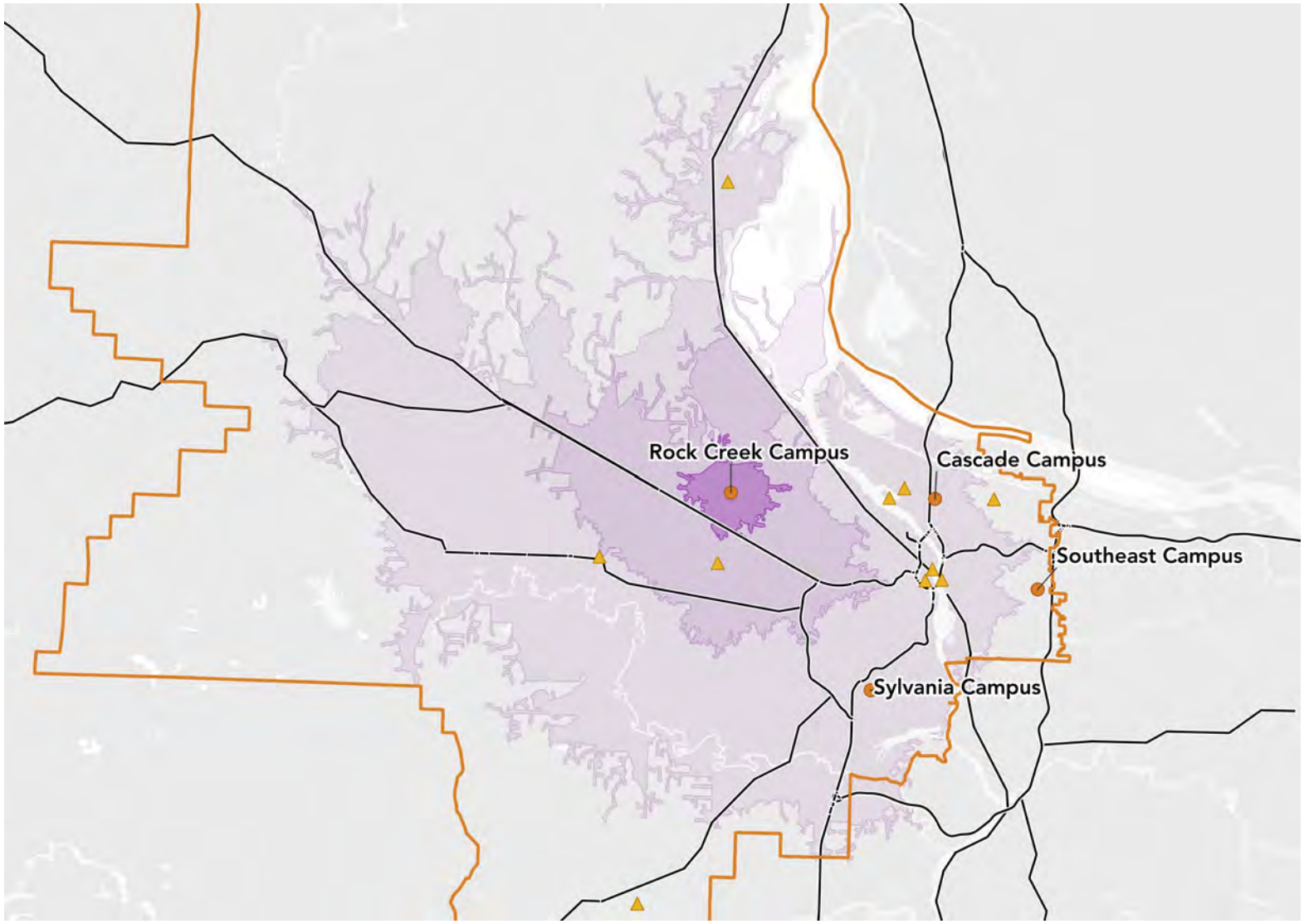
Rock Creek Campus



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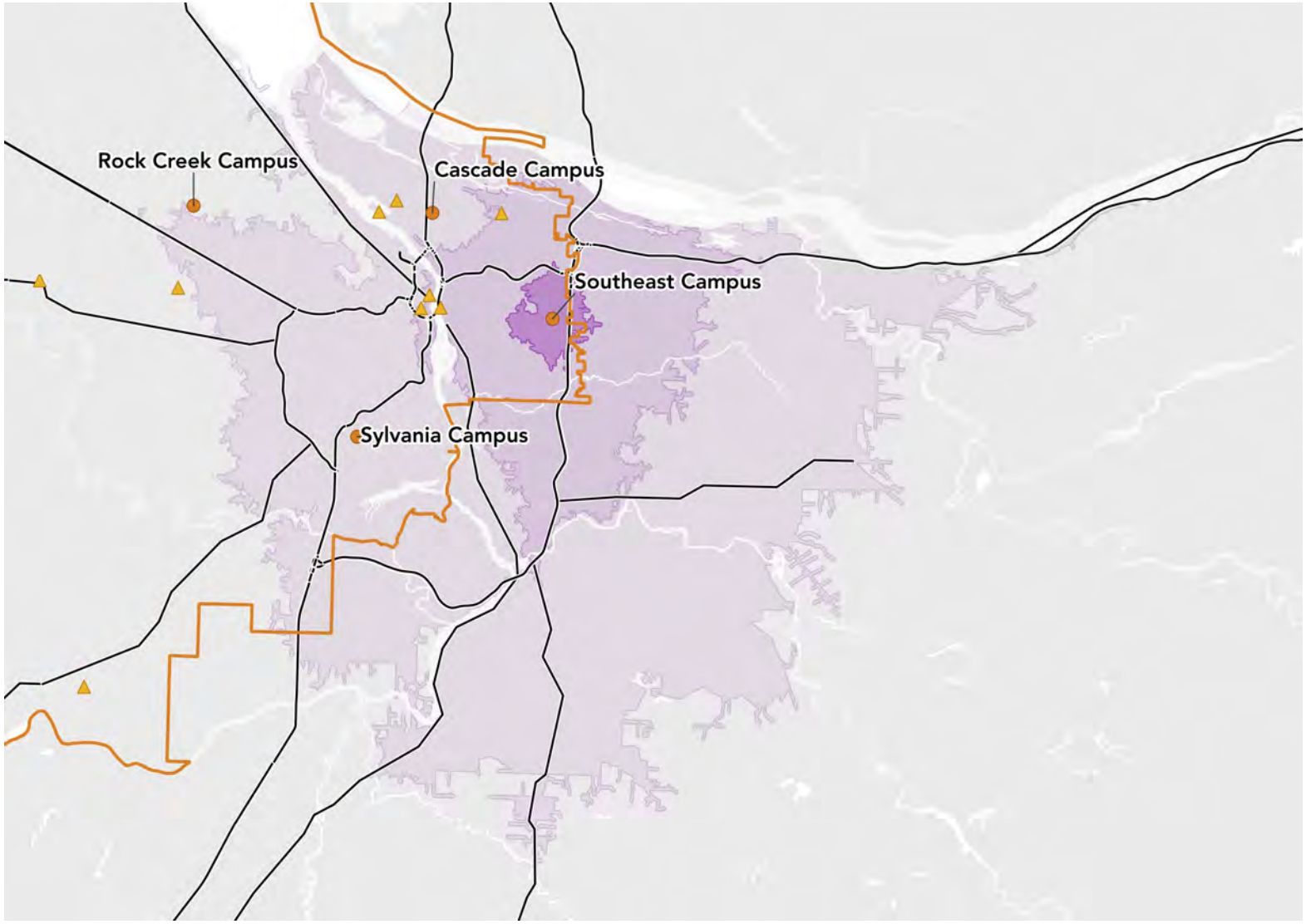
Southeast Campus



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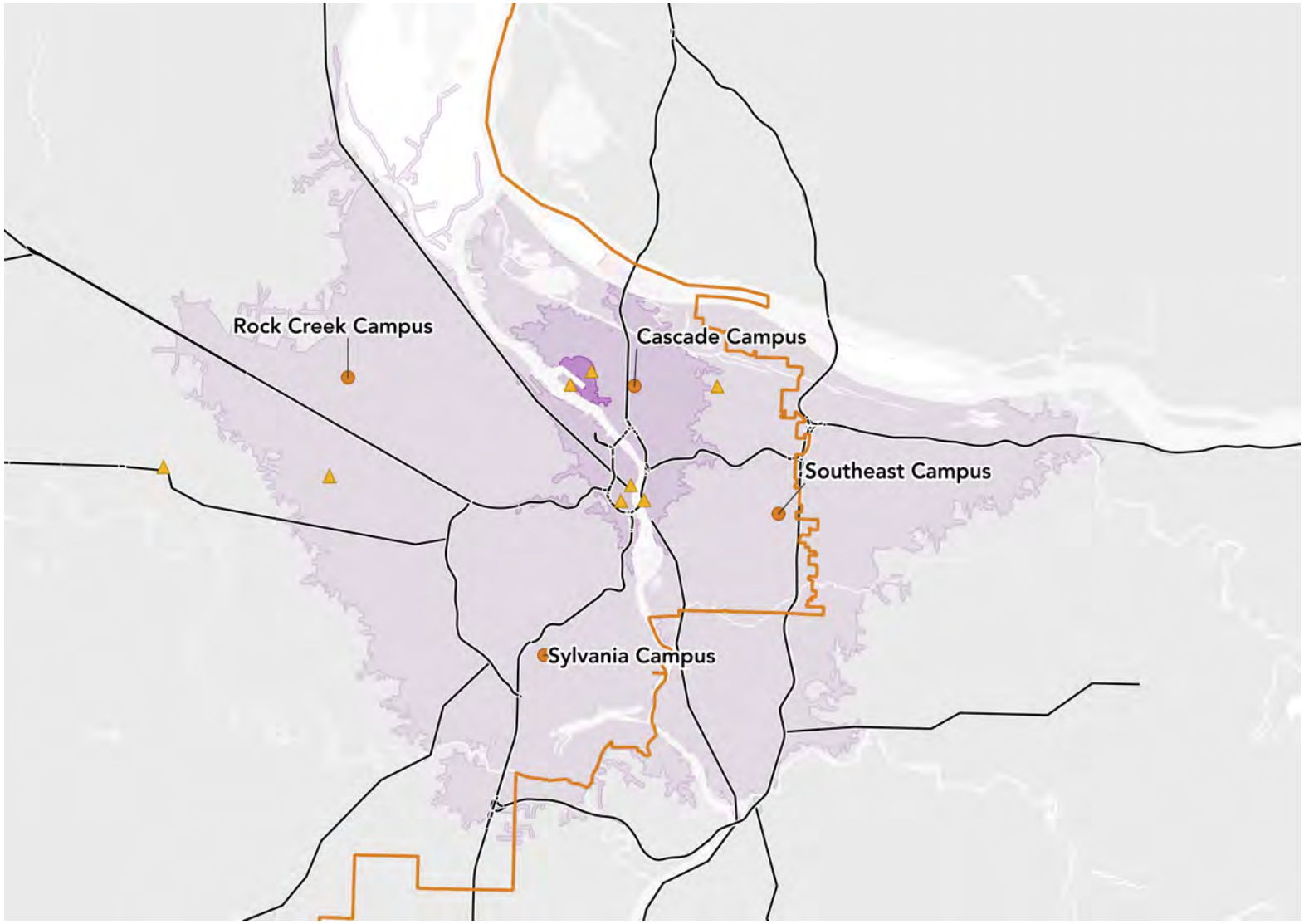
Swan Island Trades Center



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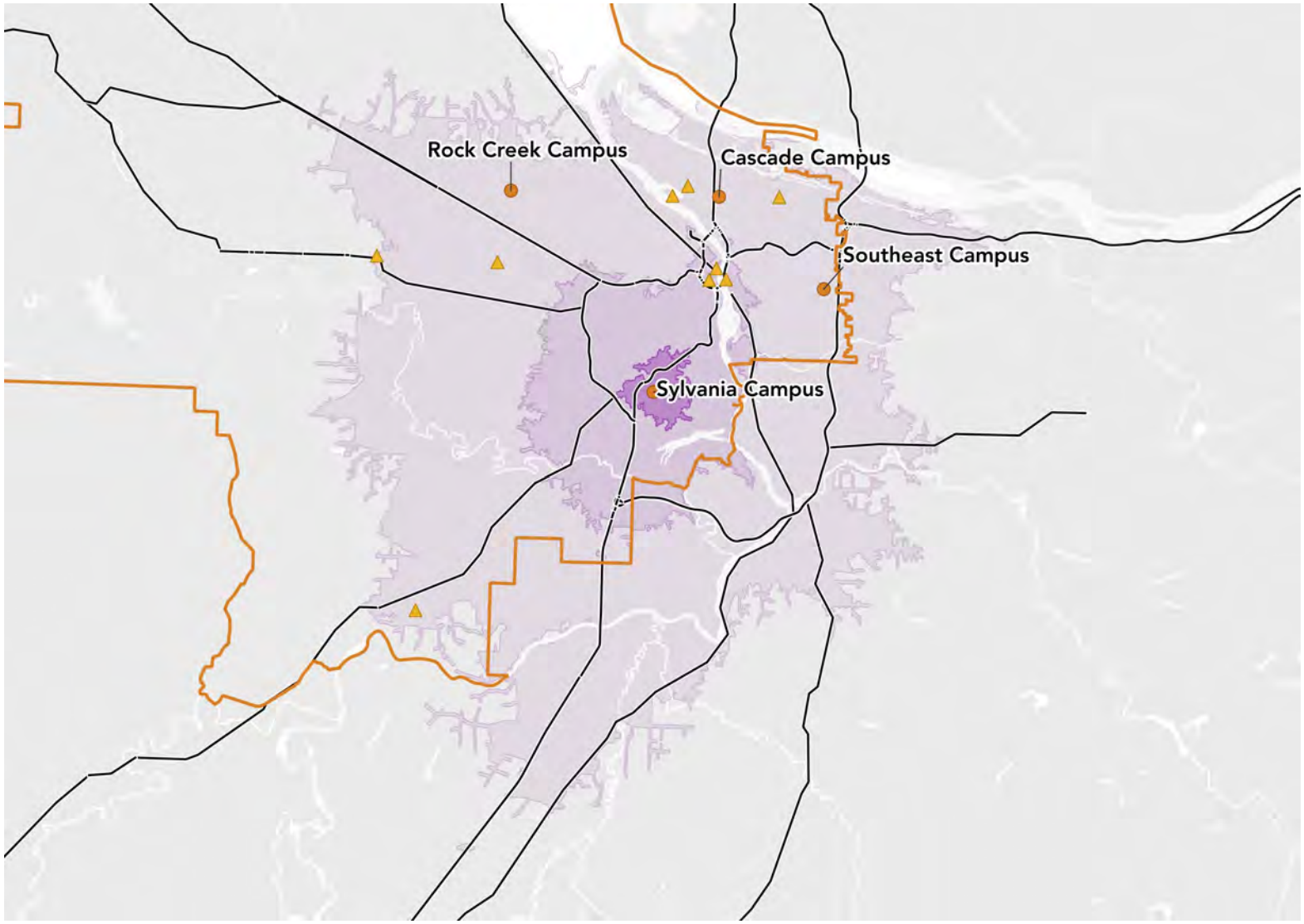
Sylvania Campus



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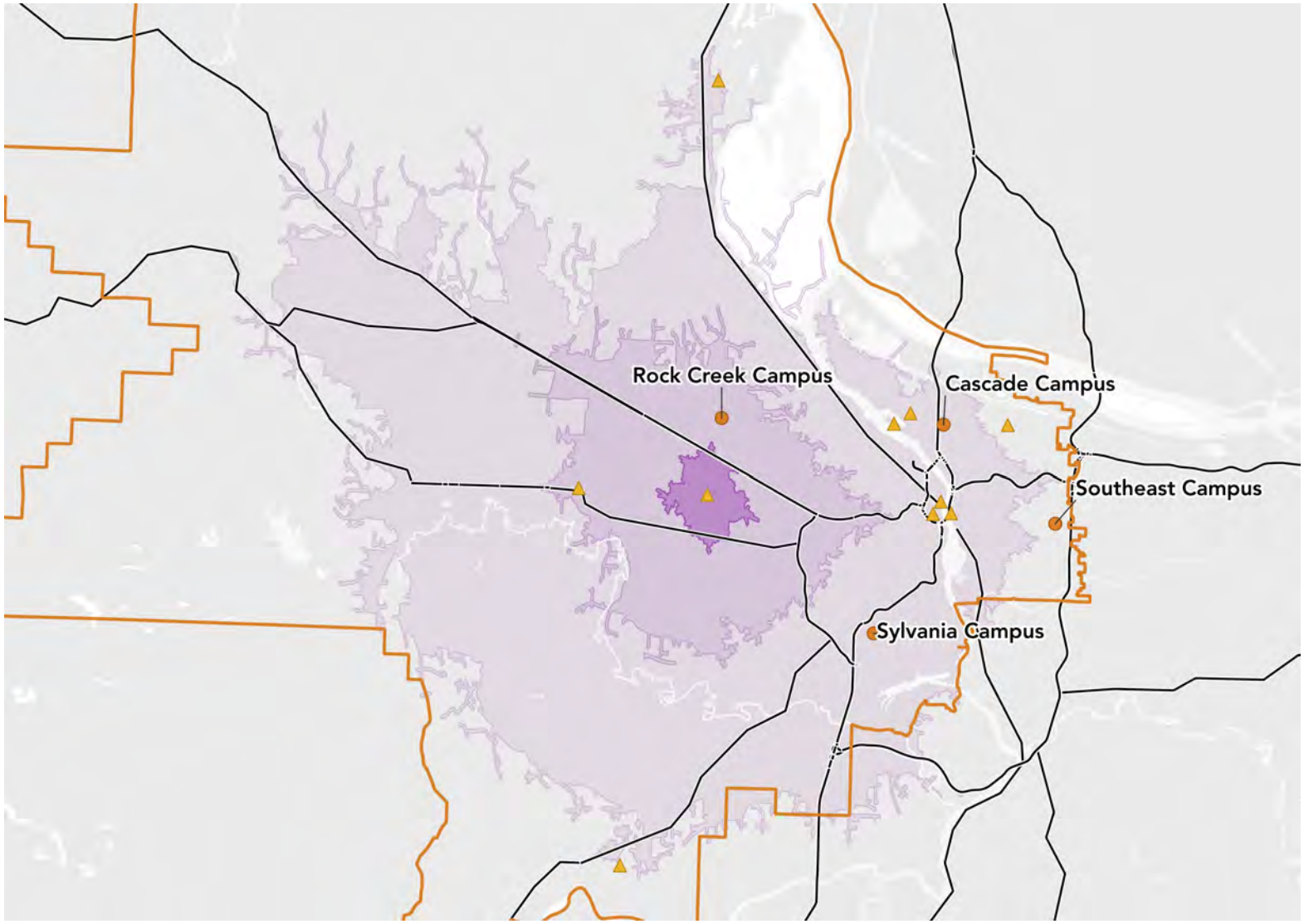
Willow Creek Center



Drive-time bands: 0-5 minutes, 5-15 minutes, 15-30 minutes

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