

CITY OF CARNATION

**STREET AND STORM SEWER SYSTEM
STANDARDS**



December 2018

Amended June 2022

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**BURIED UTILITIES IN AREA
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CITY OF CARNATION**STREETS AND STORM SEWER SYSTEM STANDARDS POLICY****CHAPTER 1: GENERAL**

This Street and Storm Sewer System Standards is established pursuant to City of Carnation Municipal Code (CMC) 12.06.010 which authorize the City Manager to administratively adopt standards to implement and enforce construction standards that apply to all new construction or reconstruction of city infrastructure including requirements applicable to street, surface water drainage facilities, and right-of-way improvements within the City of Carnation. Accordingly, the guidelines, standards, and specifications contained in this manual apply to the engineering and construction of all streets and storm sewer facilities established and/or improved within the City.

The City Manager or his/her designee is responsible for all interpretations and/or revisions to the manual as may be required for its implementation. The standards contained in this manual will be considered as reasonable minimum requirements, and will not be modified, except as may be permitted by the City Manager pursuant to a requested modification, adjustment, or variance, and subject to all applicable decision criteria.

This document may be downloaded from: <https://www.carnationwa.gov/docs>

Updates will be made available to the public as they are incorporated into the City Standards. It will be the responsibility of the applicant and/or their representatives to obtain updated revisions of this manual.

SECTION 1: DEFINITIONS

- A. “Access” is the safe, adequate, and usable ingress/egress (entrance/exit) to a property or use.
- B. “Average Daily Traffic (ADT)” is the total number of vehicles traveling past a particular point in an average 24-hour period. Typically used in quantifying the combined number of vehicles traveling either direction on a particular roadway.
- C. “Alley” is a public or private way, at the rear or side of property, permanently reserved as a means of vehicular or pedestrian access to a property.
- D. “Applicant” is the person, partnership, joint venture, firm, or corporation who has applied for a Development Permit or approval.
- E. “As-Built Drawing(s)” are a stamped and signed engineering plans that have been revised to reflect all changes to the plans that have occurred during construction, including changes in materials, distances, lengths, location, elevations, volumes, etc.

- F. “Best Management Practice (BMP)” Are one of those practices described in the Stormwater Management Manual for Western Washington prepared by Washington State Department of Ecology (WSDOE).
- G. “Biofiltration” is the process of reducing pollutant concentrations in water by filtering the polluted water through vegetation.
- H. “Council” is the City Council of the City of Carnation.
- I. “City” is the City of Carnation in King County, State of Washington acting through its legally constituted elected officials, employees, or agents.
- J. “City’s Contractor” is the Contractor(s) under contract with the City.
- K. “City Engineer” or “Engineer” shall be a licensed civil engineer and as designated by the City Manager.
- L. “Complete Streets” is a policy to design, construct, operate and maintain an appropriate and integrated transportation system that will meet the needs of motorist, pedestrians, bicyclists, wheelchair users, transit vehicles and riders, freight haulers, emergency responders, and residents of all ages and abilities,
- M. “Developer” is any party that performs work, or activity that requires a permit or approval. Developers must have a business license.
- N. “Dedication” shall mean the deliberate appropriation of land by its owner for public use or purpose, reserving no other rights than those that are compatible with the full exercise and enjoyment of the public uses or purpose to which the property has been devoted. The intent to dedicate will be evidenced by the owner by the presentment for filing of a final plat, short plat, binding site plan or statutory warranty deed that shows the dedication thereon. Acceptance by the public will be evidenced by written approval issued by the City of such document for filing with the County Auditor.
- O. “Driveway” is an established and surfaced portion of the lot whose use is for the purpose of ingress and egress to a carport, garage, parking area or loading and unloading station for vehicles.
- P. “Engineering Plan” is a plan prepared, stamped, and signed by a professional civil engineer. An engineering plan may be supplemented with detailed drainage calculations, structural calculations, or other supporting documents needed to assess the total plan.
- Q. “Engineering Review” is an evaluation by the City of Carnation of a proposed project’s compliance with City Standards and other applicable City, State, and Federal regulations, ordinances, and policies.

- R. “Fire Marshal” is the agent designated by the City Manager. The Fire Marshal for the City is the authorized representative of Eastside Fire and Rescue.
- S. “Frontage Improvements” are all of the street pavement, curb, gutter, sidewalk, storm drainage, power and communications cable undergrounding, street trees and street lighting, as specified by these Standards, located within any public right-of-way abutting the property boundary of the development.
- T. “Grading” is any excavating or filling of earth materials or any combination thereof.
- U. “Half Street” is a street constructed along an edge of development utilizing at least half the regular width of the right-of-way and permitted as an interim facility pending construction of the other half of the street by the adjacent owner.
- V. “Inspector” is the City authorized representative assigned to make inspections for compliance with the City specifications and standards.
- W. “Licensed Contractor” is a contractor licensed by the State of Washington.
- X. “Manager” is the City Manager or their designee, of the City of Carnation.
- Y. “Owner” as used herein is the property owner constructing the street or storm sewer and its contractor, and any representatives thereof, including builders or engineers acting on behalf of the owner.
- Z. “Owner’s Contractor” or is any “Contractor” or agent of the owner authorized to act on behalf of the owner.
- AA. “Plans” are the plans, profiles, cross sections, elevations, details, and supplementary specifications, sign by a licensed professional engineer and approved by the Director, that show the location, character, dimensions, and details of the work to be performed.
- BB. “Private Access Tract” is a privately owned and maintained tract providing vehicular access to four or fewer residential properties.
- CC. “Private Street” is a privately owned and maintained access provided for by a tract, easement, or other legal means, typically serving three or more potential dwelling units.
- DD. “Private Access Tract” is a privately owned and maintained tract providing vehicular access to four or fewer residential properties.
- EE. “Private Street” is a privately owned and maintained access provided for by a tract, easement, or other legal means, typically serving three or more potential dwelling units.

- FF. “Property” is the Parcel of land associated with any development being improved to these standards.
- GG. “Public Street” is a publicly owned facility providing access, including the roadway and all other improvements, inside the right-of-way.
- HH. “Public Utility” is a company providing public service such as gas, electric power, telephone, telegraph, water, sewer, or cable television, whether or not such company is privately owned or owned by a governmental entity.
- II. “Public Works Director” is the director of public works or their designee, of the City of Carnation.
- JJ. “Rain Garden” is a non-engineered shallow, landscaped depression, with compost- amended native soils and adapted plants. The depression is designed to pond and temporarily store stormwater runoff from adjacent areas, and to allow stormwater to pass through the amended soil profile (ref. SWMMWW Appendix I-G).
- KK. “Right-of-Way” is land, property, or property interest (e.g., an easement), usually in a strip, acquired for or devoted to transportation purposes.
- LL. “Sidewalk” is any publically owned and maintained pedestrian facility.
- MM. “Shoulder” is the paved or unpaved portion of the roadway outside the traveled way that is available for emergency parking or non-motorized use.
- NN. “Standard Installation” is an installation requiring only a stub service and a storm sewer to connect the property to the City’s system of storm sewers.
- OO. “Standard Specifications” are the Standard Specifications for Road, Bridge, and Municipal Public Works Construction prepared by the Washington State Chapter, American Public Works Association (APWA), and Washington State Department of Transportation (WSDOT); latest edition with revisions.
- PP. “Storm Sewer” is any lateral, trunk, or other sewer owned or constructed by and/or a part of the public storm sewer facilities of the City.
- QQ. “Street” is any publicly owned or maintained road designed to provide a safe access to all users, including bicyclists, motorists, public transit vehicles, school buses, emergency responders, wheel chair users, and pedestrians.
- RR. “Storm Sewer Lateral” is the line which connects at the property or easement line to the City’s storm sewer stub service and extends on private property to the connection at the building, and is owned and constructed by private parties and maintained by the property owner.

- SS. “SWMMWW” is the Stormwater Management Manual for Western Washington, current edition published by the Washington State Department of Ecology.
- TT. “Traveled Way” is the part of the road made for vehicle travel excluding shoulders and auxiliary lanes.

SECTION 2: GENERAL POLICIES

The City has adopted policies to guide in the administration of these standards. A summary of some of the policies are included in this chapter.

These Standards cannot provide for all situations. They are intended to assist, but not to substitute for competent work by design professionals and in construction methods.

These Standards are also not intended to limit unreasonably and innovative or creative effort which could result in better quality, cost savings, or both. Any proposed departure from these standards will be subject to review, approval and acceptance by the City. The City Manager shall retain the ultimate authority to approve or disapprove proposed deviations from these Standards.

The intent of these policies is to establish general rules and regulations for the service and extension of service for the water, sewer, road and storm drainage systems of the City; and to promote the public health, safety, and general welfare of the users these systems in accordance with standards established by the City, county, state and federal governments.

- A. Authorized employees of the city, properly identified, shall have access, upon the permission of the owner or his/her authorized agent, at reasonable hours of the day, to all parts of the premises for which improvements are being constructed within the City for the purpose of assuring conformity to these standards.
- B. Whenever the owner of any premises supplied by the City restrains authorized city employees from making such necessary inspections, work on the improvements may be discontinued.
- C. Any person causing damage to any property belonging to the City shall be liable to the City for any and all damages resulting either directly or indirectly therefrom.

The Standards shall apply to all newly constructed road and right-of-way facilities, both public and private, within the City of Carnation.

The Standards apply to modifications of roadway features of existing facilities which are within the scope of reconstructions, required off-site road improvements for land developments, or capital improvement projects when so required by the City of Carnation.

The Standards shall apply to utility poles and other public utility facilities within the City of Carnation.

The Storm Sewer Standards shall apply to any new project or re-development that will result in the addition of 1,000 square feet or more of impervious surface to the project side. For purposes of these Standards impervious surfaces are classified as asphalt, concrete, gravel or roof materials.

Section 2.1 Responsibility to Provide Roadway Improvements

- A. Any land development that will impact the service level, safety, or operational efficiency of City roads; or is required by City code, hearing examiner, or City staff determination to improve streets, shall make required improvements in accordance with these Standards.
- B. Unless modified or exempt as provided for in CMC 15.56.170.C, any activity that requires a Land Use or Building Permit will require that the developer construct or install frontage improvements in accordance with these Standards

The development will be exempt from this frontage improvement requirement:

- 1. If the improvements permitted for additions, alternations, or repairs within any twelve-month period, do not increase the gross floor space of an existing building or facility by more than fifty percent (50%).
 - 2. If the building permits for residential garages, carports, or accessory structures not intended as a dwelling unit.
- C. Any project development that contains internal public streets shall construct or improve those streets to these Standards. The design of all private internal streets shall be submitted for City approval.
 - D. All development projects may be required to include pedestrian facilities as a part of the design. Where existing streets are to be modified, pedestrian facilities shall be updated to current American with Disabilities Act (ADA) requirements and as determined by the City.

Section 2.2 Variances from these Standards

- A. Variances from these Standards may be granted by the City Engineer with final approval of the City Manager upon evidence that such variances are in the public interest and that requirements for safety, function, fire protection, appearance and maintainability based upon sound engineering judgment are fully met. Variance requests for subdivisions should be proposed at preliminary plat stage and prior to approval of the engineering plans for construction. Any anticipated variances from these Standards which do not meet the International Fire Code shall also require concurrence by the Fire Marshall.
- B. Questions regarding interpretation of these Standards may be directed to the City Engineer.

Section 2.3 Call Before You Dig

The owner and contractor are advised that underground utilities such as but not limited to electrical power, natural gas, telephone, cable TV, water system main lines, water system service lines and storm sewer lines are buried within the City's Right-of-Way and on private property.

The presence or location of these utilities are not readily identifiable and can only be located by trained personnel.

Underground utilities may be shown graphically in these standards or other documents provided by the City. Any representation of underground utilities is for general informational purposes only. The owner or their agents may not rely upon any representatives of the location or absence of underground utilities in these standards or other documents provided by the City.

The Applicant and Contractor must be aware that excavating or digging for any reason on any public properties, public Rights-of-Way, or private properties requires notification of the Utilities Underground Location Center at 833 or 1-800-424-5555 no less than 48 hours and two business days prior to excavation. Failure to properly follow the notification procedures to advise public and private utility companies of your plans to excavate may result in serious injuries or fatalities as well as damage to the utility that the Applicant or Contractor are responsible for. As a reference only the Applicant and contractor are advised of web information available at www.callbeforeyoudig.com or at the web search prompt for "Utilities Underground Location Center Washington State".

The Applicant and Contractor are encouraged to familiarize themselves with the requirements of all State and Federal laws governing the requirements to notify all utility companies of the Applicant's project and plans to excavate or dig. The City of Carnation provides the information about the requirement to notify the Utilities Underground Location Center to the Applicant and Contractors operating under any Permit issued by the City as advisory only and assumes no responsibility or liability for the Applicant's or Contractor's adherence to said requirements.

Section 2.4 Cultural Resources

The Owner and their Contractor are advised of the possibility of encountering buried artifacts or other cultural resources during the construction of any improvements that require excavation. In the event an artifact or other cultural resource is discovered during construction, the owner is advised to contact City Hall immediately. The City will refer the owner to the appropriate State or Federal agency for additional instructions.

SECTION 3: PERFORMANCE GUARANTEES

CONSTRUCTION PERFORMANCE GUARANTEES

Bonds or other allowable securities will be required by the City to guarantee the performance or maintenance of required civil-related work. Types of securities may include a cash deposit, or a bond from an acceptable surety. The amount and form of the financial guarantee shall be determined by the City and will be based upon a formula of 150 percent of the estimated construction cost of the facilities within existing and future right-of-ways once the plat is recorded. The minimum performance guarantee shall be \$3,000.00

The amount of the financial guarantee may be reduced during construction, as determined by the City. At no time will the financial guarantee amount be reduced to less than \$3,000.00

When a performance bond is used, an applicant may be allowed to obtain approval of a development proposal, or obtain a building permit, certificate of occupancy or other permit prior to completing installation of sidewalks, the final lift of pavement, or installation of landscaping.

The Performance Guarantee shall be in place until all the required improvements are complete and accepted by the city and the Maintenance Guarantee is posted or one year, whichever is greater.

MAINTENANCE GUARANTEES

The performance of the right-of-way improvements shall be guaranteed for a period of at least two years from the latest date of either the acceptance by the city of the construction and installation of the improvements following the final construction inspection or final plat recording, whichever one is greater. The amount and form of the maintenance financial guarantee shall be determined by the City and will be based upon a formula of at least 20 percent of the final construction cost of the facilities or 20% of the performance bond, whichever is less. The minimum maintenance guarantee shall be \$3,000.00. Maintenance guarantees will not be required when the required performance guarantee is \$3,000.00.

ADDITIONS, BETTERMENTS, EXTENSIONS – REIMBURSEMENT CONTRACTS

In the absolute discretion of the City Council on a recommendation from the City Manager, a developer who has installed improvements at his own expense, and who is qualified for reimbursement may be given a contract for pro-rata reimbursement, but in no event shall its terms of reimbursement exceed 15 years. In the event the City agrees to enter into such contract, the contract shall provide for a set-aside of the estimated actual costs of the City's legal and administration expense incurred in administering the contract, to be approved by the City Council. The contract shall specify, by legal description and scaled drawings, attached to the contract, the area benefited by the utility addition, betterment or extension and cost identified with each benefited lot or parcel.

BILL OF SALE.

All improvements constructed and conveyed to the City shall be done by a Bill of Sale. The Bill of Sale shall be on a form provided by the City and duly executed by the Developer.

SECTION 4: STANDARD SPECIFICATIONS

All work, materials and testing shall conform to the “Standard Specifications for Road, Bridge, and Municipal Construction”, current edition, as prepared jointly by the Washington State Department of Transportation and the Washington State Chapter of the American Public Works Association, and herein after referred to as the “Standard Specifications,” except as herein modified.

SECTION 5: OTHER SPECIFICATIONS

The current edition of the following shall be applicable when pertinent, when specifically cited in the Standards, or when required by higher funding authority:

- A. City of Carnation Municipal Code.
- B. Applicable Washington Administrative Code.
- C. Stormwater Management Manual for Western Washington, published by the Washington State Department of Ecology.
- D. Design Manual, published by the Washington State Department of Transportation.
- E. Manual of Uniform Traffic Control Devices, published by the American Traffic Safety Services Association, the Institute of Transportation Engineers and the American Association of State Highway and Transportation Officials.
- F. U.S. Department of Transportation manual on Uniform Traffic Control Devices, as amended and approved by Washington State Department of Transportation (MUTCD).
- G. Local Agency Guidelines, WSDOT, as amended.
- H. Guidelines for Urban Arterial Program, WSDOT, as amended.
- I. Design criteria of federal agencies including the Federal Housing Administration, Department of Housing and Urban Development; and, the Federal Highway Administration, Department of Transportation.
- J. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), Current edition.
- K. Standards of the American Society for Testing and Materials (ASTM).
- L. City of Carnation Combined Water and Sanitary Sewer Utility Technical Standards.
- M. City of Carnation Comprehensive Water System Plan.
- N. City of Carnation Comprehensive Sewer System Plan.
- O. Standards of the American National Standards Institute (ANSI).
- P. Standard Specifications for Highway Bridges, adopted by AASHTO.
- Q. Guide for the Development of Bicycle Facilities, adopted by AASHTO.

SECTION 6: LEGAL RELATIONS AND RESPONSIBILITIES

LAWS TO BE OBSERVED

The Contractor at all times shall comply with all Federal and State laws, local laws and ordinances, and any regulations which in any manner affect the project.

Failure to comply with these Standards may result in denial of plan or development permit approval, revocation of prior approvals, legal action for forfeiture of bond, code enforcement, and/or other penalties as provided by law. The Contractor shall release, indemnify and promise to defend and save harmless the City, its officer, employees and agents from and against any and all liability, loss, damage, expense, actions and claims, including cost and reasonable attorney's fees incurred by the City in defense thereof, asserting or arising directly or indirectly on regulations whether such violations are by the contractor, his subcontractors, his employees, or his agents.

1. Right-of-Way Permit

Prior to performing any work within a public right-of-way, the person performing the work shall obtain a right-of-way or street use permit from the Public Works Director, who may condition the permit as necessary to protect the public health, safety and welfare (CMC 15.56.250).

Permittee shall provide traffic control to ensure public safety and notify Carnation Public Works a minimum of 2 working days prior to the start date. No work shall be buried until observed and accepted by the Public Works Department or the City Engineer. Buried work not observed and accepted by the City Representative shall be exposed by the Contractor for observation by City Representative at the Contractor's sole cost.

2. Clearing and Grading Permit

Clear and Grade permits are required for all grading, excavation or filling involving fifty (50) cubic yards or more of material that is greater than two-feet in depth or that creates a cut or fill slope greater than five-feet in height and steeper than two horizontal to one vertical (CMC 15.44.200).

Clear and grad applications shall include a vicinity map, property boundaries, extent and location of proposed clearing and grading activities, and major physical features of the property. Including location and dimension of buffer areas and location and description of proposed erosion-control devices or structures.

A clearing and grading permit is not required for agricultural activities, excavation for a septic tank, drain field or well, clearing of one thousand square feet where the existing land use is single-family residential or clearing and grading associated with the construction of a single-family residence that has been issued a valid building permit.

3. Drainage Permit

All new development or redevelopment except for single family residential development, the result of which is to create, add or otherwise cause to exist upon a development site two thousand square feet or more of: (i) new impervious surface area, (ii) replaced impervious surface area, or (iii) new impervious surface area plus replaced impervious surface area require a Drainage Permit.

All stormwater drainage plans must comply with all applicable state and/or federal regulations, specifically including without limitation the following:

- a. The most current edition of the Washington State Department of Ecology's Stormwater Management Manual for Western Washington (DOE Manual).
- b. Underground injection wells shall be registered with the Washington State Department of Ecology in accordance with WAC Chapter 173-218, Underground Injection Control Program.
- c. Discharge of storm water runoff into groundwater shall comply with the provisions of WAC Chapter 173-200 Water Quality Standards for Groundwaters of the State of Washington

Unless using standard DOE Manual details, all stormwater drainage plans must be designed by a professional engineer.

No surface water may be channeled or directed into a sanitary sewer.

General. BMPs shall be used for stormwater management, for source control of pollution, for runoff treatment, and for construction stormwater pollution prevention to comply with the DOE Manual.

All new development and redevelopment as defined in this chapter shall be required to implement BMPs for on-site stormwater management, for source control of pollution, for construction stormwater pollution prevention, and to manage stormwater discharge to avoid harming downstream properties, regardless of whether such activities require a permit.

PROTECTION AND RESTORATION OF PROPERTY

The developer or contractor shall protect and preserve from damage, interference and destruction of all private and public property on or in the Vicinity of the work. If such property is damaged or destroyed or its use interfered with by the contractor or his agents, it shall be restored immediately to its former condition by the contractor at his expense and such interference terminated.

The developer's work shall be confined to the job site premises and necessary off-site easements and they shall not enter upon or place materials on other private premises except by written consent of the individual owners, and shall hold harmless the City from all suits and actions of every kind that might result from the use of private property

UTILITIES AND SIMILAR FACILITIES

The contractor or developer shall be responsible under RCW for locating all existing underground utilities and protecting the same against damage whether shown on the plans or not. The contractor shall support and protect all pipes, curbs, conduits, poles, wires or other apparatus which may be in any way affected by the work, and do everything to support, sustain, and protect the same, under, over, along, or across said work. In case any of said public or private utilities should be damaged, they shall be repaired by the contractor whenever feasible on the private/public utility having control of same, and the expense of such repairs, shall be the responsibility of the developer or contractor.

The contractor shall further be responsible for any damage done to any street or other public property, or to any private property by reason of the breaking of any water pipe, sewer, or gas pipe, electric conduit or other utility by or through his/her negligence..

TRAFFIC CONTROL

The developer/contractor shall be responsible for interim traffic control during construction on or along traveled roadways. Traffic control shall follow the guidelines of the WSDOT/APWA standard specifications and comply with the requirements of the MUTCD manual. The Traffic Control Plan shall be submitted to for approval by the City prior to the start of construction.

Signs must be legible and visible and should be removed at the end of each week work day if not applicable after construction hours.

All necessary and/or required traffic control devices will be in place prior to the beginning of the project construction, or on a daily basis during project construction.

DETOURS AND ROAD CLOSURES

When road closures cannot be avoided the developer/contractor shall post “to be closed” signs a minimum of five days prior to the closing. The types and location of the signs shall be shown on a detour plan. A detour plan must be prepared and submitted to the City Engineer and approved prior to closing any City street. In addition, the developer/contractor must notify emergency services, school district transportation department and any other affected persons or agencies as directed by the City Engineer at least five days prior to closing.

SECTION 7: DEVELOPER EXTENSION AGREEMENT

The City may require a developer extension agreement where the proposed development requires the extension of various services provided by the City, including extension of public utilities and/or streets. A copy of the developer extension agreement will be provided to the applicant upon request.

SECTION 8: DRAFTING STANDARDS

Construction drawing shall be signed by a professional civil engineer currently registered in the State of Washington.

All drafting shall be completed in AutoCAD. Drafting symbols shall be per Joint APWA/WSDOT Drafting Symbols and Legends. Drawings shall be sufficiently layered so that topographic data, lot lines, text and design details may be easily turned on or off.

All plans submitted for either design approval or permanent record will be free of photographs, stick-ons, or pen/pencil shading. Hatching may be acceptable if the pattern is not excessively dense.

Upon Completion of Construction, the electronic file shall be edited to reflect actual construction conditions and as-built records. The electronic file shall then be submitted to the City and shall become the property of the City. The electronic file shall contain all data, including topography, lot line, other utilities and text. Title blocks may be removed.

The as-built drawing printed on a 22"x34" and 11"x17" paper and wet stamped by the engineer of record.

The following plans for Public Works improvements and utilities shall be prepared.

- A. Erosion Control and Grading Plan
- B. Street Improvements
- C. Storm Drain or Drainage Plan (Drainage & Street Plans may be combined together)
- D. Sanitary Sewer Plan if applicable
- E. Water System Plan if applicable
- F. Landscaping Plan if applicable
- G. Spill Prevention Control and Countermeasures Document
- H. Street Lighting if applicable

SECTION 9: FORMAT AND REQUIRED DATA

- A. All public works plans for street improvements and utility systems shall be prepared in a plan/profile format wither with sheets printed in half plan and half profile or with separate sheets for plan review and profile views. Minimum text height will be such that text is legible at half scale.

- B. Design drawings will be submitted on clean, legible blue or black format.
- C. As-built drawings shall be submitted on good quality bond paper, and legible to-scale PDF files. Sheet sizes will be 22" x 34" for engineering drawings or 18" x 24" for survey drawings. No sepia will be accepted.
- D. No engineering plans will be accepted with architect's scale.
- E. Plans will show all existing and proposed monuments. All Monumentation will be described with coordinates. In addition, centerline of roadways, easements (with type and dimensions), and other pertinent data will be referenced to existing monuments.
- F. All existing features (pipes, curbs, power poles, etc.) are to be produced with a small pen or half tones. Proposed features will be distinguished by a larger or bolder line weight.
- G. Plans shall be prepared with all utilities, both new and existing, shown on all sets of plans. For example, on the sanitary sewer sets, the water and storm drains shall be shown with the sanitary sewer portions being heavily highlighted. Other utilities shall be shown in profile views where crossings occur.
- H. If applicable, use notes specifying City or WSDOT standard details for common items such as catch basins, restrictors, fire hydrant assemblies, etc.
- I. Provide signature block on all Public Works plans for City Engineer and City Manager's approval.
- J. Show complete data for curb radii, utility locations (new and existing), curb elevations, street stationing, street widths, existing adjacent improvements, elevations of existing street improvements and utilities, etc.
- K. All elevations and grades on public works plans shall be to verified datum.

SECTION 10: SURVEY MONUMENTS

- A. All existing survey monuments, which are disturbed, lost, or destroyed during surveying or building shall be replaced by a land surveyor registered in the State of Washington at the expense of the responsible developer.
- B. A cast-in-place concrete surface monument per WSDOT Standard Plan A-10.20-00 and A-10.30-00, with the exception that the letters WSDOT shall not be on the cover. The Monument Case and Cover are not necessary outside of right-of-way unless subject to traffic loads, but shall be replaced with a white guard post and shall be placed as outlined below.

C. Required Monument Locations

Appropriate monuments will be placed:

1. At all street intersections;
 2. At the PC and PT's of all horizontal curves;
 3. At PI of all horizontal curves of streets where the PI lies within the limits of the traveled roadway;
 4. At all section corners, quarter corners, and sixteenth corners;
 5. At all corners, control points, and angle points around the perimeter of subdivisions. $\frac{1}{2}$ " diameter (#4) or $\frac{3}{4}$ " diameter (#6) reinforcing bar or $\frac{3}{4}$ " diameter galvanized pipe is acceptable at these locations, provided they do not coincide with points of more significant monumentation.
- D. The monument case shall be installed after the final course of surfacing has been placed.

CHAPTER 2: STREET STANDARDS

SECTION 1: STREET CLASSIFICATION

City streets are classified functionally as indicated below. Function is the controlling element for classification and shall govern right-of-way, road width and road geometries. Other given elements such as access, and average daily traffic count, or ADT, are typical.

1. ARTERIAL STREETS

Function – to collect and distribute traffic between SR203 and collectors or local access streets, or directly to traffic destinations such as schools, community centers, athletic fields, shopping centers, multiple residential areas, churches, concentration of offices or clinics, etc., and traffic from neighborhood to neighborhood within a community. Standard profiles have been developed for arterial segments of Entwistle, NE 40th Street, and Larson Avenue.

ADT – Over 5,000

Access – Partially controlled infrequent access to abutting properties. Parking may be restricted.

2. COLLECTOR STREETS

Function- to collect and distribute traffic between arterial streets and local access streets, or directly to traffic destinations; to serve neighborhood traffic generators such as stores, elementary school, church, clinic, multifamily homes, etc.

- 60-foot minimum right-of-way.
- 38 feet of pavement, consisting of two 10-foot travel lanes, and two 9-foot parking lane.
- 6.5-foot sidewalks on both sides. Sidewalk to be adjacent to parking lane if on one side only.
- Curb and vertical gutter adjacent to sidewalk.
- The parking lane may be replaced with two bicycle lanes or a sharrow lane at the discretion of the City.
- Stormwater options include an infiltration trench within city right-of-way.

ADT – 1,000 to 5,000.

Access – Direct access to adjacent properties allowed.

3. MINOR COLLECTOR STREETS

Function- to collect and distribute traffic between arterial streets and collectors or local access streets, or directly to traffic destinations; to serve neighborhood traffic generators such as elementary school, church, multifamily homes, etc.

- 60-foot minimum right-of-way.
- 34 feet of pavement, consisting of two 12-foot travel lanes, and one 10-foot parking lane.
- 6.5-foot sidewalks on one or both each sides. Sidewalk to be adjacent to parking lane if on one side only.
- Curb and vertical gutter adjacent to sidewalk.
- The parking lane may be replaced with two bicycle lanes or a sharrow lane at the discretion of the City.
- Stormwater options include an infiltration trench within the right-of-way.

ADT – 500 to 1,000.

Access – Direct access to adjacent properties allowed.

4. LOCAL ACCESS STREET

Function is to provide for direct access to individual lots and connections to the larger roadway system. Local access streets offer the lowest levels of mobility. A standard profile developed for the “original plat” which shall mean the Tolt Townsite Company Plat of Tolt, Volume 20, Page 43, encompassing the area bounded by Bagwell Street, Milwaukee Avenue, Entwistle Street, and Stewart Avenue. A standard profile is also developed for new developments outside of the original plat boundary.

Original Plat:

- 60 foot right-of way is already established in the original plat
- 2 10-foot travel lanes, 8-feet on street gravel parking on both sides.
- Pedestrian access provided by a 5-foot paved pathway on one side.
- An 8-ft infiltration swale for stormwater management.

ADT- Less than 500.

Access – Alleys are encouraged for parking access.

New Development:

- 48 to 50-foot right-of way.
- 2 10-foot travel lanes, 9-foot paved parking lane(s).
- 6-foot cement concrete sidewalks, curb and gutter on both sides.
- Stormwater catch basins on both sides of the street, water quality and underground infiltration facilities.

ADT- Less than 500.

Access – Direct access to adjacent properties.

5. ALLEYS

Provide very low speed access between land uses and local streets or collectors. The geometry of alleys discourages through traffic movements and usually restricts travel to only those land uses directly abutting the alley.

Alleys can allow driveways, garages and utilities to be removed from the front of houses, thus creating a less cluttered landscape. Removing driveways can allow for more on-street parking. For efficient access for all residences on an alley, alleys shall connect to streets at both ends. Franchised utilities shall be placed in alley when practical. In general, dead-end alleys should only be used where appropriate to site houses to take advantage of public open spaces or to address other site constraints and shall provide a turnaround where the dead-end distance exceeds 150 feet.

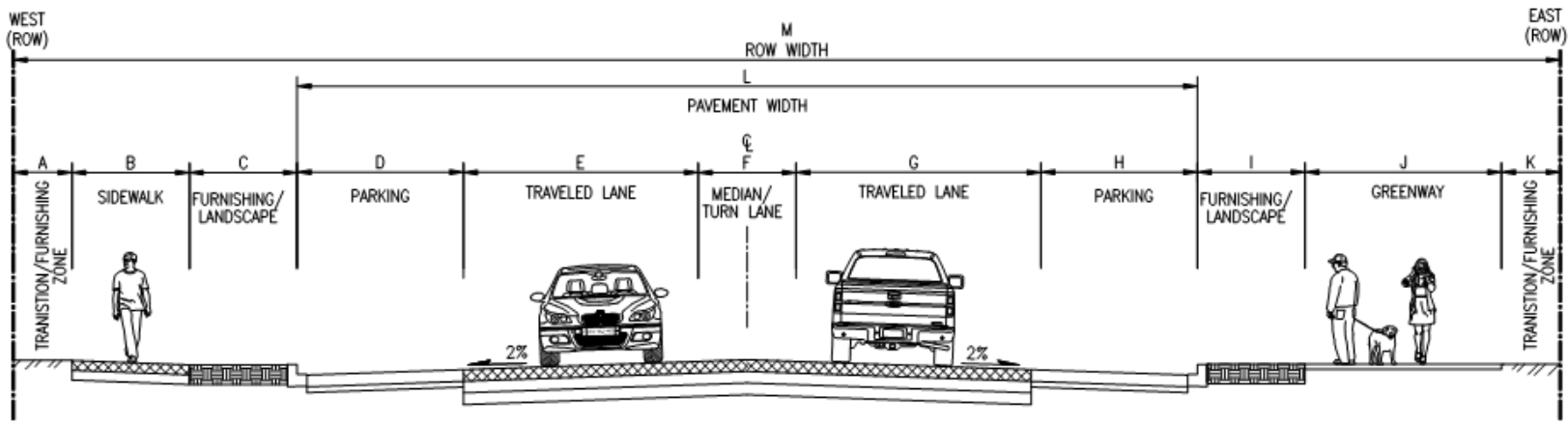
- 16-foot right-of-way width.
- 12-foot wide asphalt width with 3-foot thickened edge asphalt curb shall be provided on one side for drainage control.

Where alleys meet any other street classification, the following signage and demarcation features may be required to enhance sight distance and improve safety.

- Install 8-inch wide white extruded MMA or thermoplastic rumble strip demarcations per detail at a distance 15 feet behind sidewalk (or intersecting street if no sidewalk).
- Paint curbs on intersecting street for a distance of 20 feet on both directions from the alley intersection. Use high visibility industrial enamel safety yellow.
- Limit the height of fences and vegetation on the corner lots of the alley to enhance sight distance.

ADT- Less than 100.

Access- Direct access to adjacent properties, parking not permitted on alleys.



RIGHT OF WAY SECTION DIMENSIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M
SECTION	TRANSITION/ FURNISHING ZONE	SIDEWALK	FURNISHING/ LANDSCAPE	PARKING	TRAVELED LANE	MEDIAN/ TURN LANE	TRAVELED LANE	PARKING	FURNISHING/ LANDSCAPE	GREENWAY	TRANSITION/ FURNISHING ZONE	PAVEMENT WIDTH	ROW WIDTH
TOLT MACDONALD PARK TO FIRE STATION	0'	0'	0'	0'	12'	0'	12'	0'	5.5'	12'	0'	24'	80'
FIRE STATION TO TOLT MIDDLE SCHOOL	5'	6'	0'	8'	12'	0'	12'	0'	5'	12'	0'	32'	60'
TOLT MIDDLE SCHOOL E. BLANCHE ST	0'	6'	5'	0'	12'	0'	12'	0'	5'	12'	0'	24'	60'
E. BLANCHE ST TO E. EUGENE ST	0'	6'	5'	8'	12'	0'	12'	0'	5'	12'	0'	32'	60'
E. EUGENE ST TO ENTWISTLE ST	3'	6'	0'	8'	12'	0'	12'	0'	5'	12'	2'	32'	60'
ENTWISTLE ST TO COMMERCIAL ST	15'		0'	8'	12'	0'	12'	8'	0'	15'		40'	70'
COMMERCIAL ST TO MORRISON ST	0'	8'	7'	8'	12'	0'	12'	0'	7'	12'	4'	32'	70'
IN FRONT OF CEMETERY	0'	7'	5.5'	0	12'	11'	12'	8'	5.5'	12'	0'	32'-43'	65'

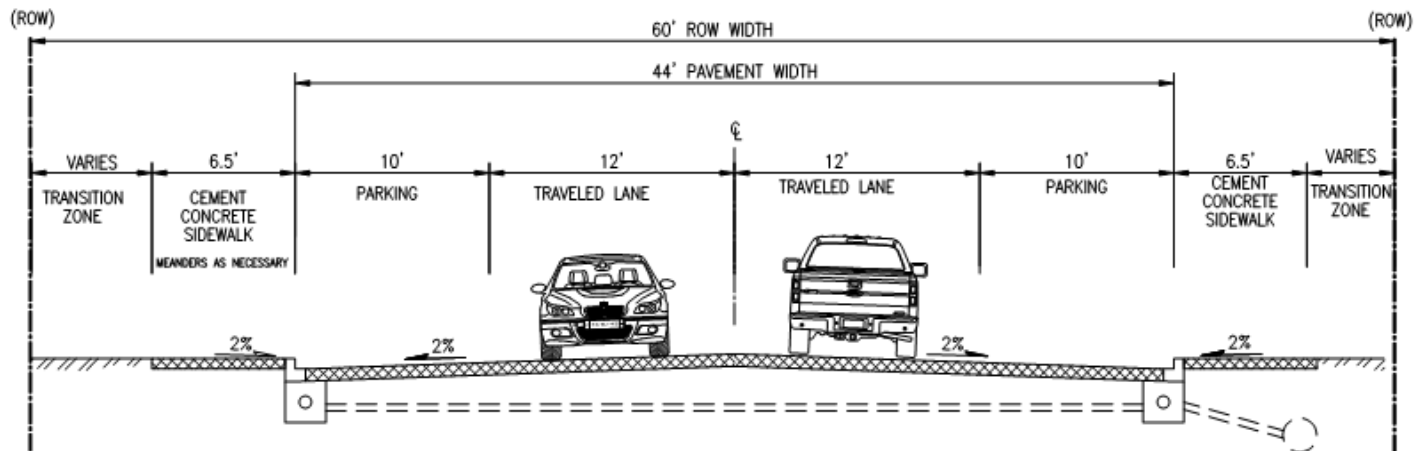
NOTES:

1. REFERENCE: CITY OF CARNATION TOLT AVENUE ACTION PLAN FEBRUARY 2013. FOR ADDITIONAL SECTIONS AND TRANSITIONS.

**City of Carnation
Right of Way Standards**

2018
TOLT AVE
SECTIONS

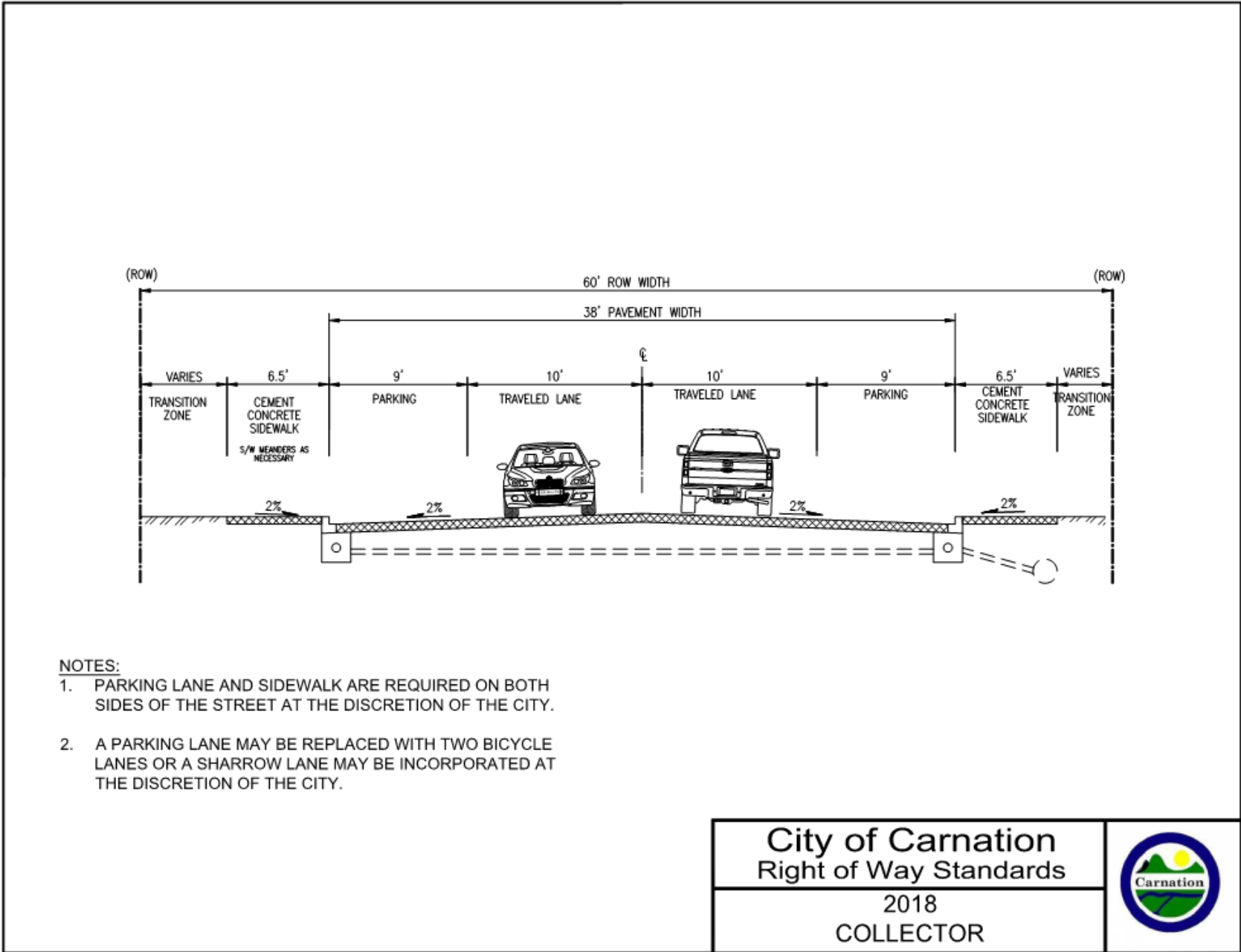


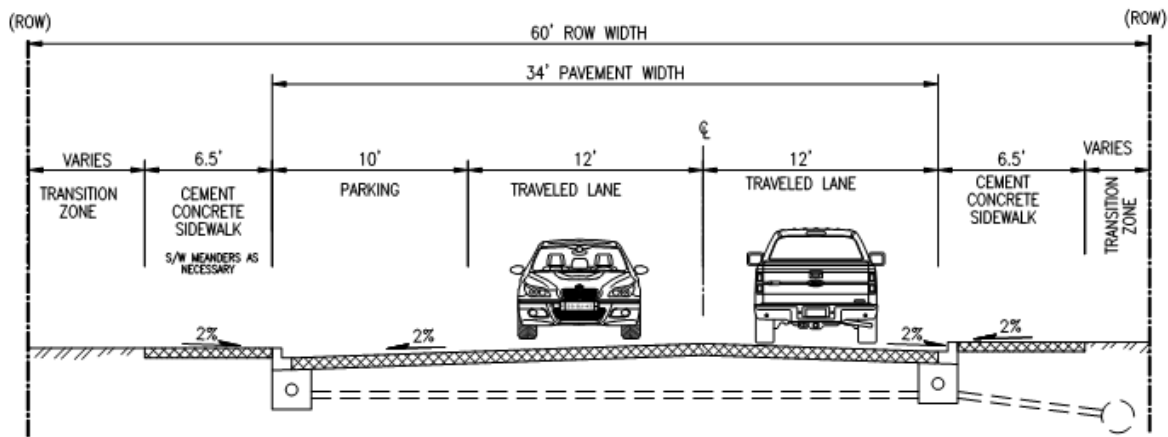


NOTES:

1. PARKING LANE AND SIDEWALK ARE REQUIRED ON BOTH SIDES OF THE STREET AT THE DISCRETION OF THE CITY.
2. A PARKING LANE MAY BE REPLACED WITH TWO BICYCLE LANES OR A SHARROW LANE MAY BE INCORPORATED AT THE DISCRETION OF THE CITY.

<p>City of Carnation Right of Way Standards</p>	
<p>2018 ARTERIAL EXHIBIT</p>	



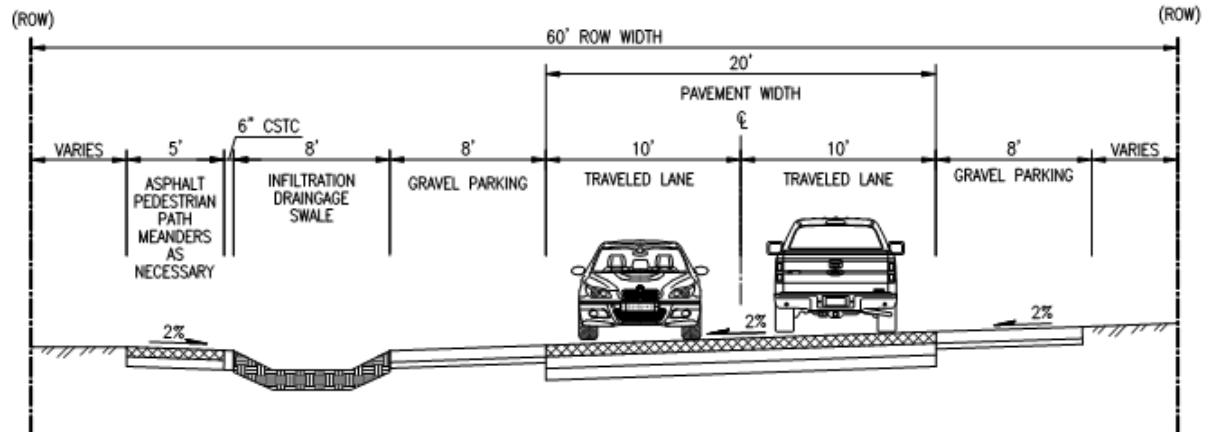


NOTES:

1. THE PARKING LANE MAY BE REPLACED WITH TWO BICYCLE LANES OR A SHARROW LANE MAY BE INCORPORATED AT THE DISCRETION OF THE CITY.

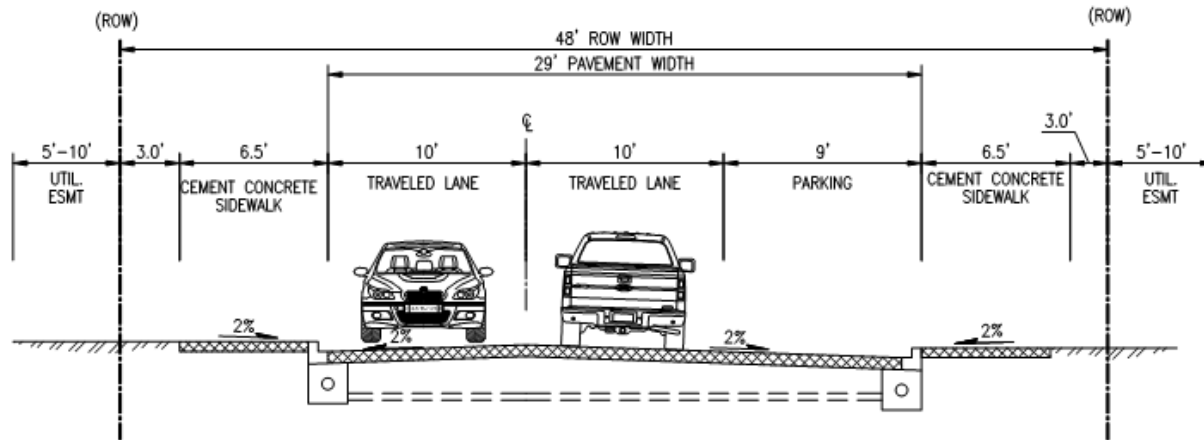
City of Carnation
 Right of Way Standards
 2018
 MINOR COLLECTOR





City of Carnation
Right of Way Standards
2018
Local Access Original Plat



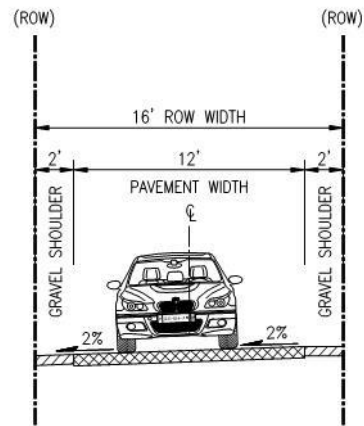


NOTES:

1. AT THE DISCRETION OF THE CITY A SIDEWALK ON ONE SIDE OF THE STREET MAY BE REPLACED WITH AN INFILTRATION SWALE ON DEAD END STREETS.
2. STORM DRAINAGE WATER QUALITY AND INFILTRATION FACILITIES ARE REQUIRED.

City of Carnation
 Right of Way Standards
 2018
 Local Access





NOTES:

1. STORM WATER MANAGEMENT FACILITIES MAY BE LOCATED WITHIN PROPERTY BEING DEVELOPED.

City of Carnation
Right of Way Standards

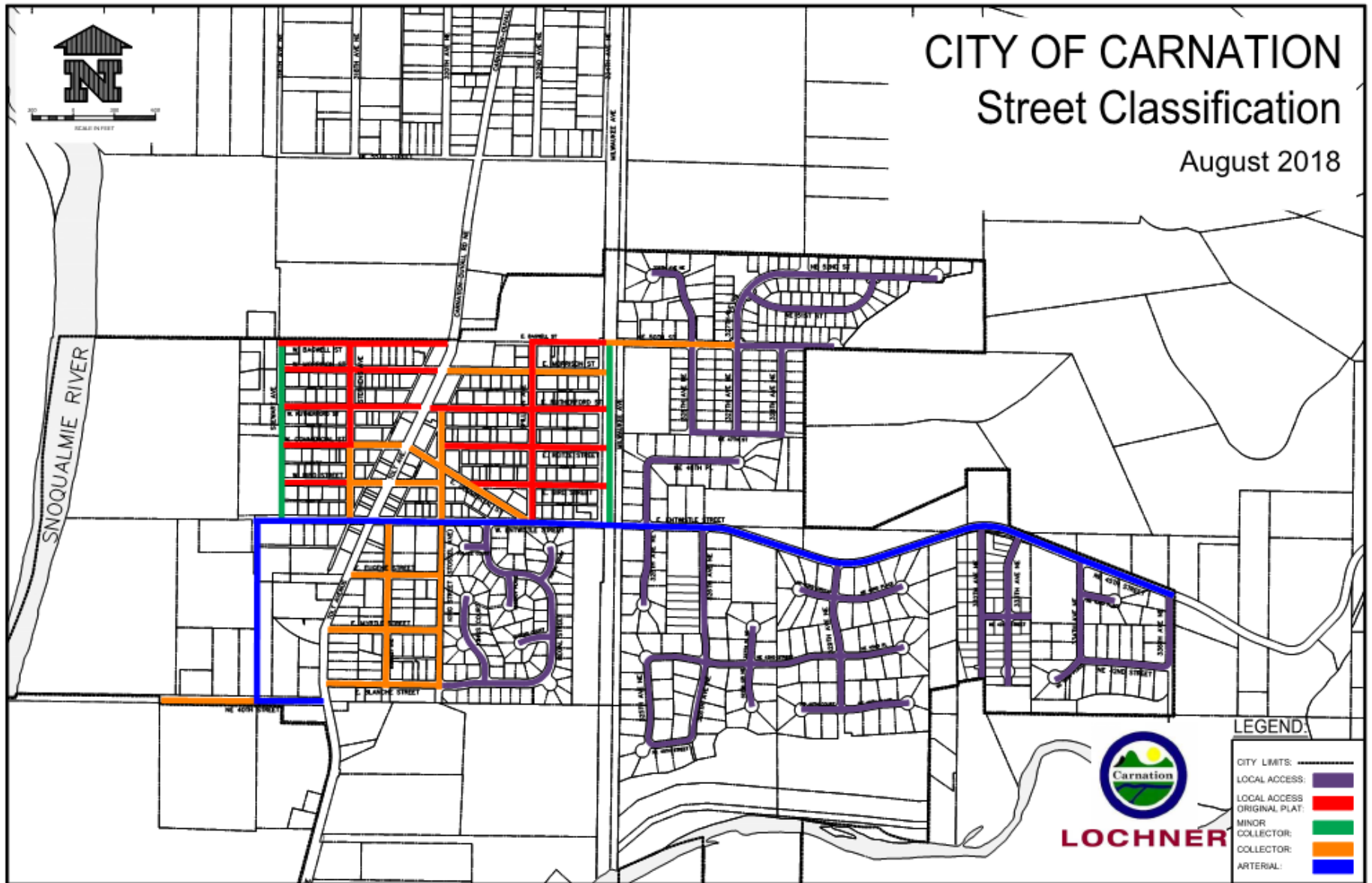
2018
ALLEY



STREET STANDARDS BY CLASSIFICATION

	Right-of-way	Pavement width	Travel Lanes	Parking	Pavement Section	Curb	Sidewalks	Bike Lane
Arterial:	60'	44' (varies)	2-12'	2-10'	6" HMA 4" CSTC 4" CSBC	Vertical	2-6', Cement Concrete	Sharrow
Collector	60'	38' (varies)	2-10'	2-9'	6" HMA 4" CSTC 4" CSBC	Vertical	2-6' Cement Concrete	Sharrow
Minor Collector	60'	34'	2-12'	1-10'	6" HMA 4" CSTC 4" CSBC	Shoulder	2-6' Cement Concrete, may be reduced to one.	Sharrow
Local Access -New Development	48'	29'	2-10'	1 or 2- 9' parking	4" HMA 4" CSTC 4" CSBC	Vertical or Shoulder	1 or both sides 6' Cement Concrete Sidewalk	No
Local access: Original Plat	60'	20'	2-10'	2-8' gravel	4" HMA 4" CSTC 4" CSBC	None	5' asphalt pathway (can meander)	No
Alley	16'	12' (may be gravel in residential)	1-8'	None	4" HMA 4" CSTC or 4" CSTC	None	None	No

- Final street cross sections including bicycle lane requirement will be determined by the City. Tolt Avenue pavement section is 14" HMA, 12" CSBC.
- A four-inch compacted section of CSTC is required under curbs and sidewalks.



SECTION 2: OTHER STREET TYPES

Section 2.1 Half Streets

A half street may be permitted as an interim facility if such alignment is consistent with, or will establish, a reasonable circulation pattern and based on an analysis of the number of dwelling units served and/or the ADT that will be generated by the development as determined by the City.

- Right-of-way width of the half street shall equal at least 30 feet; and
- If feasible the half street shall be graded consistent with locating centerline of the ultimate road section on the property line; Pavement width shall be not less than 20 feet.
- The sidewalk shall be constructed as required for the designated street classification.
- Property line edge of street shall be finished with curbing, shoulders, ditches, and/or side slopes so as to assure proper drainage, bank stability, and traffic safety.
- Half streets shall not intersect other half streets unless so approved by the City.

When a half street is eventually completed to a whole street, the completing developer shall reconstruct the original half street as necessary to produce a proper full-width street of designated section with the proper symmetry of a cull crown section, unless an alternatively approved section is granted by the City.

The obtaining of any right-of-way or easements needed to accomplish the above shall be the responsibility of the developer.

Section 2.2 Expansion of existing streets

When an existing asphalt paved street is to be widened, the edge of pavement shall be saw cut to provide a clean, vertical edge for joining to the new asphalt. After placement of the new asphalt section, the joint shall be sealed and the street ground overlaid two inches, full width throughout the widened area. The requirement for overlay may be waived by the City Engineer based on the condition of existing pavement and the extent of required changes to channelization.

Section 2.3 Private Streets

While community street requirements are usually best served by public streets, owned and maintained by the City, private streets may be appropriate for some local access streets. Usually these are minor access streets, either residential or commercial and are secondary accesses.

1. Private streets may be approved under the following criteria:

- Permanently established by right-of-way, tract or easement providing legal access to each affected lot, dwelling unit, or business and sufficient to accommodate required improvements, to include provision for future use by adjacent property owners when applicable.
 - Built to these Standards, as set forth herein.
 - Accessible at all times for emergency and public service vehicle use;
 - Will not land lock present or future parcels
 - Not needed as public streets in the opinion of the Public Works Director.
 - Covenants have been approved, recorded, and verified with the City which provide for maintenance of the private streets and associated parking areas by owners in the development.
 - The private street shall serve four (4) or fewer lots unless otherwise allowed by the City.
 - The private street serves commercial or industrial facilities where no circulation continuity is necessary.
 - The City Engineer and Fire Marshall determine that the access is adequate for health, life, and safety services.
 - Maintained by a capable and legally responsible owner or homeowners' association or other legal entity made up of all benefited property owners.
 - Clearly described on the face of the plat, short plat, or other development authorization as a private street. All private streets shall be clearly signed at the street entrance as a private street.
2. The City of Carnation will not accept private streets for maintenance as public streets.

Section 2.4 Fire Apparatus Access roads

DEFINITION

A fire apparatus access road is a road that provides fire apparatus access from a fire station to a facility, building, or portion thereof. This is a general term that includes all other terms such as fire land, public street, private street, parking lot lane and access roadway.

TIMING OF INSTALLATION

When a fire apparatus access road or a water supply for fire protection is required to be installed, such protection shall be installed and made serviceable prior to and during the time of construction except when approved alternative methods of protection are provided.

WHERE REQUIRED:

1. Buildings and Facilities. Approved fire apparatus access roads shall be provided for every facility, building, or portion of a building hereafter constructed within the City.

The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet of all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility. Only the Fire Marshall or designee is authorized to waive these requirements.

2. Additional Access. The Fire Marshall or designee is authorized to require more than one fire apparatus access road based on the potential for impairment of a single road by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access. See Eastside Fire and Rescue website for Fire Lane requirements.

SPECIFICATIONS

1. Dimensions. Fire apparatus access roads shall have an unobstructed width of not less than 15 feet in residential streets 3 homes or less, 20 feet in residential areas with 4 or more homes and in commercial and multi-family areas. The Fire Marshall or designee shall have the authority to require an increase in the minimum access widths where they are inadequate for fire or rescue operations.
2. Surface. Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus (25 tons unless otherwise specified by the Fire Marshall or designee) and shall be surfaced with Asphalt Concrete Pavement (ACP) so as to provide all-weather driving capabilities.
3. Turning Radius. The required turning radius of a fire apparatus access road shall be determined by the Fire Marshall or designee.
4. Dead Ends. Dead end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved area for turning around fire apparatus. Fire sprinklers may be installed in lieu of a turnaround if acceptable to the Fire Marshall and the City Engineer.
5. Bridges and Elevated Surfaces. Where a bridge or an elevated surface is a part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with AASHTO Standard Specifications for Highway Bridges. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges.
6. Grade. If the grade of a fire apparatus access road is 15 percent or greater, the Fire Marshall or designee may require additional fire protection for all structures affected or served by said roadway.

MARKING

Where required by the Fire Marshall or designee, approved signs or other approved notices shall be provided for fire apparatus access roads to identify such roads or to prohibit obstruction thereof. Signs and notices shall be maintained in a clean and legible

condition at all times and be replaced or repaired when necessary to provide adequate visibility.

Fire lane signage and markings shall be consistent with the International Fire Code, Appendix D, Section D103.6, current edition. Fire lanes shall be posted “No Parking – Fire Lane” and “Tow Away Zone.” Curbing shall be painted red for vertical curb applications, and/or a four-inch (4”) continuous red stripe shall delineate the limits of the fire lane and the no parking zone.

Blue Type-2BB raised pavement markers shall be located on the centerline of all streets, lanes, or alleys perpendicular to fire hydrants.

OBSTRUCTION OF FIRE APPARATUS ACCESS ROADS

The minimum width and clearance of a fire apparatus access road shall not be obstructed in any manner, including the parking of vehicles. This includes any roadway that serves as a fire apparatus access road. Any fire apparatus access road with an emergency vehicle drivable width (capable of supporting 25 tons) of less than 30 feet shall be posted “No Parking” on one side. Any fire apparatus access road with an emergency vehicle drivable width (capable of supporting 25 tons) of less than 24 feet shall be marked as a “Fire Lane” per City of Carnation standards, with no parking on either side.

REQUIRED GATES AND BARRICADES

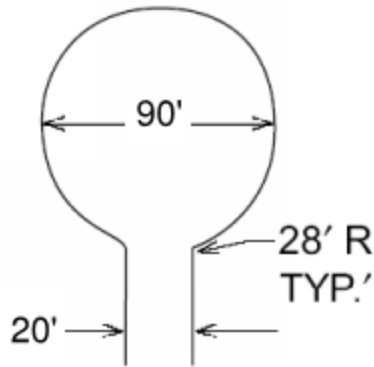
The Fire Marshall or designee is authorized to require the installation and maintenance of gates or other approved barricades across fire apparatus access roads, trails, or other access ways, not including public streets, alleys, or highways. When required, gates and barricades shall be secured in an approved manner.

SECURITY GATES

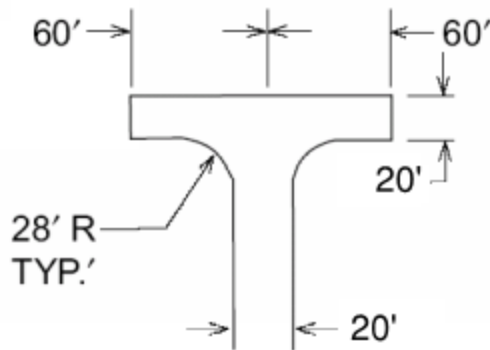
The installation of security gates across a fire apparatus access road shall be approved by the Fire Marshall or designee. Where security gates are installed, they shall have an approved means of emergency operation.

The security gates and the emergency operation shall be maintained operational at all times.

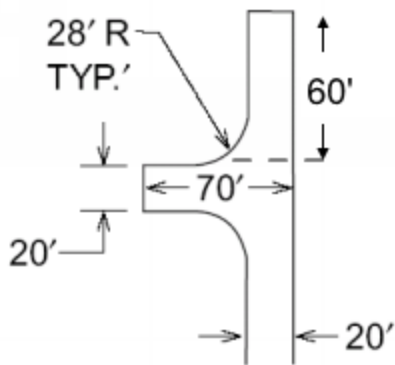
**EASTSIDE FIRE & RESCUE
FIRE APPARATUS TURNAROUND STANDARDS**



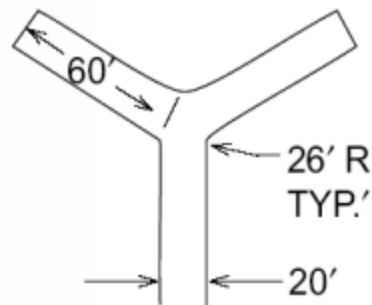
90' DIAMETER
CUL-DE-SAC



120' HAMMERHEAD



ACCEPTABLE ALTERNATIVE
TO 120' HAMMERHEAD



ACCEPTABLE ALTERNATIVE
TO 120' HAMMERHEAD

Maximum 2% cross slope.

12/2018

SECTION 3: STREET DESIGN

Section 3.1 General

Street design must provide for the maximum loading conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

All street designs shall be completed by a licensed civil engineer and expert in transportation facility design. All geometrical and design considerations shall be in accordance with the Association of State Highway and Transportation Officials guidelines.

Street and cross section design shall be in accordance with WSDOT/APWA Standard Specifications, the City's Standard Plans, and the following requirements:

- A. One-way Streets. Local access streets, including loops, may be designated One-Way upon a finding by the City that topography or other site features make two-way traffic impractical.
- B. Bus Zones and Turn-Outs. During the design of arterials and neighborhood collectors, the designer shall contact King County Metro Service Planning, phone 206-684-1622 and the Riverview school district to determine bus zone (stop) locations and other bus operation needs. The road project shall provide wheel chair accessible landing pads at designated bus zones and where required shall include turnouts and shelter pads. Pedestrian and handicapped access improvements within the right-of-way to and from the bus loading zone or turn-out from nearby businesses or residences shall also be provided as part of the street improvement. Surfacing requirements may also be affected, particularly on shoulders. See Metro's publication, "Metro Transportation Facility Design Guidelines," if applicable.
- C. Guardrail/Embankment Heights. Guardrail installations shall conform to WSDOT/APWA Standard Plan C-1, Beam Guardrail Type 1 and C-2, Guardrail Placement. End anchors shall conform to WSDOT/APWA Standard Plan C-t, Beam Guardrail Anchor Type 1.

Evaluation of embankments for guardrail installations shall be in accordance with Figure 710-6 of the WSDOT Design Manual.

- D. Off-Street Parking Spaces. The number of off-street parking spaces required shall conform to City of Carnation Code. The specifications for off-street parking spaces shall be as provided in City of Carnation Code.
- E. For all new streets, all base course shall be ATB, 6 inches minimum, except in alleys.
- F. For all new streets, the final asphalt course shall be 3 inches minimum, except alleys. The final lift of asphalt shall be placed only at the direction of the City.

- G. Asphalt pavers shall be self-contained, power-propelled units. Truck mounted type pavers shall only be used for City maintenance and paving of irregularly shaped or minor areas as approved by the City Engineer, or as follows:
- a) Pavement widths less than eight feet; and
 - b) Pavement lengths less than 150 feet.

Section 3.2 Design Considerations

Street design and layout should be based on the function of the street, the loadings on the street, the general terrain, the type of development being served and the vision of the city. As such, street construction plan submittals to the City should include the following information.

- Street classifications
- Design Speed
- Cross section
- Pavement section
- Street plantings/street side facilities
- Traffic control and street name plan
- Number of lots to be served by the street
- Proposed lot loading (from street or alley)
- Forecasted travel demand volumes (vehicular and non-motorized)
- Emergency vehicle access plan
- Parking prohibitions or limitations
- Sidewalk/trail plan
- Other pertinent information

At the discretion of the City, some of the above information may not be required to be shown on street construction plans if it was included as part of the review process for an approved preliminary plat or other development proposal (i.e., number of lots to be served, average lot width, forecasted travel demand volumes, etc.).

A. CONNECTIVITY

Street layout and plat design shall create efficient well-connected streets and alleys. Proposed streets should be aligned with existing streets. The alignment of neighborhood collectors should provide for their continuation into other existing, proposed or potential adjoining parcels. Alleys shall connect to streets on both ends when possible.

Street alignments will relate where practical to natural topography and will be selected so as to minimize grading and avoid excessive runoff. Alignment and connections of newly constructed public streets will be provided in accordance with the following conditions, unless otherwise prohibited:

1. Street connection will be provided to any existing public street or right-of-way abutting the proposed development.
2. Pedestrian and emergency access will be provided to any abutting public school, public building, public park, trail, or bikeways.

3. Streets will be located for the development of adjoining land.

B. ALLEYS

Alley-accessed lots provide for a better street-front pedestrian environment than streets with front load-driveways, because with alleys driveways do not cut across the sidewalk. The use of alleys is encouraged in higher density single family detached and attached housing. In evaluating the extent to which alleys can be provided, the following factors shall be considered:

- pedestrian and vehicular circulation
- logical layout of street system
- the creation of cohesive sense of neighborhood
- topography
- location of sensitive areas
- anticipated traffic volumes on frontage roads

C. CUL-DE-SACS

In most neighborhoods, cul-de-sacs will be allowed only for physical constraints such as wetlands, excessive natural grade differential between parcels, emergency vehicle access needs, or to efficiently serve difficult-to- access areas of lands that could not otherwise be served by connected street.

Where cul-de-sacs are used, they should be the shortest possible length to adequately address the constraint within the neighborhood. Cul-de-sacs will have a maximum length of 500 feet.

The pavement bulb radius shall be 45 feet for cul-de-sacs. Larger radii create large expanses of pavement which may be unsightly and increase impermeable area. The use of an island may be considered, but adequate room should be left for maneuvering.

Cul-de-sac bulbs should not exceed 6% cross-slope grades. Temporary cul-de- sacs may be allowed on neighborhood collectors and local access streets when future extensions of streets are anticipated. A cul-de-sac is considered a vehicle turnaround, which differs from a parking court. Parking courts may be allowed in multifamily lots.

D. DRIVEWAYS

Except as otherwise provided in CMC Chapter 15.96 the following shall apply:

1. A residential driveway shall typically serve only one parcel. A driveway serving more than one parcel may be allowed only with approval from the City.
2. Driveways entrances shall be constructed per WSDOT Standard Details for Cement Concrete Driveway Entrance, type to be determined by City Engineer.

3. All abandoned driveway areas on the same frontage shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored.
4. All driveways shall be constructed of Portland Cement Concrete over a minimum 6-inches of 5/8" minus crushed rock meeting 95% MDD compaction.
5. Grade breaks, including the tie to the roadway, will be constructed as smooth vertical curves. The maximum change in driveway grade will be eight percent within any ten feet of distance on a crest and 10 percent within any ten feet (10') of distance in a sag vertical curve.
6. No driveway, other than one serving a detached dwelling unit, will be approved where backing onto the sidewalk or street will occur.
7. Where driveways cross sidewalks, the thickness of the concrete shall not be less than six inches (6") and be constructed of Class 4000 Concrete.
8. For driveways that serve only single-family residential dwellings, driveway width shall be minimum ten feet (10'), and have a maximum driveway width of 18 feet (18').
9. For driveways that serve multi-family residential dwellings, driveway width shall be minimum twelve feet (12'), and have a maximum driveway width of twenty-two feet (22').
10. For driveways that serve uses other than residential uses, driveway width shall be minimum ten feet (10') and maximum twenty feet (20') for a one-lane, one-way driveway; minimum twenty-feet (20') and maximum twenty-four feet (24') for a two-lane, two-way driveway; and minimum thirty feet (30') and maximum thirty-six feet (36') for a three-lane, two-way driveway. Driveway widths may be increased in order to provide adequate width for vehicles that may be reasonably expected to use the driveway, as determined by the Public Works Director.
11. On frontages 75 feet or less, no more than one driveway per lot shall be constructed; on frontages over 75 feet, two or more driveways per lot may be permitted, subject to approval by the City.
12. No portion of driveway width shall be allowed within 5 feet of side property lines unless it is shared by two parcels. This side property line setback may be reduced by the City Engineer if properties are developed and there is no other reasonable access to the car port or garage.
13. For commercial or industrial driveways with heavy traffic volumes or significant numbers of trucks, the City may require construction of the access as a road intersection. This requirement will be based on traffic engineering analysis submitted by the applicant that considers, among other factors, intersection spacing, sight distance and traffic volumes.

14. Notwithstanding any other provisions, driveways will not be allowed where they are prohibited by separate City Council action or where they are determined by the City to create a hazard or impede the operation of traffic on the roadway.

E. CURBS, GUTTERS AND SIDEWALKS

Curbs, Gutters, and Sidewalks shall be per WSDOT Standard Plans. Only vertical curbs shall be constructed.

1. Subgrade compaction for curbs, gutters, and sidewalks shall meet a minimum 95 percent of maximum density (modified proctor) . The curb, gutter, and sidewalk subgrade shall consists of a minimum 4-inch depth of 5/8" minus crushed rock.
2. Concrete for curbs, gutters, and sidewalks shall be Class 3000 or Class 4000 for driveways, furnished and placed in accordance with WSDOT/APWA Standard Specifications. Cold weather precautions as set forth in WSDOT/APWA Standard Specifications shall apply. The City may reject any of the curb, gutter, and sidewalk based on installation means and methods, performance or aesthetics.
3. Rolled curbs are not allowed.

F. LANDSCAPING PLANTER OR DRAIANGE SWALE

1. A five-foot wide landscaping planter or drainage swale between the curb and sidewalk may be required at the city's discretion. Landscape design shall conform to the approved tree list or swale planting requirements (See Section 4.2.C and Appendix).
2. Spray irrigating may be required within all landscaped right of way and public access easements. For frontage improvement projects, irrigation shall be fed from a private metered water source.
3. Drainage Swales shall comply with the city standard cross section and planting schedule, see Detail DR-1.

G. ROOT BARRIER

1. When sidewalks are constructed beneath a tree canopy or as determined by the city engineer, a root barrier shall be installed a minimum of 24-in deep and shall be made of 1/4" thick nylon fabric set 1/2" below finished grade. The root barrier shall be installed a minimum of ten-feet centered on the tree along the sidewalk or curb sloped as required to avoid undermining sidewalk or pavement.

2. Distance between tree and root barrier to be determined by the city engineer, minimum distance is 3 times the trunk caliper.
3. All roots over 1-in in diameter that are exposed and damaged during construction activities shall be removed with a straight cut.

H. CURB RAMPS

1. On all streets with vertical curb, ramped sections to facilitate passage of handicapped persons shall be constructed through curb and sidewalk at street intersections and other crosswalk locations. Where a ramp is constructed on one side of the street, a ramp shall also be provided on the opposite side of the street. Curb ramps shall be positioned so that a ramp opening is situated within the marked crosswalk or crossing area if unmarked.
2. Curb ramps shall be per WSDOT Standard Plans. Subgrade compaction for curb ramps shall meet a minimum 95 percent of maximum density (modified proctor) and consist of a minimum 6-inch depth of 5/8" minus crushed rock.

I. BIKE LANES

1. Bike lanes shall be provided wherever called for in the Comprehensive Plan or Capital Improvement Program.
2. Bike lanes shall be provided when substantial bike usage is expected which would benefit from construction of a bicycle facility.
3. Bike lanes shall be provided when determined by the City.

J. STRIPING AND SIGNING

3. Pavement markings shall be used on bike lanes and paths according to MUTCD.
4. The design of all signalized intersections shall consider bicycle usage and the need for bicyclists to actuate the signal.
5. Street signs are defined as any regulatory, warning, or guide signs. The developer is responsible for providing all street signs. Street signs will comply with the latest editions of these standards, WSDOT Standards, and the MUTCD.
6. Street name signs will display street names and orientation designation. Public Streets will be indicated by green signs with white lettering. Private Streets will be indicated by yellow signs with black lettering, and the letters "PVT" in the lower right-hand corner of the street sign. Street name signs shall be per the current MUTCD.

7. The developer will provide pavement markings and street signs, including poles and hardware, under the City's direction to establish uniformity.

K. PAVEMENT MARKINGS, MARKERS, AND PAVEMENT TAPERS

1. Pavement markings, markers or striping shall be used to delineate channelization, lane endings, crosswalks and longitudinal lines to control or guide traffic. Channelization plans or crosswalk locations shall be approved by the City Engineer.
2. Pavement markings for legends and crosswalks shall be reflectorized hot applied plastic. Centerlines and lane markings shall employ raised pavement markings consistent with "WSDOT/APWA Standards Plans" H- 5d. Extruded or sprayed markings shall be dressed with glass beads for initial reflectance. All materials shall be designed to maintain reflectance while the material wears.
3. Where pavement widening less than 300 feet in length is abruptly ended and edge lines do not direct traffic to through lanes, lane markers shall be installed at 10 foot centers near the end of the paved area at a 10:1 taper.
4. Crosswalks shall be installed at all intersections controlled by traffic signals and other areas required by the City Engineer including bulbouts for pedestrian safety and traffic calming. Crosswalks shall consist of sets of longitudinal lines eight inches wide by 10 feet and with eight-inch separation. A set of these lines shall be installed between each lane, between the wheel tracks in each lane and at the pavement edges.
5. All pavement markings shall be laid out with spray paint and approved by the City Engineer before they are installed. Approval may require a three working day advance notice to have field lay-out approved by the City Engineer or to make arrangements to meet the City Engineer on site during the installation.

L. SLOPE, WALL, AND DRAINAGE EASEMENTS AND RIGHT-OF-WAY REDUCTION

1. Easements. Either the functional classification or particular design features of a road may necessitate slope, sight distance, wall or drainage easements beyond the right-of-way line. Such easements may be required by the City Engineer in conjunction with dedication or acquisition of right-of-way.

M. ROAD AND SIDEWALK CUTS

All road and sidewalk cuts within public right-of-way shall require a right-of- way permit.

1. Except for emergency situations, open cuts made to the surfacing of any public roadway shall not be made for the periods stated below:

Pavements:

- a) Five- (5) years immediately following new construction or reconstruction.
 - b) Three- (3) years immediately following major resurfacing, (greater than 1.5 inches of new surfacing) this does not include surface treatments such as BST, chip seal, fog seal, slurry seal, etc.
 - c) Two- (2) years immediately following a surface treatment such as BST, chip seal, fog seal, slurry seal, etc.
2. If an open cut is allowed to a public roadway, all joints shall be saw cut prior to patching, and an approved crack sealer shall be used to seal all cracks and joints in the vicinity of the roadway cut(s). Crack sealant shall be rubberized asphalt as specified in WSDOT/APWA Standard Specifications Section 9-04.10 (ASTM D-1190) unless approved by Public Works Director or City Engineer. Plain emulsified asphalt, or “tack” is not an acceptable substitute.
 3. If an open cut is allowed in a cut moratorium section of pavement, the minimum mitigation is to repave ½ the width of the paved surface for a length of one hundred feet (100’) unless the road cut crosses over the centerline, which will require repaving the full-width for a length of one hundred feet (100’). Actual mitigation shall be determined by the Public Works Director.
 4. Temporary restoration of trenches will be accomplished by using minimum two inches (2”) HMA, or two inches (2”) medium- curing (MC-250) Liquid Asphalt (cold mix).
 5. Prior to beginning street trenching work, the contractor will ensure that temporary patching material is stockpiled at the project site, both for completing and maintaining the patching.
 6. All temporary patches will be maintained by the contractor and temporary patches in the travel lane(s) will be made permanent within ten (10) working days, unless approved otherwise by the Public Works Department. Patches that are not properly maintained will be identified by the City Construction Inspector and repaired by the City at the developers/contractors expense.
 7. Asphalt surface restoration within the right-of-ways shall be consistent with the City of Carnation’s Combined Water and Sanitary Sewer Utility Technical Standards, Sections 6.8 – 6.10 and 8.5.D.

N. ROCK FACINGS

1. Rock facings may be used for the protection of cut or fill embankments up to a maximum height of four feet above the keyway instable soil conditions, which will result in no significant foundation settlement or outward thrust upon the walls. For heights over four feet above the keyway or when soil is unstable, a design prepared by a structural engineer shall be provided. The placement of any rockery type wall is subject to approval by the City Engineer.

2. Keyway

A keyway consisting of a shallow trench of minimum 12-inch depth shall be constructed the full rockery length, and slightly inclined towards the face being protected. It shall be excavated the full rockery width including the rock filter layer. The keyway subgrade shall be firm and acceptable to the City Engineer.

3. Underdrains

- a. A minimum 6-inch diameter perforated or slotted drainpipe shall be placed in a shallow excavated trench located along the inside edge of the keyway. The pipe shall be bedded in pea gravel to a minimum height of 18 inches above bottom of pipe. A filter fabric shall surround the gravel backfill and shall have a minimum 1-foot overlap along the top surface of the gravel.
- b. The perforated pipe shall be connected to an infiltration gallery or to an acceptable outfall.

O. SIDE SLOPES

1. Side slopes shall generally be constructed no steeper than 2:1 on both fill slopes and cut slopes. Steeper slopes may be approved by the City Engineer upon showing that the steeper slopes, based on soils analysis, will be stable.
2. Side slopes shall be stabilized by grass sod or seeding or by other planting or surfacing materials acceptable to the City Engineer.

P. ROADSIDE OBSTACLES

Non-yielding or non-breakaway structures, including rookeries and retaining walls, which may be potential hazards to the traveling public shall be placed with due regard to safety. On roads with a shoulder or mountable curb, hazardous objects shall be placed as close to the right-of-way line as practicable and a minimum of 10 feet from the edge of the traveled way or auxiliary lane.

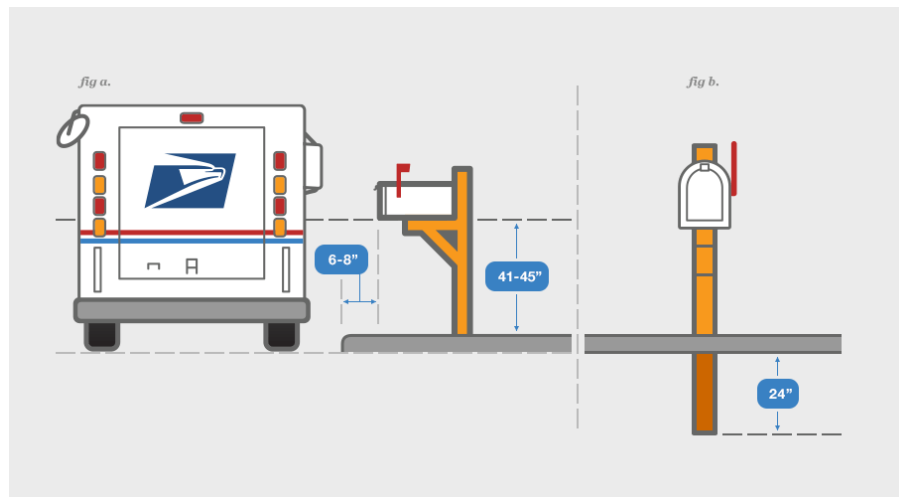
On urban roads with a vertical curb section, hazardous objects shall be placed at the back of the sidewalk, and as close to the right-of-way line as practical. Such an object shall not be placed in a sidewalk.

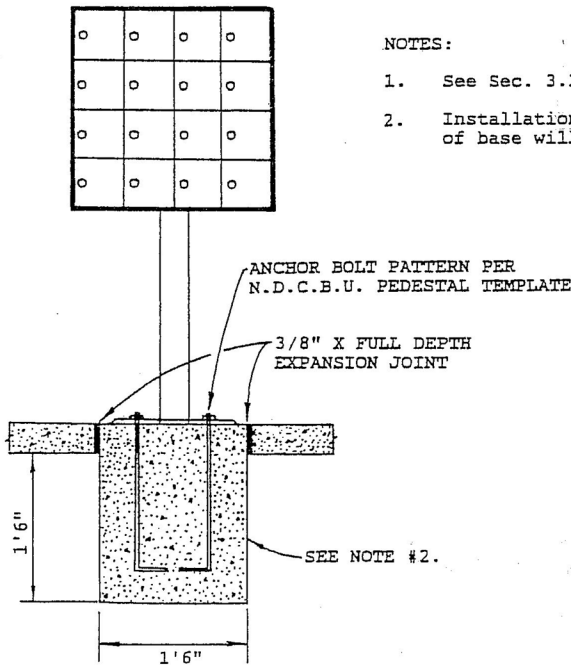
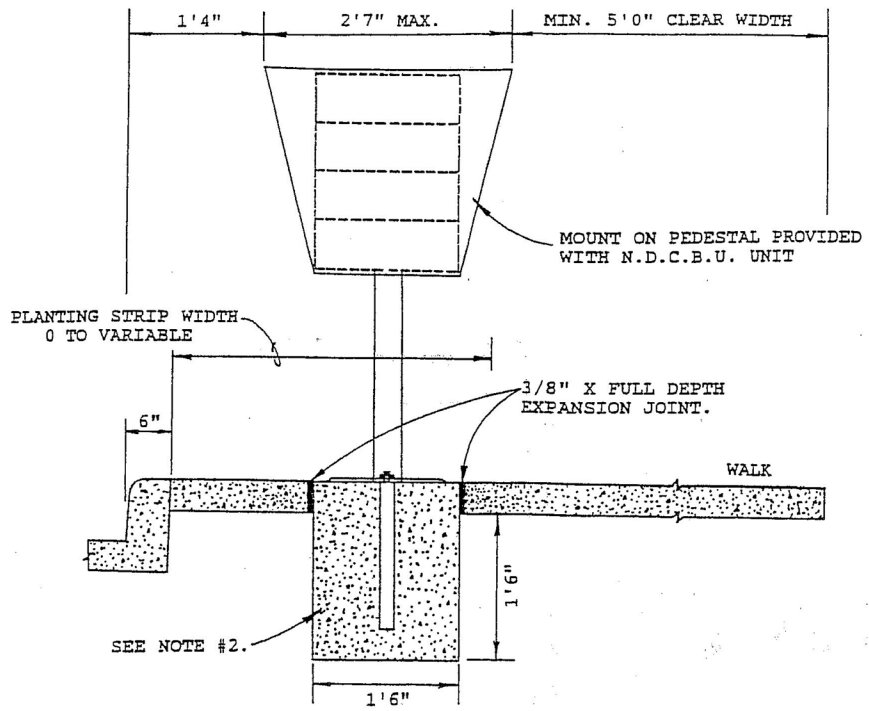
For city streets with curbs, a two-foot clear zone applies.

SECTION 4: APPURTENANCES

Section 4.1 Mailboxes

1. New mailbox installations for multiple residences shall utilize cluster mail boxes in kiosks or group mailbox shelters.
2. The street improvement plans showing the location for all mailboxes shall be submitted by the developer to the City of Carnation post office for review and approval. The postmaster must approve the location of all mailboxes. The developer shall include evidence of the post office approval in project submittals. Mailbox placement and installation shall in accordance with the standard details for mailboxes.
3. Front of mailbox shall be eighteen inches (6 to 8") behind vertical curb face or outside edge of shoulder, with a minimum five feet (5') of sidewalk behind the mailbox
4. The mailbox shall be 41" to 45" from the road surface to the bottom of the mailbox or point of mail entry.
5. The street improvement plans shall clearly designate the location for new or relocated mail boxes whether in single or cluster formation.
6. The street improvement plans shall include any information for necessary widening or re-configuration of sidewalk suitable knock outs or curb outs for mail box pedestals. When mailboxes are located in the sidewalk, the sidewalk shall be widened to provide a clear width of not less than 5 feet behind the mailboxes.
7. Mailboxes shall be set on posts strong enough to give firm support, but not to exceed 4 x 4-inch wood or material and design with comparable breakaway characteristics.
8. The Developer shall coordinate with the Post Office for standard details and placement of Neighborhood Delivery and Collection Box Units (NDCBUs).

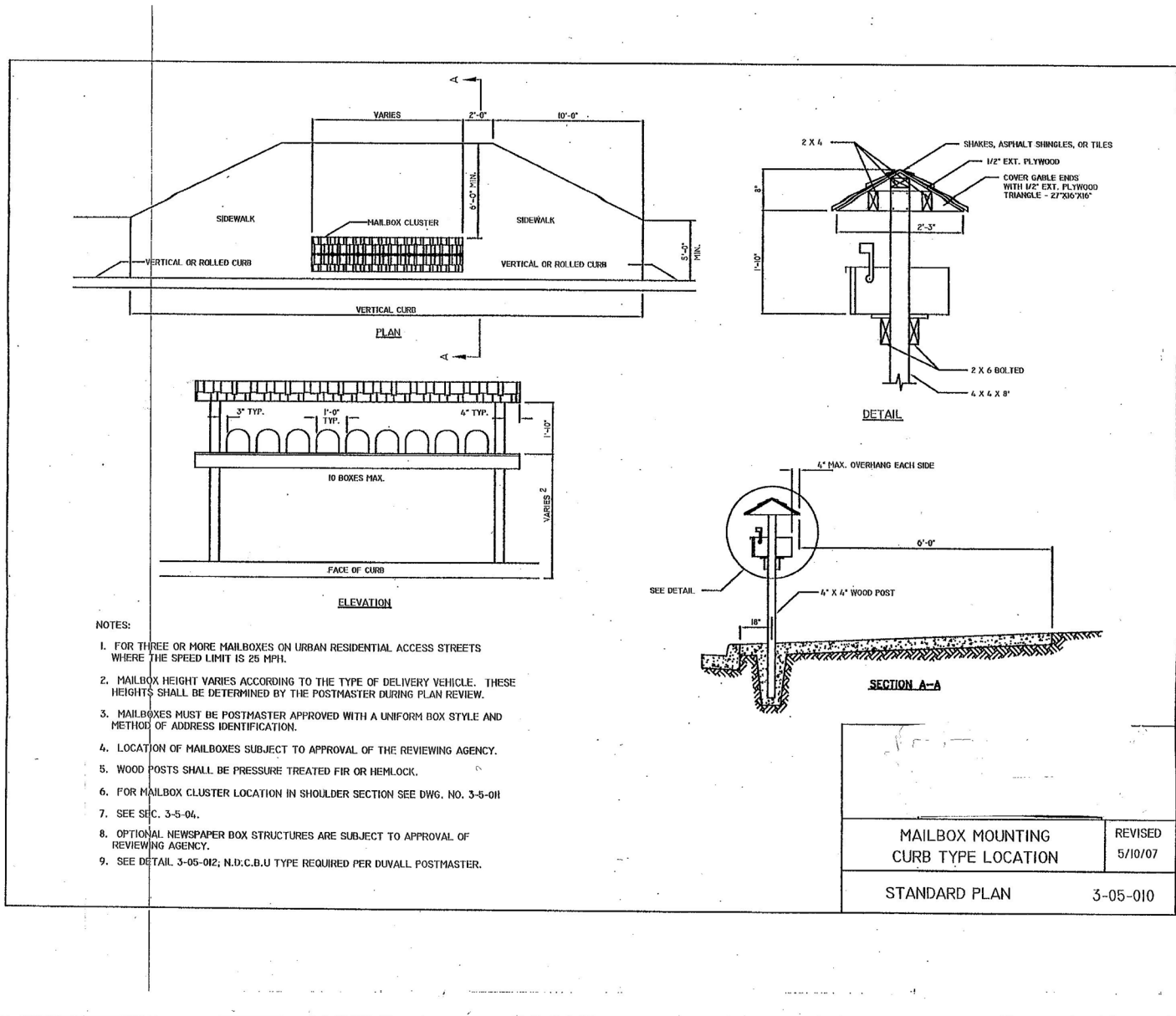




NOTES:

1. See Sec. 3.2.16.
2. Installation of N.D.C.B.U. including construction of base will be done by U.S. Postal Service.

CITY OF CARNATION	
NEIGHBORHOOD DELIVERY & COLLECTION BOX UNIT (N.D.C.B.U.)	
JULY 1988	STANDARD PLAN NO. 316



Section 4.2 Lighting**A. STREETLIGHTS**

1. Streetlights shall be provided with the development of all new subdivisions, and for new commercial, mixed-use, industrial, and institutional property development.
2. All new streetlights shall be designed and installed in accordance with the standards for such improvements of the City, and they will be owned and operated by the City or its designee (Puget Sound Energy). Non-standard, internal, privately owned and maintained streetlights may be acceptable as permitted by the Public Works and Planning Departments.
3. A public street lighting plan submitted by the applicant or Puget Sound Energy (PSE), and subject to approval by the Public Works Director, will be required for all streetlight installations. Installations on privately owned property shall be designed to the same standards as those specified in Section 4.2.B, except that ownership and maintenance is by private party or homeowners' association. Type of installation will be as directed by the Public Works Director except where noted herein.
4. PSE or an engineering firm approved by the City capable of performing such work will prepare all public streetlight designs. The engineer will be licensed by the State of Washington. After the system is approved, completed, and accepted, a set of "as-built" plans and electronic submittals will be submitted to the City as a permanent record.
5. Streetlight system continuity and extensions shall be provided when there exists a possibility for future street extensions.
6. Street lighting system design shall include the following:
 - Site plan that shows electrical and physical layout for streetlight fixtures
 - Site plan with photometric calculations showing foot-candle coverage
 - Calculations for uniformity ratio
 - Line losses
 - Power source
 - Installation details
 - Light fixture schedule with specifications for each fixture type
7. All new streetlight wiring, conduit and service connections shall be located underground. The applicant will be responsible for providing or obtaining necessary easements for underground power for streetlighting systems designed and constructed as part of an approved development permit.
8. After the system is approved, installed, inspected, and accepted, a set of "as-built" plans in electronic format will be submitted to the City as a permanent record.

9. In residential subdivisions, Homeowner's Associations (HOAs) shall be established to pay for maintenance and on-going expenses of street lighting, including electric power.

B. ILLUMINATION LEVEL STANDARDS

1. Illuminating Engineering Society of North America (IESNA) RP –Series standards apply. IES RP-8 and RP-19 standards shall be met for roadway lighting.
2. Light fixtures shall be located on one side of the roadway only or shall be staggered when placed along both sides of the roadway.
3. Streetlights at intersections shall be required as a minimum. Streetlights in residential areas shall be located at street ends, intersections, and at non-motorized crossings.
4. Streetlight fixtures shall be located across the street from each other and staggered.
5. LED Luminaires with Type 2, 3, and 5 distributions.
6. Light-loss of no less than 0.85.
7. For Craftsman Fixtures per Subsection 4.2.C.3 and Figure 2.4.1, installed on Tolt Avenue and on Entwistle Street between Larson Avenue and Spilman Avenue:
 - a. At intersections: Average maintained foot-candles of 1.5 and uniformity ratio average (foot-candle/minimum foot-candle) of 3:1
 - b. Along Roadway: Average maintained foot-candles of 1.2 and uniformity ratio average (foot-candle/minimum foot-candle) of 3:1
 - c. Along Walkways and Shared Used Paths: Average maintained foot-candles of 0.8 and uniformity ratio average (foot-candle/minimum foot-candle) of 4:1
8. For Decorative fixtures per Subsection 4.2.C.4 and Figure 2.4.2, installed on all City streets excluding Tolt Avenue or Entwistle Street between Larson Avenue and Spilman Avenue:
 - a. At intersections other than local residential streets: Average maintained foot-candles of 0.9 and uniformity ratio average (foot-candle/minimum foot-candle) of 4:1
 - b. Along Roadway other than local residential streets: Average maintained foot-candles of 0.6 and uniformity ratio average (foot-candle/minimum foot-candle) of 4:1

- c. Along Walkways and Shared Used Paths: Average maintained foot-candles of 0.4 and uniformity ratio average (foot-candle/minimum foot-candle) of 6:1
9. When lighting is installed as part of a half street improvement, these requirements for illumination levels and uniformity ratios only apply to the associated improvement except at intersections. Intersections shall comply with the required illumination requirements.

C. STREETLIGHT FIXTURE STANDARDS

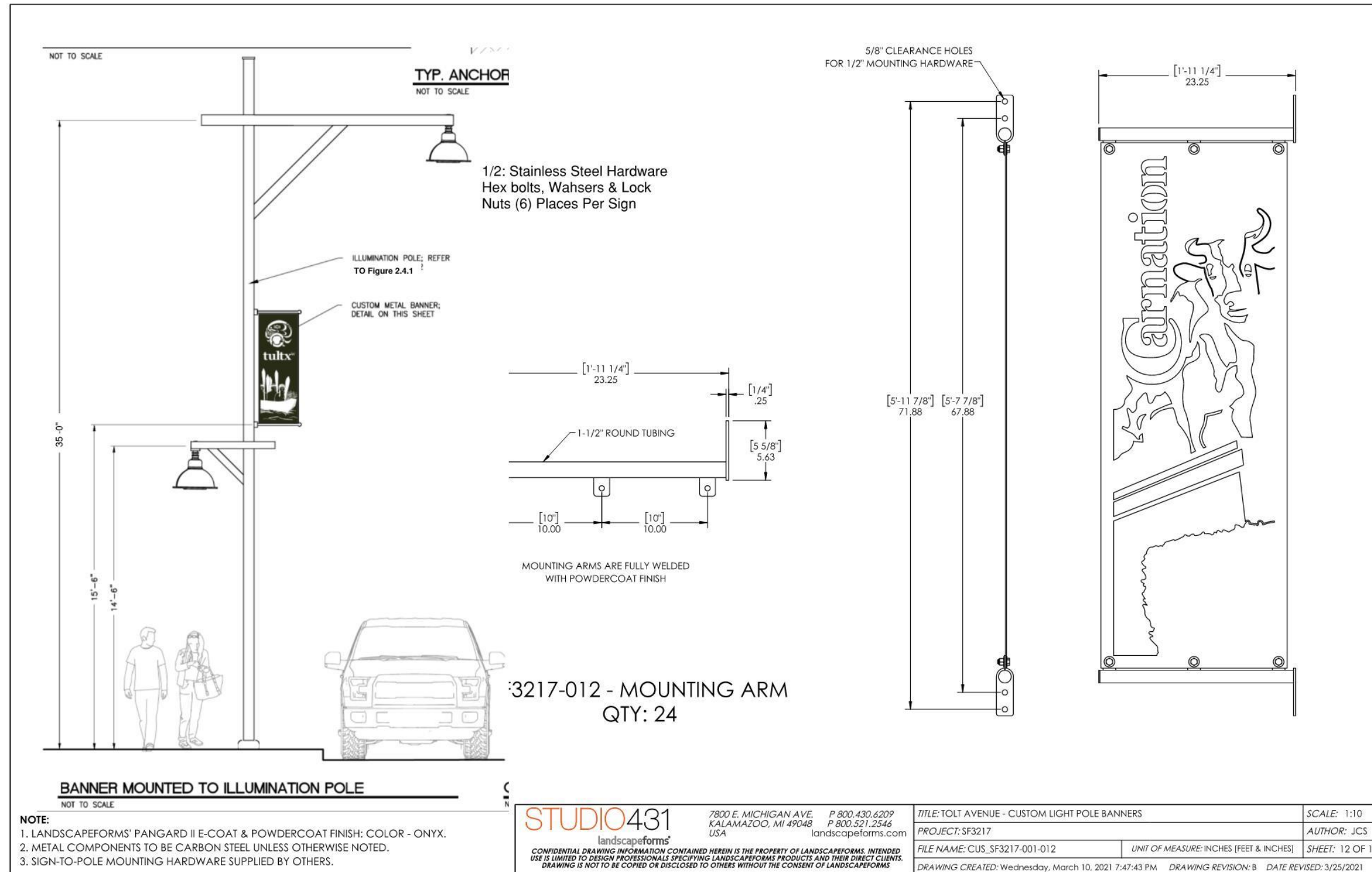
All Fixtures:

1. Hardware shall be S304 stainless steel.
2. Light Emitting Diode (LED) luminaries with a photocell shall be utilized for all new facilities.

Light Standard foundation shall be per WSDOT Standard Plan J-28.30-03 or as designed by PSE.

3. Craftsman fixtures: The street lighting system along Tolt Avenue and along Entwistle Street from Larson Avenue to Stossel Avenue shall be designed with the following Craftsman fixture types and lighting characteristics:
 - Dual Roadway/Pedestrian light poles with one fixture mounted at 35 feet with a 12-foot arm facing the roadway and a second fixture mounted at 14.5 feet with a 3-foot arm on the backside of the pole overhanging the sidewalk.
 - Roadway luminaire shall be Cyclone Domia CY55P1B (mounted at 35 feet height) and pedestrian luminaire Cyclone Domia SY21P1 (mounted at 14.5 feet height) or approved equivalents.
 - Poles shall be 40 feet in height, 6-inches square steel with 20-amp GFI receptacle and base plate as detailed in Figure 2.4.1.
 - Mounting Brackets shall be placed 15.5 feet above sidewalk as detailed in Figure 2.4.2. Banner designs shall be coordinated with the City.
 - Color of poles shall be RAL 8019 Powdercoat - grey brown and luminaire fixture shall be textured flat black.

4. Decorative fixtures: The street lighting system along all other City streets regardless of classifications shall be designed with the following Decorative fixture types and lighting characteristics:
 - Roadway light poles shall be 20-ft in height, Aluminum Fluted poles, Lumec RTA97N-20-BAD22-GFI with decorative base cover and 6-foot extended reach bracket Lumec model VR6-1A-WDE configuration, as detailed in Figure 2.4.3 or approved equivalent.
 - Roadway luminaire shall be Lumec Urban Domus Pendant, with Type III flat glass lens, decorative contemporary side-mounted as-aluminum adapter. DMS50, LED4K, LE3F-240v-SMB with house side shield or approved equivalent.
 - Color of poles and luminaire fixtures shall be Standard Bronze, BR-TX.



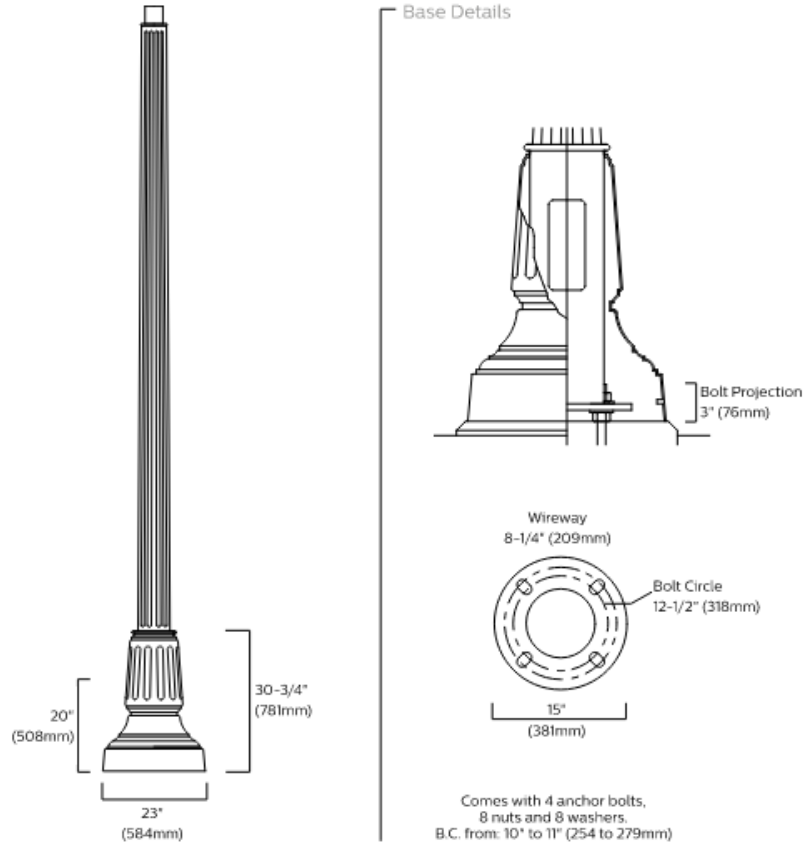
B-SIZE SHEET

Craftsman Fixture Banner and Banner Arm- Figure 2.4.1

Outdoor Poles and Brackets

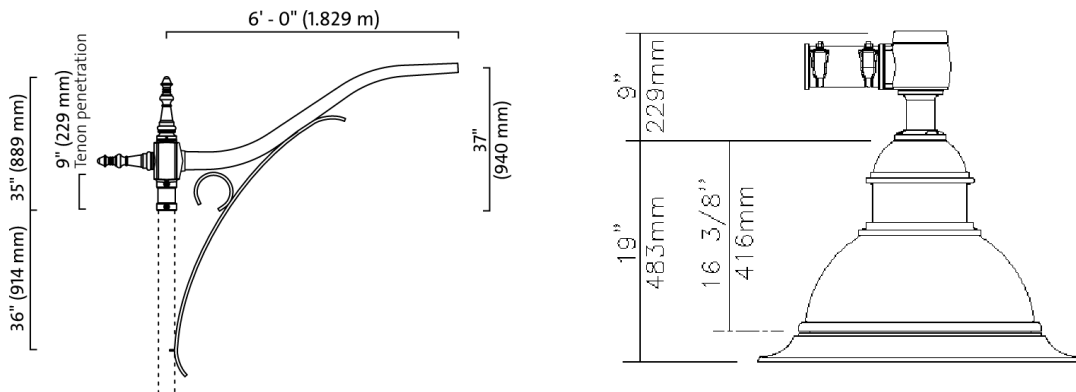
RTA926 / RTA927 / RTA928 – Aluminum Fluted Pole

Dimensions



VR6

EPA: 4.44 sq.ft. Weight: 30.0 lbs. (13.6 kg)



Decorative Fixture - Figure 2.4.3

Section 4.3 Plantings

A. STREET TREES

The recommended trees and minimum spacing (spread) between them is defined in the City of Carnation's Approved Street Tree List. Spacing is approximate – exact spacing will depend on locations of streetlights, fire hydrants, driveways, sight clearance triangles, etc.

Street trees shall be selected from the approved species list shown in the Approved Street Tree List included in the Appendix. At the time of installation, street trees shall be a minimum 2-inch caliper measured six inches (6") above the ground and shall be installed as shown in WSDOT Standard planting details and WSDOT Standard Specifications Chapter 8-02.

Root barriers are required for all trees planted in planter strips and within 10' of the back of sidewalks.

Street trees shall not be planted closer than ten feet (10') from driveways/alleys, and thirty feet (30') from intersections.

CHAPTER 3: STORM DRAINAGE STANDARDS

SECTION 1: GENERAL

The City of Carnation adopted the current edition of the Washington State Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW).

This Manual may be obtained on the Washington State DOE web site at <http://www.ecy.wa.gov/programs/wq/Stormwater/manual.html>

This section applies to public and private development within the City. It is expressly the purpose of this Chapter to provide for and promote the health, safety, and welfare of the general public through sound development policies and construction procedures. The intent is to:

4. Protect water quality by preserving the designated uses of the water body (as defined in WAC-173-210A);
5. Maintain and protect groundwater quantities, locations, and flow patterns;
6. Ensure the safety of City roads and rights-of-way; and
7. Decrease drainage-related damages to public and private property.

All development and redevelopment must manage stormwater on-site. The City of Carnation does not have a stormwater conveyance network capable of accepting stormwater runoff from areas outside the existing tributary areas.

SECTION 2: STORM DRAINAGE DESIGN AND CONVEYANCE

Storm drainage design shall be in accordance with the Stormwater Minimum Requirements for new and redeveloped sites, as established in the adopted Ecology Manual, Carnation Municipal Code, and the City Standards.

Low Impact Development (LID) principles and strategies are required for site design in Carnation. LID principles and strategies identify areas conducive to stormwater management during the site planning process. By identifying areas with good infiltration potential, and areas for preserving vegetation, a project can reduce the amount of stormwater runoff generated by a project site.

Total new and/or replaced hard surfaces shall be calculated as a total for the development, including areas onsite and within public right of way, such as frontage improvements. Stormwater water quality, or infiltration facilities that serve private property shall not be located in dedicated public road right-of-way areas unless specifically approved by the Public Works Director or Designee.

The maximum hard surface lot coverage shall be used to determine the hard surface area for stormwater design.

Construction of the lot drainage connection systems must be feasible and allow connection to the proposed formal and short subdivision improvements or to the documented infiltration areas.

Lot drainage infiltration systems may be constructed concurrent with the building construction.

Stormwater conveyance shall not be located underneath structures. A 10' minimum building and property line setback is required for closed drainage systems and infiltration systems, as measured from the edge of the pipe or infiltration system.

Stormwater shall not be conveyed to the city's sanitary sewer vacuum system.

Storm pipe within the public right-of-way shall be a minimum of twelve-inch (12") diameter. Eight-inch (8") diameter may be permitted on cross street laterals less than sixty-six feet (66') long to avoid utility conflict or meet shallow gradient with written modification approval from the Public Works Department. The following pipes, specified in Section 9-05 of the WSDOT Standard Specifications, are allowed:

- A. Plain or reinforced concrete storm sewer pipe;
- B. Ductile iron (must be used when cover is less than two feet);
- C. Smooth interior wall, corrugated exterior wall polyethylene (e.g. N-12);
- D. Smooth wall high-density polyethylene (HDPE), SDR-32.5, SDR-26, SDR-21, SDR-17, SDR-11, depending on application.
- E. PVC pipe (SDR-35).
- F. Polypropylene (PP)

PVC used for stormwater conveyance shall be colored white and shall not be colored green. No exceptions. The purpose being to prevent possible cross-connections and confusion with sanitary sewer conveyance.

Trench excavation, backfill, compaction, and temporary and permanent asphalt surface restoration for stormwater conveyance pipe shall comply with Typical Trench Detail D-4 and Section 6 - General Construction Standards for Water and Sanitary Sewer System of the City of Carnation's Combined Water and Sanitary Sewer Utility Technical Standards.

Catch basins shall be spaced no greater than one-hundred fifty feet (150') for gutter grades less than one percent (<1%), two-hundred feet (200') for grades between one and three percent (1% - 3%), and three-hundred feet (300') for grades between three percent and ten percent (3% - 10%).

All new or adjusted catch basins within the street right-of-way for the project which are used as

inlets, regardless of grade, shall be fitted with vanned grates.

The last catch basin prior to entering a stormwater shall have a tee structure on the outlet.

SECTION 3: CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A SWPPP consisting of a report and a plan sheet(s) showing locations of all BMP measures shall be submitted for all land-disturbing activities which meet the criteria in the DOE Manual (Vol II, Ch 3.3) as modified by the SWPWDS.

This SWPPP shall be signed and stamped by a Professional Engineer and have the Certified ESC Lead (Provide proof of current certification) person listed on the SWPPP sheet.

The SWPPP sheet(s) shall be presented in the construction plan set. The plan sheet shall show ALL BMP's to be utilized on-site. No exceptions. General notes are not sufficient to replace the plan sheet requirement. A separate plan sheet shall be utilized for each phase in a phased-construction project.

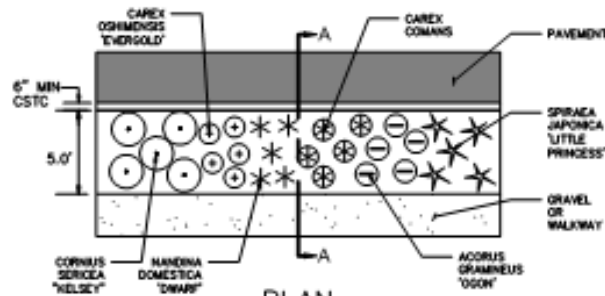
This document including plan sheet must be present on-site for the entire duration of the project. Failure to produce the full approved SWPPP plan will result in a "Stop Work Order."

At a minimum, the following SWPPP measures shall be installed and maintained in accordance with the DOE Manuals as modified by this manual. These facilities shall be modified and/or upgraded as needed for unexpected storm events. (DOE Manual, Vol II, Ch 4, BMP's)

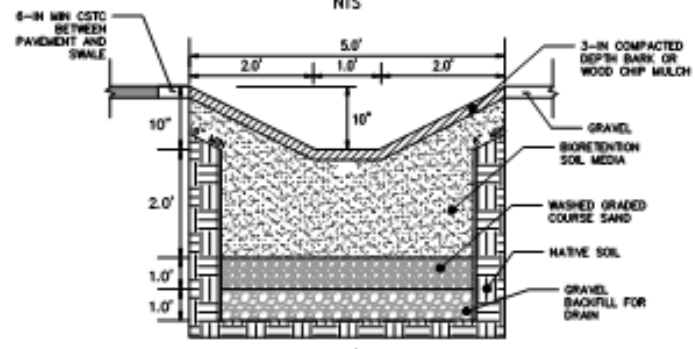
1. Prior to any clearing or grading, silt fencing shall be installed down slope of all areas to be disturbed.(BMP C233)
2. Prior to any clearing or grading, downstream storm drain inlet protection shall be installed. (BMP C220) **Filter fabric wrapped under or over a grate inlet is not an acceptable method of inlet protection.**
3. Prior to any delivery of materials or construction of any kind, a stabilized construction entrance shall be installed. The entrance shall be a minimum fifteen feet (15') by one-hundred feet (100') in area, with sturdy, non-woven filter fabric underlying four-inch to eight-inch quarry spalls one-foot deep. (BMP C105)
4. Sediment traps with interceptor swales and check dams at a minimum shall be proposed unless the applicant has proven the site is too small for a sediment trap and the City of Carnation has given their written approval. (BMP's C240, C200 and C207)
5. Temporary and permanent cover measures shall be provided to protect disturbed areas. Cover methods include mulch, erosion control nets and blankets, plastic covering, seeding, and sod.(BMP's C100 series)

6. It is the responsibility of the applicant to maintain erosion control measures in proper working condition to insure that no sediment is leaving the site.
7. If, in the opinion of the inspector, the Public Works Director, the Public Works Superintendent, the City Engineer, or the Planning Director, the temporary erosion control measures are not installed, installed incorrectly, or are in need of repair, a “Stop Work Order” may be issued until corrective action is taken.

Appendix



PLAN
TYP. SWALE PLANTING DETAIL
NTS



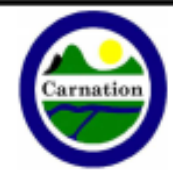
ELEVATION
SWALE CROSS SECTION A-A

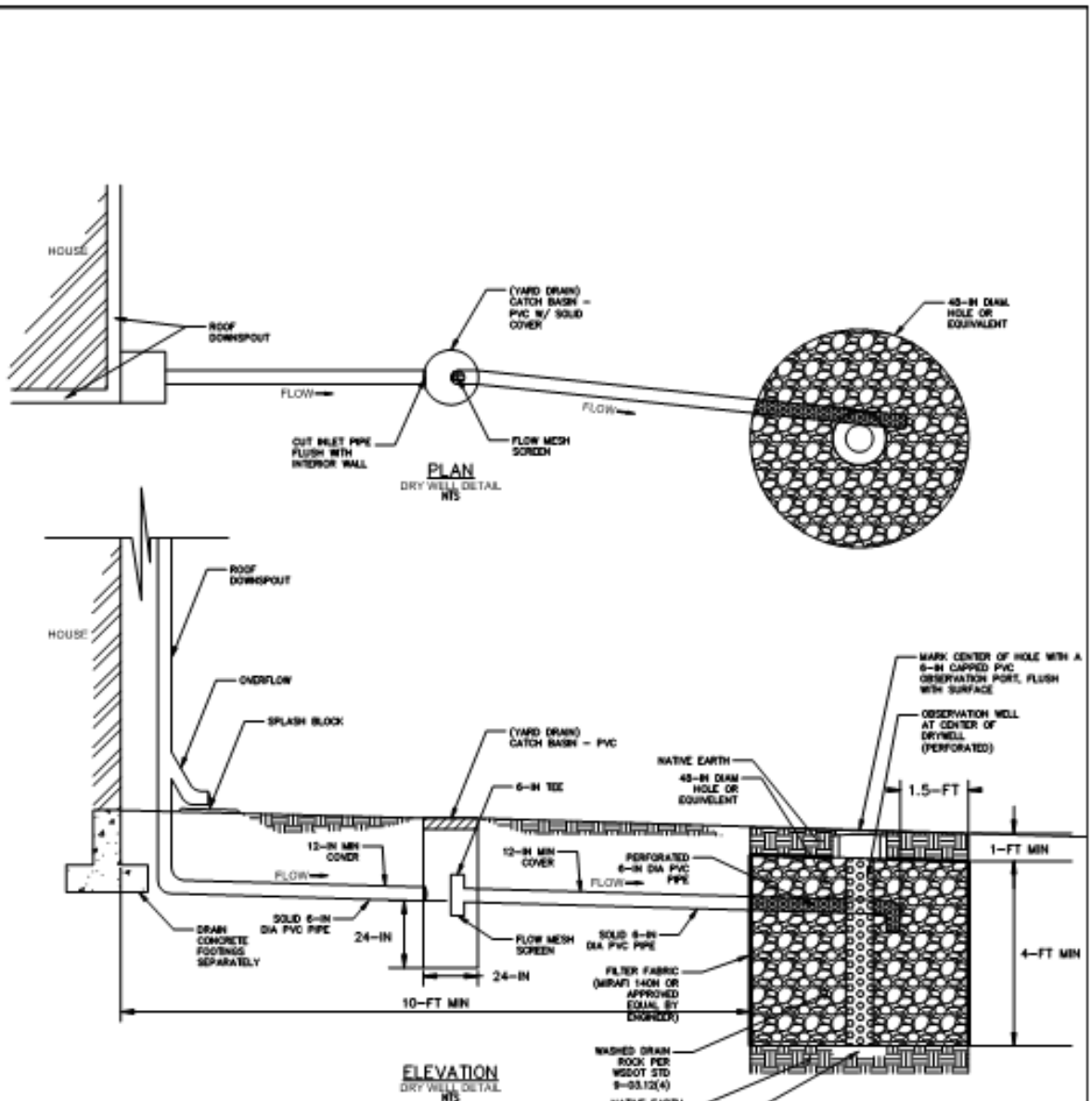
- NOTES:
- 1) SEE PLANTING SCHEDULE. PLANTS TO BE PLACED IN RANDOM GROUPS OF 5, 10, AND 15 LIKE PLANTS PER GROUP. OFFSET PLANTS 6" MIN FROM ADJACENT GRAVEL STRIP, PAVEMENT, DRIVEWAYS, AND PATHWAY. UNLESS OTHERWISE NOTED IN THE PLANTING SCHEDULE.
 - 2) BIORETENTION SOIL MIX PER 2012 DOE STORMWATER MGMT MANUAL VOL. V BMP T 7.30 "DEFAULT BIORETENTION SOIL MEDIA (BSM)."
 - 3) WASHED GRADED COARSE SAND PER WSDOT STD 9-03.13(1)
 - 4) GRAVEL BACKFILL FOR DRAINS PER WSDOT STD SPECS SECTION 9-03.12(4).
 - 5) NO PERFORATED PIPE UNDERDRAINS AND NO DISCHARGE PIPES ALLOWED INTO TRENCH.
 - 6) EXTEND TRENCH BOTTOM TO SANDY/GRAVELLY LAYER IDENTIFIED IN SOIL REPORT.
 - 7) NO UTILITIES ALLOWED THROUGH OR UNDER TRENCH UNLESS NO OTHER ALTERNATIVE EXISTS AS DETERMINED BY THE CITY.

PLANTING SCHEDULE				
RAIN GARDEN PLANT MIX				
BOTANICAL NAME	COMMON NAME	SIZE	SPACING	REMARKS
CORNUS SERICEA "KELSEY"	DWARF RED TWIG DOGWOOD	1 GAL CONT	INSTALL PLANTS IN EQUAL PROPORTIONS OF 20% EACH AT A SPACING OF 18" O.C. IN RANDOM GROUPS OF 5, 10, AND 15 LIKE PLANTS PER GROUP. OFFSET PLANTS 6" MIN FROM ADJACENT SIDEWALK, CURBS, AND WALLS.	FULL AND WELL ROOTED
CAREX COMANS	NEW ZEALAND HAIR SEDGE	1 GAL CONT		
ACORUS GRAMINEUS "OGON"	GOLDEN VARIEGATED SWEET FLAG	1 GAL CONT		
CAREX OSHIMENSIS "EVERGOLD"	VARIEGATED JAPANESE SEDGE	1 GAL CONT		
NANDINA DOMESTICA "DWARF"	DWARF NANDINA	1 GAL CONT		
SPIRAEA JAPONICA "LITTLE PRINCESS"	LITTLE PRINCESS SPIREA	1 GAL CONT		
SOIL AND MULCH				
BARK OR WOOD CHIP MULCH* 3" DEPTH IN SHRUB AND GROUND COVER PLANTING AREAS, AND RAIN GARDEN PLANT MIX AREA.				SEE WSDOT SPEC 8-02.3(11)

LOCHNER
(425)-454-3160

BIORETENTION SWALE & PLANTING

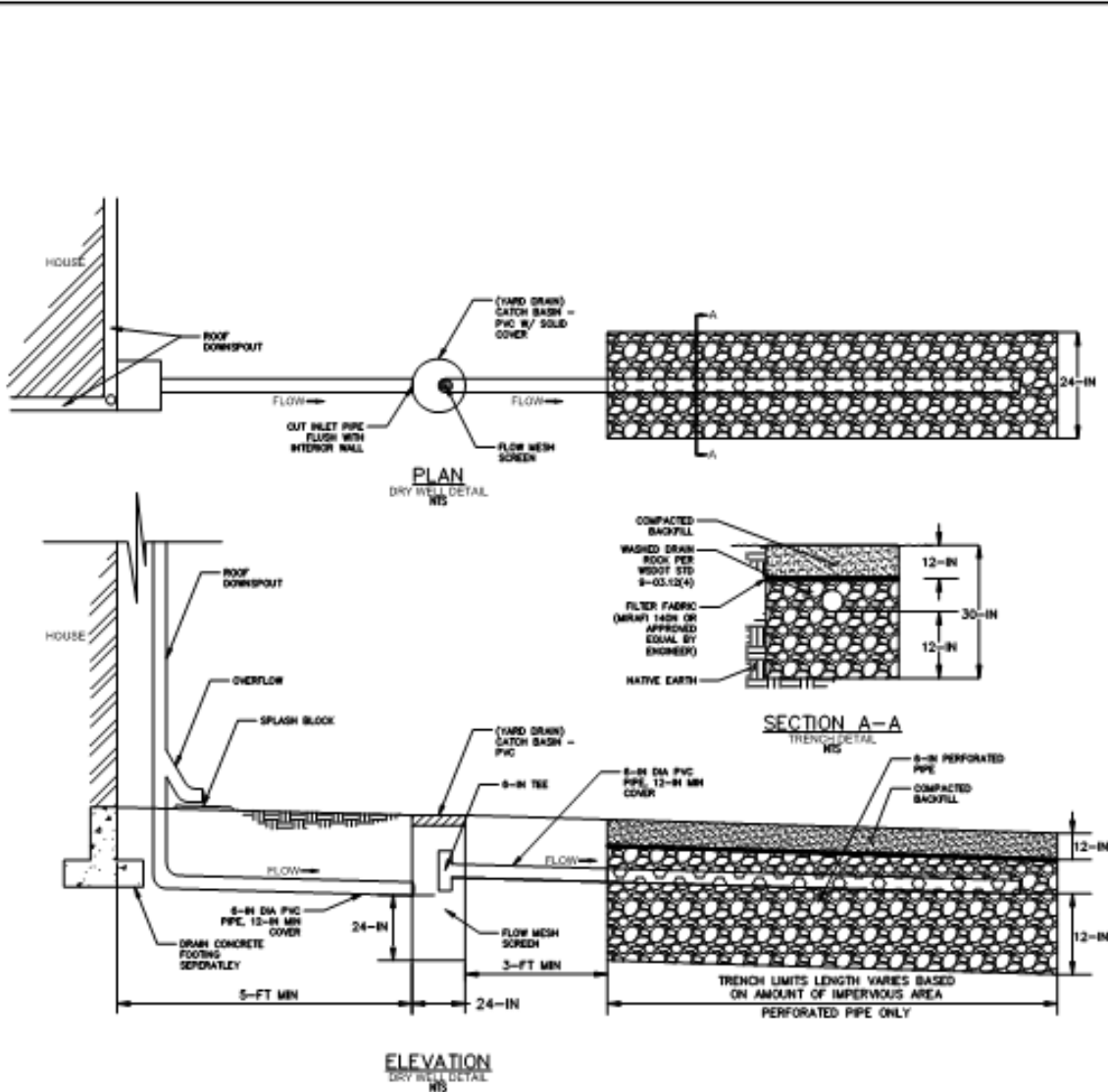





NOTES:

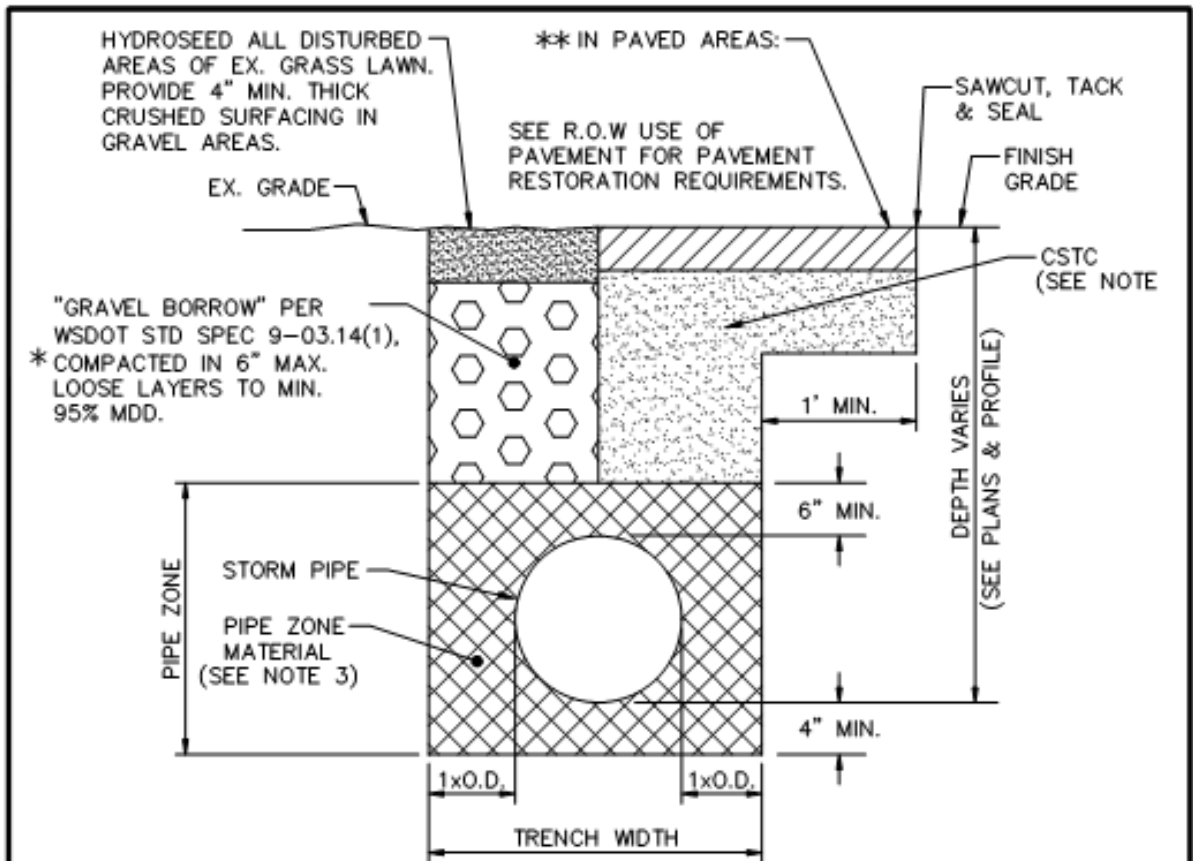
- 1) DRY WELL LOCATION SHALL BE 10-FT MIN FROM HOUSE FOOTING AND PROPERTY LINE.
- 2) 24-IN (YARD DRAIN) CATCH BASIN PVC PER WSDOT STD B-10.70-00 AND SHALL HAVE A 24-IN SUMP DEPTH
- 3) WASHED DRAIN ROCK PER WSDOT STD SPECS SECTION 9-03.12(4).
- 4) 6-IN PIPE SHALL TRANSITION FROM SOLID PVC TO PERFORATED ONCE WITHIN DRYWELL LIMITS
- 5) NUMBER OF REQUIRED DRYWELLS VARIES BASED ON AMOUNT ON IMPERVIOUS AREA.
- 6) EXTEND BOTTOM OF DRYWELL TO SANDY/GRAVELLY LAYER IDENTIFIED IN SOIL REPORT.

<p>LOCHNER (425)-454-3160</p>	<p>DOWNSPOUT INFILTRATION DRYWELL</p>	
<p>11/2018</p>		<p>DWG. NO. DR-2</p>



- NOTES:
- 1) DRY WELL LOCATION SHALL BE 10-FT MIN FROM HOUSE FOOTING AND PROPERTY LINE.
 - 2) 24- IN (YARD DRAIN) CATCH BASIN PVC PER WSDOT STD B-10.70-00 AND SHALL HAVE A 24-IN SUMP DEPTH
 - 3) WASHED DRAIN ROCK PER WSDOT STD SPECS SECTION 9-03.12(4)
 - 4) 6-IN PIPE SHALL TRANSITION FROM SOLID PVC TO PERFORATED ONCE WITHIN TRENCH LIMITS
 - 5) MAXIMUM TRENCH LENGTH IS 100-FT FROM CATCH BASIN.

<p>LOCHNER [425]-454-3160</p>	<h2 style="margin: 0;">DOWNSPOUT INFILTRATION TRENCH</h2>	
<p>11/2018</p>		<p>DWG. NO. DR-3</p>



NOTE:

1. PERPENDICULAR, OPEN CUT TRENCH CROSSINGS WITHIN THE RIGHT-OF-WAY SHALL BE BACKFILLED WITH 100% CRUSHED SURFACING TOP COURSE (CSTC) PER WSDOT 9-03.9 (3).
 2. MINIMUM COVER FOR STORM PIPE SHALL BE 3'
 3. PIPE ZONE MATERIAL PER WSDOT 9-03.12(3).
 4. COMPACTION SHALL BE, AT LEAST 95% OF MAXIMUM DENSITY, PER WSDOT STANDARD SPECIFICATION SECTION 2-03.3(14)D.
- * BACKFILL COMPACTION ON PRIVATE EASEMENTS WHICH ARE NOT USED FOR DRIVING PURPOSES SHALL BE MINIMUM 90% MAX. DRY DENSITY (MDD).
- ** IN R.O.W MATCH EXISTING PAVEMENT SECTION PLUS 1", BUT NOT LESS THAN 4" ACP CLASS ½" PG.64-22 OVER 6" CSTC (COMPACTED THICKNESS), TACK & SEAL NEAT LINES.

LOCHNER
(425)-454-3160

TYPICAL TRENCH DETAIL



11/2018

DWG. NO.

D-4

City of Carnation – Approved Street Tree List

December 2018

Large Columnar Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Acer nigrum</i> 'Green Column' Green Column Black Sugar Maple	50	10	No	6	N/A		Good close to buildings
<i>Acer rubrum</i> 'Armstrong' Armstrong Red Maple	60	25	No	6	N/A		Attractive silver-grey bark.
<i>Acer rubrum</i> 'Franks Red'™ Red Sunset Maple	45	35	No	6	N/A		Leaves turn into a captivating red hue, lasting late into the fall.
<i>Ginkgo biloba</i> 'Princeton Sentry' Princeton Sentry Ginkgo	40	15	No	6	N/A		Very narrow growth.
<i>Nyssa sylvatica</i> Tupelo	60	20	No	6	N/A		Handsome chunky bark – Great Plant Pick
<i>Quercus</i> 'Crimschmidt' Crimson Spire Oak	45	15	No	6	N/A		Hard to find in the nursery trade
<i>Quercus frainetto</i> Italian Oak	50	30	No	6	N/A		Drought resistant – beautiful green, glossy leaves in summer. Great Plant Pick
<i>Quercus robur</i> 'fastigiata' Skyrocket Oak	40	15	No	6	N/A		Columnar variety of oak
<i>Taxodium distichum</i> 'Mickelson' Shawnee Brave Bald Cypress	55	20	No	6	N/A		Deciduous conifer - tolerates city conditions





Large Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Aesculus flava</i> Yellow Buckeye	60	40	No	6			Least susceptible to leaf blotch – large fruit – fall color is varied, but quite beautiful
<i>Cercidiphyllum japonicum</i> Katsura Tree	40	40	No	6	N/A		Needs lots of water when young – can produce large surface roots. Great Plant Pick
<i>Fagus sylvatica</i> Green Beech	50	40	No	6	N/A		Silvery-grey bark
<i>Fagus sylvatica</i> 'Asplenifolia' Fernleaf Beech	60	50	No	6	N/A		Beautiful cut leaf. Great Plant Pick
<i>Ginkgo biloba</i> 'Magyar' Magyar Ginkgo	50	25	No	6	N/A		more upright and narrow than 'Autumn Gold'
<i>Gymnocladus dioica</i> 'Espresso' Espresso Kentucky Coffee	50	35	No	6	N/A		Very coarse branches - extremely large bi-pinnately compound leaves
<i>Liquidambar styraciflua</i> 'Rotundiloba' Rotundiloba Sweetgum	45	25	No	8	N/A		Only sweetgum that is entirely fruitless. Smooth rounded leaf lobes
<i>Liriodendron tulipifera</i> Tulip Tree	60	30	No	8	N/A		Fast-growing tree – can get very large in open conditions



City of Carnation – Approved Street Tree List

December 2018

Large Trees, Continued

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Metasequoia glyptostroboides</i> Dawn Redwood	50	25	No	6	N/A		Fast growing deciduous conifer. Great Plant Pick
<i>Platanus x acerifolia</i> 'Bloodgood' Bloodgood London Planetree	50	40	No	8	N/A		More anthracnose resistant than other varieties – large tree that needs space
<i>Platanus x acerifolia</i> 'Yarwood' Yarwood London Planetree	50	40	No	8	N/A		High resistance to powdery mildew
<i>Quercus bicolor</i> Swamp White Oak	60	45	No	8	N/A		Interesting shaggy peeling bark
<i>Quercus coccinea</i> Scarlet Oak	60	40	No	6	N/A		Best oak for fall color
<i>Quercus garryana</i> Oregon Oak	50	40	No	8	N/A		Native to Pacific Northwest. Great Plant Pick
<i>Quercus imbricaria</i> Shingle Oak	60	50	No	6	N/A		Nice summer foliage - leaves can persist throughout the winter
<i>Quercus muhlenbergii</i> Chestnut Oak	60	50	No	6	N/A		coarsely toothed leaf
<i>Quercus rubra</i> Red Oak	60	45	No	8	N/A		Fast growing oak – large tree that needs space
<i>Quercus velutina</i> Black Oak	60	50	No	8	N/A		More drought tolerant than red oak
<i>Taxodium distichum</i> Bald Cypress	55	35	No	8	N/A		A deciduous conifer, broadly spreading when mature – columnar when young. Great Plant Pick
<i>Ulmus</i> 'Homestead' Homestead Elm	60	35	No	6	N/A		Complex hybrid - close in form to American elm - Resistant to Dutch elm disease
<i>Ulmus</i> 'Frontier' Frontier Elm	50	35	No	6	N/A		Resistant to Dutch elm disease
<i>Zelkova serrata</i> 'Greenvase' Green Vase Zelkova	45	40	No	6	N/A		Attractive exfoliating bark provides Winter appeal. Dark green leaves turn orange-red and purple in Fall. Great Plant Pick
<i>Zelkova serrata</i> 'Village' Green' Village Green Zelkova	40	40	No	6	N/A		Green Vase, Mussichino and Halka are improved forms. Great Plant Pick














Medium / Large Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Acer campestre</i> Hedge Maple	50	30	No	5	N/A		Contrary to its name, this is not a small tree – nice overall shape and structure
<i>Acer campestre</i> 'Evelyn' Queen Elizabeth Hedge	40	30	No	5	N/A		More upright branching than the species.

City of Carnation – Approved Street Tree List

December 2018

Medium / Large Trees, Continued

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Acer freemanii</i> 'Autumn Blaze' Autumn Blaze Maple	50	40	No	6	N/A		Cross between red and silver maple – fast growing with good fall color
<i>Acer miyabei</i> 'Morton' State Street Maple	40	30	No	6	N/A		Similar to, but faster growing and larger than Hedge maple
<i>Acer pseudoplatanus</i> 'Atropurpureum' Spaethii Maple	40	30	No	5	N/A		Leaves green on top purple underneath.
<i>Acer rubrum</i> 'Scarsen' Scarlet	40	25	No	6	N/A		Leaves are darker green and larger than those of other Red Maples, and they hold up well in summer heat.
<i>Aesculus x carnea</i> 'Briottii' Red	30	35	No	6			Resists heat and drought better than other horsechestnuts
<i>Corylus colurna</i> Turkish Filbert	40	25	No	5	N/A		Tight, formal, dense crown - not for areas with high pedestrian traffic as tree can have significant debris from nut production. Great Plant Pick
<i>Ginkgo biloba</i> 'Autumn Gold' Autumn Gold Ginkgo	45	35	No	6	N/A		Narrow when young
<i>Liquidambar styraciflua</i> 'Moraine' Moraine Sweetgum	40	25	No	8	N/A		Light green foliage. More compact than other varieties of sweet gum. Brittle branches
<i>Nothofagus antarctica</i> Antarctic Beech	50	35	No	5	N/A		Rugged twisted branching and petite foliage – difficult to find in the nursery trade
<i>Tilia americana</i> 'Redmond' Redmond Linden	50	30	No	8	N/A		Pyramidal, needs extra water when young
<i>Tilia cordata</i> 'Greenspire'	40	30	No	6	N/A		Symmetrical, pyramidal form – sometimes has structural issues due to tight branch attachments
<i>Ulmus parvifolia</i> 'Emer II' Allee Elm	45	35	No	5	N/A		Exfoliating bark and nice fall color – Resistant to Dutch Elm Disease





Medium Columnar Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Acer rubrum</i> 'Bowhall' Bowhall Maple	40	20	No	6	N/A		An upright, pyramidal form that is significantly wider than 'Armstrong' or 'Columnare'
<i>Carpinus betulus</i> 'Fastigiata' Pyramidal European Hornbeam	40	15	No	5	N/A		Broadens when older. Great Plant Pick
<i>Fagus sylvatica</i> 'Dawycck Purple' Dawycck Purple Beech	40	12	No	6	N/A		Purple foliage.
<i>Liriodendron tulipifera</i> 'Fastigiatum' Columnar Tulip Tree	40	10	No	6			Good next to buildings – can have problems with tight branch angles. Great Plant Pick
<i>Malus</i> 'Tschonoskii' Tschonoskii Crabapple	30	15	Yes	5			Sparse green fruit, pyramidal





















City of Carnation – Approved Street Tree List

December 2018

Medium Columnar Trees, Continued

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Oxydendron arboreum</i> Sourwood	35	12	No	5			Consistent and brilliant fall color. Great Plant Pick
<i>Pyrus calleryana</i> 'Cambridge' Cambridge Pear	40	15	No	5			Narrow tree with better branch angles and form than the species – brittle limbs may still be a problem with breakage due to ice or wet snow


























Medium Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Acer grandidentatum</i> 'Schmidt' Rocky Mt. Glow Maple	25	20	Yes	5	N/A		Intense red fall color - Limited availability in nursery trade
<i>Acer rubrum</i> 'Karpick' Karpick Maple	40	20	No	6	N/A		Finer texture than other narrow forms of columnar maple
<i>Acer truncatum</i> x <i>A. platanoides</i> 'Keithsform Norwegian Sunset Maple	35	25	No	5	N/A		Reliable fall color - nice reddish orange
<i>Acer truncatum</i> x <i>A. platanoides</i> 'Warrensred' Pacific Sunset Maple	30	25	Yes	5	N/A		Limited use under higher wires
<i>Carpinus caroliniana</i> American Hornbeam	25	20	Yes	5	N/A		Outstanding fall color (variable – yellow, orange, red) – nice little tree. Great Plant Pick
<i>Cladrastis kentukea</i> Yellowwood	40	40	No	5			White flowers in spring, resembling wisteria flower – blooms profusely only every 2 to 4 years – yellow/gold fall color
<i>Cornus controversa</i> 'June Snow' Giant Dogwood	40	30	No	5			Frothy, 6-inch clusters of white flowers in June – Great Plant Pick
<i>Cornus</i> 'Eddie's White Wonder' Eddie's White Wonder Dogwood	30	20	Yes	5			A hybrid of <i>C. florida</i> and <i>C. nuttallii</i>
<i>Crataegus crus-galli</i> 'Inermis' Thornless Cockspur Hawthorne	25	30	Yes	5			Red persistent fruit
<i>Crataegus phaenopyrum</i> Washington Hawthorne	25	20	Yes	5			Thorny – do not plant in high use areas
<i>Crataegus x lavalii</i> Lavalle Hawthorne	25	20	Yes	5			Thorns on younger trees. Great Plant Pick
<i>Davidia involucrata</i> Dove Tree	40	30	No	5		N/A	Large, unique flowers in May. Great Plant Pick
<i>Eucommia ulmoides</i> Hardy Rubber Tree	50	40	No	6	N/A	N/A	Dark green, very shiny leaves – insignificant fall color
<i>Fagus sylvatica</i> 'Rohanii' Purple Oak Leaf Beech	50	30	No	6	N/A	N/A	Attractive purple leaves with wavy margins. Great Plant Pick
<i>Halesia monticola</i> Mountain Silverbell	45	25	No	5			Attractive small white flower

City of Carnation – Approved Street Tree List

December 2018

Medium Trees, Continued

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Halesia tetraptera</i> Carolina Silverbell	35	30	No	5			Attractive bark for seasonal interest
<i>Koelreuteria paniculata</i> Goldenrain Tree	30	30	Yes	5			Midsummer blooming – slow growing. Great Plant Pick
<i>Magnolia denudata</i> Yulan Magnolia	40	40	No	5		N/A	6" inch fragrant white flowers in spring. Great Plant Pick
<i>Magnolia grandiflora</i> 'Victoria' Victoria Evergreen Magnolia	25	20	Yes	5		N/A	Evergreen magnolia – can be damaged in years with wet, heavy snow. Great Plant Pick
<i>Magnolia kobus</i> 'Wada's Memory' Wada's Memory Magnolia	30	20	Yes	5			Does not flower well when young. Great Plant Pick
<i>Ostrya virginiana</i> Ironwood	40	25	No	5	N/A		Hop like fruit – slow growing
<i>Phellodendron amurense</i> 'Macho' Macho Cork Tree	40	40	No	5	N/A		This variety is fruitless – fall color can be varied. High drought tolerance
<i>Pterostyrax hispida</i> Fragrant Epaulette Tree	40	30	No	5			Pendulous creamy white flowers – fragrant – difficult to find in the nursery trade
<i>Quercus ilex</i> Holly Oak	40	30	No	5	N/A	N/A	Evergreen oak - Underside of leaf is silvery-white. Often has a prominent umbrella form
<i>Quercus robur x alba</i> 'Crimschmidt' Crimson Spire Red Oak	45	15	No	5	N/A		Mildew resistant foliage and rusty red fall color.
<i>Rhamnus purshiana</i> Cascara	30	20	Yes	5	N/A		Native tree – fall color depends on exposure – purplish fruit feeds many native birds
<i>Robinia x ambigua</i> Pink Idaho Locust	35	25	No	5			Fragrant flowers. Sterile variety. Drought tolerant. Some varieties will sucker profusely.
<i>Sophora japonica</i> 'Regent' Japanese Pagodatree	45	40	No	6			Has a rapid growth rate and tolerates city conditions, heat, and drought.
<i>Sorbus x hybridia</i> Oakleaf Royal Mt. Ash	30	20	Yes	5			It has leaves which are similar to English oak, and interesting bark for seasonal features.
<i>Styrax japonica</i> Japanese Snowbell	25	25	Yes	5			Reliable and easy to grow, it has plentiful, green ½" inch seeds. Flowers similar to lily in the valley. Great Plant Pick
<i>Tilia cordata</i> 'De Groot' De Groot Littleleaf Linden	30	20	Yes	5	N/A		One of the smaller stature littleleaf lindens.
<i>Tilia cordata</i> 'Chancole' Chancellor Linden	35	20	No	6	N/A		Pyramidal when young. Fragrant flowers that attract bees.
<i>Ulmus parvifolia</i> 'Emer I' Athena Classic Elm	30	35	No	5	N/A		High resistance to Dutch Elm Disease. Drought resistant. Cinnamon colored exfoliating bark for seasonal interest.

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Small Columnar Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Maackia amurensis</i> Amur Maackia	30	20	Yes	5		N/A	Interesting exfoliating bark – flowering in June or July - varies in intensity from year to year
<i>Malus 'Adirondack'</i> Adirondack Crabapple	20	10	Yes	5			Very resistant to apple scab – one of the narrowest crabapples – persistent reddish ¼" fruit. Great Plant Pick
<i>Malus 'Red Barron'</i> Red Barron Crabapple	20	10	Yes	5			Deep pink blossom and persistent red berries for seasonal interest
<i>Sorbus americana 'Dwarfscrown'</i> Red Cascade Mountain Ash	20	10	Yes	5			Nice winter form - Red berries in clusters



























Small Trees

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Acer buegerianum</i> Trident Maple	30	30	Yes	5	N/A		Somewhat shrublike – must train to a single stem – interesting bark. Great Plant Pick
<i>Acer circinatum</i> Vine Maple	25	25	Yes	5	N/A		Avoid using on harsh sites – native tree. Great Plant Pick
<i>Acer ginnala 'Flame'</i> Flame Amur Maple	25	20	Yes	5			Clusters of small cream colored flowers in spring – very fragrant. Nice fall color. Informal branch structure.
<i>Acer griseum</i> Paperbark Maple	30	20	Yes	5	N/A		Peeling cinnamon colored bark for seasonal interest. Great Plant Pick
<i>Acer palmatum</i> Japanese Maple	20	25	Yes	5	N/A		Many varieties available – select larger varieties for street planting
<i>Acer triflorum</i> Three-Flower Maple	25	20	Yes	5	N/A		Multi seasonal interest with tan, exfoliating bark and red, orange/red fall color. Great Plant Pick
<i>Arbutus 'Marina'</i> Strawberry Tree	25	20	Yes	5		N/A	Substitute for Pacific madrone – can suffer severe damage or death due to cold weather - evergreen
<i>Asimina triloba</i> Paw	30	20	Yes	5		N/A	Burgundy flower in spring before leaves – difficult to find in nursery trade
<i>Carpinus japonica</i> Japanese Hornbeam	20	25	Yes	5	N/A		Wide spreading, slow growing – fall color is not outstanding. Great Plant Pick
<i>Cercis canadensis</i> Eastern Redbud	25	30	Yes	5			Deep pink flowers on bare twigs in spring
<i>Cercis siliquastrum</i> Judas Tree	25	30	Yes	5			Deep pink flowers on bare twigs in spring – drought resistant
<i>Cornus alternifolia</i> Pagoda Dogwood	25	25	Yes	5			Small white flowers in flat clusters – fall color is varied. Great Plant Pick
<i>Cornus kousa 'Chinensis'</i> Kousa Dogwood	20	20	Yes	4			Does not do well on harsh, dry sites. Great Plant Pick
<i>Cornus kousa x nuttalli</i> Starlight Dogwood	30	20	Yes	5			Dark green foliage, red fall color, and large (5"), cream-colored flower bracts.

City of Carnation – Approved Street Tree List

December 2018

Small Trees, Continued

Scientific & Common Name	Mature Height	Spread	Under Wires?	Min Strip Width	Flower Color	Fall Color	Comments
<i>Cotinus obovatus</i> American Smoke Tree	25	25	Yes	4			Showy pinkish panicles of flowers in the spring – reddish purple leaves on some varieties. Great Plant Pick
<i>Lagerstroemia 'tuscaraora'</i> Tuscarora Hybrid Crape Myrtle	20	20	Yes	4			Light cinnamon brown bark lends year round interest – drought resistant – likes a warm site
<i>Liquidambar styraciflua</i> 'Clydesform' Emerald Sentinel Sweet Gum	30	12	Yes	4	N/A		Slow growing. Broadleaf. Fall color yellow-orange to orange.
<i>Magnolia</i> 'Elizabeth' Elizabeth Magnolia	30	20	Yes	5		N/A	Yellowish to cream colored flower in spring. Great Plant Pick
<i>Magnolia</i> 'Galaxy' Galaxy Magnolia	25	25	Yes	5			Showy pink flowers. Great Plant Pick
<i>Magnolia x loebneri</i> Loebner Magnolia	20	20	Yes	5			Flower is 'star' shaped rather than tulip like – white to pinkish white in March or April. Great Plant Pick
<i>Malus</i> 'Golden Raindrops' Golden Raindrops Crabapple	20	20	Yes	5			Disease resistant – persistent yellow fruit in fall and winter. Great Plant Pick
<i>Malus</i> 'Donald Wyman' Donald Wyman Crabapple	25	25	Yes	5			Large white blossom – nice green foliage in summer
<i>Malus</i> 'Lancelot' ('Lanzam') Lancelot Crabapple	15	15	Yes	4			Red flower buds, blooming white – red persistent fruit
<i>Parrotia persica</i> Persian Parrotia	30	20	No	5			Blooms before it leafs out – drought tolerant - Varied fall color - reds, oranges and yellows. Great Plant Pick
<i>Sorbus alnifolia</i> Korean Mountain Ash	35	30	No	5			Simple leaves and beautiful pink/red fruit. Great Plant Pick
<i>Stewartia monodelpha</i> Orange Bark Stewartia	30	20	Yes	5			Extraordinary cinnamon colored bark – avoid hot, dry sites. Great Plant Pick
<i>Stewartia psuedocamellia</i> Japanese Stewartia	25	15	Yes	5			Patchwork bark, white flower in spring. Great Plant Pick
<i>Styrax obassia</i> Fragrant Styrax	25	20	Yes	5			Smooth gray bark and fragrant white flowers. Great Plant Pick