

City Council

Agenda

Tuesday, February 17, 2026
Council Chambers
749 Main Street
6:00 PM

Members of the public are welcome to attend and give comments remotely. However, the in-person meeting may continue even if technology issues prevent remote participation.

- You can call in to +1 719 359 4580 or 877 853 5247 (toll free) Webinar ID #876 9127 0986.
- You can log in via your computer. Please visit the [City's website](#) to link to the meeting.

City Council considers written and oral comments equally. [Email comments to Council](#) received by 3pm the date of the meeting will be included in the Council addendum and provided to each council member prior to the meeting. If you prefer to address Council in person, you may attend the meeting either in person or virtually.

- 1. Call to Order & Roll Call**
- 2. Pledge of Allegiance**
- 3. Approval of Agenda**
- 4. Public Comments on Items Not on the Agenda and Items on the Consent Agenda**

Public comments are limited to 3 minutes per speaker. When several people wish to speak on the same position on a given item, Council requests they select a spokesperson to state that position.

- 5. Consent Agenda**

The following items on the City Council Agenda are considered routine by the City Manager and shall be approved, adopted, accepted, etc., by motion of the City Council and voice vote unless the Mayor or a City Council person specifically requests an item be considered under "Regular Business." In such an event the item shall be removed from the "Consent Agenda" and Council action taken separately on said item in the order appearing on the Agenda. Those items so approved under the heading "Consent Agenda" will appear in the Council Minutes in their proper order.

- A. Approval of Minutes**

- B. Resolution No. 16, Series 2026 — A Resolution Approving a First Amendment to the Independent Contractor Agreement with Lighthouse Transportation Group, LLC

6. Council Informational Comments and Committee Reports

7. City Manager's Report

8. Regular Business

- A. Presentation: Xcel Briefing to Louisville City Council

Presentations are informational only. While Council may ask questions and have discussion, no action will be taken by Council. There will be 1 round of public comment.

- B. Presentation: Wildfire and Conflagration Risk Assessment - Louisville Fire Protection District

Presentations are informational only. While Council may ask questions and have discussion, no action will be taken by Council. There will be 1 round of public comment.

- C. Ordinance No. 1917, Series 2026 — An Ordinance Amending Title 17 of the Louisville Municipal Code Concerning Electronic Vehicle ("EV") Charging Stations - 1st Reading, Set Public Hearing

1st Reading includes the Staff Presentation and questions from Council. There is no opportunity for public comment. The Public Hearing (2nd Reading) will be set on this item for a later date. The Public Hearing will allow 2 rounds of public comment.

- D. Ordinance No. 1915, Series 2026 — An Ordinance Amending the City's Development Design Standards and Title 17 of the Louisville Municipal Code to Prohibit Nonfunctional Turf, Artificial Turf, and Invasive Plant Species for Certain New Development and Redevelopment — 2nd Reading, Public Hearing (advertised City of Louisville Website 02/05/2026)

The Public Hearing is opened and 2 rounds of public comment are taken, along with Council questions and discussion. Final action will be taken on this item.

9. City Attorney's Report

10. Upcoming Agenda Items and Identification of Future Agenda Items

11. Adjourn

**Upcoming Agenda Items
March 3, 2026 Meeting**

This list is not inclusive; items are subject to change; additional items may be added.

- DRCOG CPRG Grant Contract
- Boulder Office of Disaster Management IGA
- Fire Restrictions — Concurrent with Boulder County
- Coal Creek Golf Course Fee Approval
- Discussion / Direction — Citywide Defensible Space & WUI Map
- Tentative: Marshall Fire Fee Credit Program - IDF Contract
- EV Charging Facility Zoning Code Update - 2nd Reading

Resident Information

If you wish to speak at the City Council meeting in person, please fill out a sign-up card and present it to the City Clerk at the meeting. If you are attending remotely, please use the “raise hand” icon to show you wish to speak in appropriate public comments section.

Persons planning to attend the meeting who need sign language interpretation, translation services, assisted listening systems, Braille, taped material, or other accommodation should [email the City Clerk's Office](#) or call 303.335.4574.

A forty-eight-hour notice is requested.

Si requiere una copia en español de esta publicación o necesita un intérprete durante la reunión del Consejo, por favor llame a la Ciudad al 303.335.4574 o [email](#)

City Council Special Meeting Minutes

**January 13, 2026
City Hall, Council Chambers
749 Main Street
6:00 PM**

Mayor Leh called the meeting to order at 6:01 p.m. Roll Call was taken, and the following members were present:

City Council: Mayor Chris Leh
Mayor Pro Tem Barbara Hamlington
Councilmember Josh Cooperman
Councilmember Caleb Dickinson – Arrived at 6:02 pm
Councilmember Deborah Fahey
Councilmember Dietrich Hoefner
Councilmember Judi Kern

Staff Present: Diana Langley, City Manager
Samma Fox, Deputy City Manager
Rob Zuccaro, Community Development Director
Jeff Hirt, Planning Manager
Christina Fernandez, Deputy City Clerk
Mindy Olkjer, Executive Assistant

Regular Business

COMPREHENSIVE PLAN PUBLIC REVIEW DRAFT DISCUSSION (00:01:47)

Mayor Leh Introduced the item.

Planning Manager Jeff Hirt provided the staff report.

Council posed several questions which were acknowledged and addressed as part of the discussion.

Public Comment

- Andy Johnson, pooled time with Michelle Frieswyk-Johnson

- Cathern Smith
- Regina Rice
- Kristin Dean
- Billy Martens
- Tamar Krantz
- Cindy Bedell

Council shared their feedback and comments.

Council and staff held an in-depth discussion on the Comprehensive Plan. The conversation included extensive feedback, clarification on public input, and comments on various elements of the plan, with several specific areas highlighted for further review.

Council shared their final comments.

ADJOURN (02:29:40)

Council member Hoefner moved to adjourn the meeting; seconded by Council member Dickinson.

Aye: Leh, Hamlington, Cooperman, Dickinson, Fahey, Hoefner, Kern

Nay: None

Absent: None

Members adjourned at 8:32 pm.

Christopher M. Leh, Mayor

Genny Kline, City Clerk

City Council Special Meeting Minutes

**January 27, 2026
City Hall, Council Chambers
749 Main Street
6:00 PM**

Council member Dickinson called the meeting to order at 6:00 p.m. Roll Call was taken, and the following members were present:

City Council: ***Mayor Chris Leh - Remote
Council member Josh Cooperman
Council member Caleb Dickinson
Council member Deborah Fahey
Council member Dietrich Hoefner
Council member Judi Kern***

Absent: ***Mayor Pro Tem Hamlington***

Staff Present: ***Diana Langley, City Manager
Samma Fox, Deputy City Manager - Remote
Brandi Cummings, Cultural Services Director
Rob Zuccaro, Community Development Director
Genny Kline, City Clerk***

Regular Business

CULTURAL SERVICES UPDATE (00:01:56)

Council member Dickinson introduced the item.

Cultural Services Director Cummings presented the staff report highlighting the Library.

Among the questions Council asked were inquiries regarding Maker Space, digital materials budget, digital lending platforms, Library volunteers, funding resources, and 150/250 anniversary celebrations.

Cultural Services Director continued with the presentation focusing on the Museum.

Council and staff engaged in discussion regarding interviews of residents, space issues, monies received from Historic Preservation Commission, and land acknowledgment regarding the 150/250 anniversary celebrations.

Cultural Services Director Cummings continued with Arts and Events.

Council posed questions which were acknowledged and addressed regarding the Arts and Events Center.

Cultural Services Director Cummings presented what is next for Cultural Services

Public Comment

- Lisa Bair (pooled time)
- Jane Evans
- Judi Dressler
- Vince Dean
- Ani Liggett
- Helen Harrison
- Phyllis Postlewait
- Lynn Berggren
- Dorothy Weiner (pooled time)
- Ken Roberge
- Susan Hanstein
- Shelia Fossen
- Don Parcher

Council shared their comments and feedback.

2026 Council Work Plan Review (01:41:50)

Council member Dickinson Introduced the item.

City Manager Langley presented the staff report with a visual presentation.

Discussion included inquiries related to Economic Vitality proposed items, the Comprehensive Plan, Front & Center Vision, Economic Vitality Committee Policy recommendations, Targeted Development Code and Process Amendments, the Development Code Rewrite, Sundance Film Festival, and McCaslin Corridor.

The council posed several questions, which were acknowledged and addressed as part of the discussion.

City Manager Langley provided the Core Services proposed items – PROS Long-Range Plan and Trails Plan, Website update, WWTP Expansion, Transportation Infrastructure, Advocacy, 2027-2028 Budget and CIP, Xcel Franchise Agreement, move from Core Services to quality-of-life services, Strategic Planning, Historic Preservation Tax, Parks and Open Space Initiatives, Environmental Sustainability Initiatives, and Cultural Services Strategic Planning Initiative.

Council shared their feedback and comments.

City Manager Langley proceeded with the presentation, covering Safety, Housing, General Discussion Items, and Work Plan Decision Points. Council and staff participated in a detailed discussion of the General Discussion Items and the highlighted area of Work Plan Decision Points.

DISCUSSION / DIRECTION: UPCOMING AGENDA ITEMS & IDENTIFICATION OF NEW ONES (03:26:33)

Council member Dickinson introduced the item.

Mayor Leh left the meeting at 9:27 pm.

City Manager Langley presented the agenda items and reviewed the associated dates. Council engaged in an extensive discussion, offering comments, asking questions, and providing input on each item.

ADJOURN (03:47:25)

Council member Hoefner moved the adjourn the meeting; seconded by Council member Kern.

Aye: Cooperman, Dickinson, Fehey, Hoefner, Kern

Nay: None

Absent: Leh, Hamlington

Members adjourned at 9:48 pm.

Christopher M. Leh, Mayor

Genny Kline, City Clerk

Subject: Resolution No. 16, Series 2026 — A Resolution Approving a First Amendment to the Independent Contractor Agreement with Lighthouse Transportation Group, LLC

Date: February 17, 2026

Prepared By: Johnathan Williams, Civil Engineer III

Presented By: Kurt Kowar, Director

Summary:

Staff recommends City Council approval of the first amendment to extend the existing 2024 / 2025 Traffic Signal Maintenance and Emergency Repair contract to Lighthouse Transportation Group for the 2026 maintenance year.

Background / Prior Discussions:

At the December 19, 2023, City Council meeting, Council approved a Traffic Signal Maintenance and Emergency Repair contract with Lighthouse Transportation Group, LLC for calendar years 2024 and 2025.

The contract provides for preventative and routine maintenance, responsive maintenance, inspections, urgent repairs, and other support services associated with the City's traffic signal system. Under the agreement, the contractor furnishes all labor, equipment, testing, materials, and personnel necessary to perform the following scope of work:

- Maintenance and repair of intersection traffic signals and associated traffic control equipment;
- Maintenance and repair of mid block pedestrian signals and associated traffic control equipment;
- Repair of system equipment;
- Repair of signal interconnect and fiber optic system;
- Maintenance and repair of railroad and emergency vehicle preemption equipment;
- Maintenance and repair of speed radar signs, lighted pedestrian crossings (RRFBs) and school zone flashers.

The contract amendment covers a term of one year with a mutual option for contract extension for up to two (2) additional years. The Contract also includes agreed upon rates and costs for unscheduled and emergency repairs along with extra work for the traffic signals and traffic related equipment upgrades. The contractor is permitted a 3% escalation per renewal. Lighthouse has opted not to request an escalation in the contract rates for this amendment and honor the existing 2024/2025 hourly rate.

This contract amendment also allows future amendments to be executed by the City Manager going forward.

Development Proposal:

N/A

Analysis:

Approve the resolution for an amendment to the Independent Contractor Agreement with Lighthouse Transportation Group. Approval of the amendment will allow ongoing maintenance of the City traffic signal system at the same hourly rates identified in the 2024 / 2025 contract.

Council Work Plan:

This item is identified in the 2026 Council Work Plan. The item aligns with the core priority of Traffic Safety identified in the Council Work Plan for 2025.

Fiscal Impact:

Budgeted - funding / resources for this item have been fully budgeted and no amendment is required.

The costs of the Project are accounted for in the following fund:

City Project Funding

Description	Account	Budget Amount
2026 Signal Maintenance	101431-540111	\$170,000.00
TOTAL:		\$170,000.00

Project Expenses

Description	Account	Budget Amount
2026 Signal Maintenance – Lighthouse Agreement	101431-540111	(\$140,000.00)
REMAINING FUNDS:		\$30,000.00

Alternatives:

Council may choose not to approve the contract amendment. In that event, the existing contract would terminate, and staff would need to issue a Request for Proposals (RFP) to solicit new signal maintenance services. Until a new contract is executed, no traffic signal maintenance services would be available for the City's signal system.

Recommendation:

Staff recommends approval of the Resolution for the First Amendment to the Independent Contractor Agreement with Lighthouse Transportation Group, LLC.

Attachments:

1. Resolution No. 16, Series 2026
2. First Amendment - Lighthouse Agreement with Exhibit A-C Partially Executed
3. Lighthouse Agreement - Traffic Signal Maintenance (Executed)

**RESOLUTION NO. 16
SERIES 2026**

A RESOLUTION APPROVING A FIRST AMENDMENT TO THE INDEPENDENT CONTRACTOR AGREEMENT WITH LIGHTHOUSE TRANSPORTATION GROUP, LLC

WHEREAS, a First Amendment to the Independent Contractor Agreement has been proposed between the City and Lighthouse Transportation Group, LLC for Traffic Signal Maintenance and Emergency Repair Services; and

WHEREAS, by this Resolution, the City Council desires to approve such Amendment.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LOUISVILLE, COLORADO:

Section 1. The City Council hereby approves the First Amendment to Independent Contractor Agreement between the City and Lighthouse Transportation Group, LLC for Traffic Signal Maintenance and Emergency Repair Services (the "Amendment") in substantially the same form as the copy of such Amendment accompanying this Resolution.

Section 2. The Mayor is hereby authorized to execute the Amendment on behalf of the City, and the Mayor is hereby further authorized to negotiate and approve such revisions to the Amendment as the Mayor determines are necessary or desirable for the protection of the City, so long as the essential terms and conditions of the Amendment are not altered.

Section 3. As provided in the Amendment, the City Manager is hereby authorized to execute additional amendments to the Independent Contractor Agreement for up to two (2) additional renewal terms.

PASSED AND ADOPTED this ____ day of _____, 2026.

Christopher M. Leh, Mayor

ATTEST:

Genny Kline, City Clerk

**FIRST AMENDMENT TO THE INDEPENDENT CONTRACTOR AGREEMENT BY AND
BETWEEN THE CITY OF LOUISVILLE AND LIGHTHOUSE TRANSPORTATION GROUP, LLC
FOR TRAFFIC SIGNAL MAINTENANCE AND EMERGENCY REPAIR SERVICES**

This FIRST AMENDMENT is made and entered effective as of the ____ day of _____, 2026 by and between the CITY OF LOUISVILLE, a Colorado home rule municipal corporation (the “**City**”), and LIGHTHOUSE TRANSPORTATION GROUP, LLC, a Colorado limited liability company (the “**Contractor**”).

WHEREAS, the City and Contractor are parties to an Independent Contractor Agreement for Traffic Signal Maintenance and Emergency Repair Services dated December 19, 2023 (the “**Agreement**”); and

WHEREAS, Section 6 of the Agreement allows the parties to extend the term of the Agreement for up to three (3) renewal terms of twelve (12) months each; and

WHEREAS, the City and Contractor desire to renew the Agreement for an additional term and to update the City’s representative for the project.

NOW, THEREFORE, in consideration of the foregoing recitals, and other good and valuable consideration, the sufficiency of which is hereby acknowledged, the parties agree as follows:

1. Section 5.1 of the Agreement is hereby amended to change the City’s representative for the project to **Jonathan Williams**.

2. Section 6.1 of the Agreement is hereby amended to read as follows (words added are underlined; words deleted are ~~stricken~~):

6.1 The initial term of this Agreement shall be twenty-four (24) months. The term of this Agreement shall be from the Effective Date to December 31, 2026 ~~December 31, 2025~~, unless sooner terminated pursuant to Section 13, below. By mutual written amendment to this Agreement the parties may extend this Agreement for no more than two (2) ~~three (3)~~ successive renewal terms of twelve (12) months each. Any such amendment to extend for a renewal term may be executed by the City Manager on behalf of the City and shall be executed prior to the expiration of the then-current term and if not so executed, this Agreement shall terminate on the last day of the then-current term. The Contractor’s Services under this Agreement shall commence on the Effective Date and Contractor shall proceed with diligence and promptness so that the Services are completed in a timely fashion consistent with the City’s requirements.

3. Section 19 of the Agreement is hereby amended to update the City’s point of contact for notices as follows:

City of Louisville
Attn: Jonathan Williams
749 Main Street
Louisville, CO 80027
e-mail: jwilliams@louisvilleco.gov

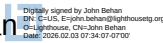
4.. The Agreement, as herein amended by this First Amendment, is hereby ratified and confirmed and remains in full force and effect in accordance with its terms.

IN WITNESS WHEREOF, this First Amendment has been entered into as of the day and year first written above.

CITY OF LOUISVILLE

CONTRACTOR:
LIGHTHOUSE TRANSPORTATION GROUP,
LLC

By: _____
Christopher M. Leh, Mayor

By:  John Behan
John Behan, Member/Manager

ATTEST

Genny Kline, City Clerk

Exhibit A – Scope of Services

Scope of Services

The 2024-2025 Traffic Signal Maintenance and Repairs Maintenance Contract will be used to provide preventative and routine maintenance, responsive maintenance, inspections, urgent repair of equipment, and other support associated with the City's traffic signal system. The Contractor will, in a good and workmanlike manner, furnish all labor, equipment, testing equipment, materials and personnel and do all work necessary and incidental to performing the following scope of work:

- (a) Maintenance and repair of intersection traffic signals and associated traffic control equipment;
- (b) Maintenance and repair of mid-block pedestrian signals and associated traffic control equipment;
- (c) Repair of System Master Equipment;
- (d) Repair of signal interconnect and fiber optic system;
- (e) Maintenance and repair of railroad and emergency vehicle preempt equipment;
- (f) Maintenance and repair of speed radar signs, lighted pedestrian crossings (RRFBs) and school zone flashers; and
- (g) Extra work, as, and if, requested by the City.

The scope of work to be performed is described in two categories:

1. **Regular Maintenance and Repair Work** – Typical work is completed in 1-2 hours and is expected to be completed on a unit price basis, based on type of work.
2. **Less Frequent and More Significant Work** – Typical work is completed within 8-16 hours which may include tasks such as larger repairs, equipment replacements, and response to equipment knockdowns. This scope of services includes emergency assessment of damaged poles resulting from high winds, heavy snow, car crashes, etc. The Contractor shall name their subcontractor identified for non-destructive testing of such poles. This scope does not include regular, systematic structural inspections, which the City will procure separately. Repairs in this category that have a cumulative cost over \$100,000 may not be completed under this contract and may be procured separately. Addition of new signals to the maintenance contract is included in Category 2.

The Contractor will provide these services for all existing and new traffic signals

and traffic control devices and associated equipment owned and/or operated by the City of Louisville.

Special conditions of this scope of services include:

- The Contractor shall guarantee all labor, materials and workmanship incorporated into the work for a period of three years after the date of the City's acceptance of work. If, in the City's opinion, work has not been performed satisfactorily in conformance with the specifications of this Agreement, or if any other deficiencies arise in the work, the City shall notify the Contractor in writing of any deficiencies. The Contractor shall correct the deficiencies within thirty (30) days of receipt of written notice. If the Contractor fails to correct such deficiencies within the allotted time, the City may have such deficiencies corrected at the Contractor's expense and in such case, Contractor shall pay such costs incurred by the City within 30 days of demand. The City shall additionally have the right to issue written notice to the Contractor terminating this Agreement, which note shall state the date of termination and reasons therefor. The City's remedies for Contractor breach shall be cumulative.
- When damage or malfunctions to equipment maintained by the Contractor, but not being actively worked on occurs, which is clearly beyond the control of the Contractor, the City shall pay all costs related to such occurrences at the prices established in this contract, provided suitable evidence has been presented by the Contractor. Such damage may be the result of, but not limited to, the following types of occurrences:
 - Vandalism
 - Vehicle Damage
 - Major Storm
 - Roadway Failures
 - Utility Failures
 - False Calls
 - Construction Damage
 - Equipment Failures
 - Detours
- During the course of maintenance or surveillance, the Contractor is expected to watch for and make other signal repairs that may be needed. However, if a situation is observed that requires repair, and may be billed to the City, approval by the City is required prior to beginning those repairs, except for repairs of an emergency nature.
- All street detours, partial or complete, shall be approved by the City. All

construction and maintenance operations which may create hazards to vehicles, bicyclists, pedestrians, or the workers shall require traffic control devices that conform to the Manual on Uniform Traffic Control Devices (MUTCD), or as required by the City.

- As additional traffic signals are accepted by the City, those locations shall be added to the contract by the City at established prices in this contract. Billing for each additional location will begin the first full month after the location is added. An acceptance inspection of the location shall be performed by the City and Contractor prior to adding a new location to the contract as detailed below.
- It shall be the responsibility of the Contractor to stock materials and parts as may be needed for normal repair of the traffic control equipment. In addition, the Contractor shall stock the necessary controllers, poles, signals and parts necessary to restore an intersection to an operating condition on an emergency basis.
- The City will notify the Contractor in writing when any other contractor is scheduled to do any work at the locations covered under this contract. The said location(s) will temporarily be removed from the contract until the other contractor's work has been accepted by the City and the Contractor at which time the location will be reinstated.

1. TECHNICAL SPECIFICATIONS

TS-1 GENERAL DEFINITIONS

The term "TRAFFIC CONTROL EQUIPMENT" as used in these documents refers to all materials, parts, units, devices, and controls used to equip a device which controls, warns, advises or detects vehicular and/or pedestrian traffic by means of any device which is electrical, electro-mechanical, electronic or other means and includes all individual parts, unit assemblies and controls to achieve the means to control, warn, advise or detect a vehicular and/or pedestrian movement.

TS-2 (INTENTIONALLY LEFT BLANK)

TS-3 ANNUAL PREVENTIVE MAINTENANCE (APM)

Annual preventive maintenance shall be done on an annual basis and completed at each traffic signal location.

The following shall be completed:

1. Documentation: Contractor shall permanently attach on the inside

of each cabinet a plastic envelope, which shall contain at least the following information: cabinet prints, phasing diagram, intersection layout sketch, controller and coordination data sheets.

2. Cabinet: Clean cabinet and components thoroughly, replace disposable filters, clean permanent filters, lubricate locks and hinges, check door seals and re-caulk if necessary. Check cabinet paint. Check and, if necessary, repair the following: thermostat and fan, cabinet light and convenience outlet.

In cases of infestation by mice, etc. the Contractor shall take appropriate safety precautions and immediately remove nesting material and debris. Additional actions shall be taken as necessary to limit the possibility for future infestation.

3. Wiring: Identify and tag all field wires, indicating phase and direction. All detector lead-in shall be properly grounded. All wiring shall be neatly arranged in the cabinet and connections shall be checked.
4. Cabinet Switches: All switches in police door and inside the cabinet shall be checked by Contractor for proper operation; repairs shall be made if necessary. These switches include flash, on/off, stop time, detector test, manual control, etc. Flash transfer relays and associated contacts shall be inspected and replaced if necessary.
5. Controller: Check all controller settings against what is stated on the data sheet and immediately report any discrepancies to the Owner. Check all indicator lamps, LEDS and LCDS for proper operation. Check all clearance intervals with a stopwatch. Observe dynamic operation, ensuring all functions to be operating properly. Check back-up batteries if applicable.
6. Conflict Monitor / MMU: Check voltage monitor operation by turning off, or disconnecting, controller. Check red fail operation by removing a load switch or flash transfer relay. Check for conflicts and conformance to NEMA specifications.

Computerized testing using an ATSI approved tester may be performed at the Owner's request and charged as per unit pricing. Computerized test results shall include monitor location, manufacturer, model, serial number, tests completed, and test date. The technician shall review these results and check for conformance with tester standards. Copies of test results shall be left in the cabinet.

7. Coordination: Check telephone and fiber lines, interconnect, and all associated equipment for proper operation. Check for proper controller manipulation by use of holds, force off, max 2, etc. Check all settings per data sheet. Check clock on coordination equipment and reset if necessary. Check back-up batteries.
8. Preempt: Test railroad preempt for proper operation, with test switch or by removing or jumping input as required. Check Opticom equipment by use of emitter from proper distance.
9. Detection: Check for proper operation of all vehicle detection.

Inductance Loops – Check all loop and micro-loop splices and re-splice and re-seal connections as necessary. Check detector amplifier settings (vary frequency to prevent cross talk). Re-tune if necessary and observe operation. Check the extend and delay functions, if applicable. Check pavement for problems which may accelerate loop failure. Reseal loops within pavement as necessary. Report all pavement failures to the Owner.

Video Detection – Check cameras for proper alignment. Check video quality. Make adjustments as necessary.

10. Signal Heads: Check all signal heads for proper height and alignment, check for damaged housings, lenses, reflectors, visors, burned out bulbs or LEDs and worn mounting hardware and report problems to the Owner.
11. Poles: Check poles for damage, need of paint. Check for missing hand-hole covers, nut covers or missing nuts and replace if necessary. Check alignment and general conditions. Report any problems to the Owner.
12. Mast arms: Check mast arms for damage, need of paint, alignment, and general condition. Report any problems to the Owner. Check for missing or damaged hardware and covers, and replace if necessary.
13. Span-wire: Check all top and bottom span-wires for excessive slack, sag, damage, fraying and proper height, adjust as necessary. Check all eyebolts, strand vices, hangers, hardware, signs, etc. for damage or excessive wear and report problems to the Owner.

14. Pull-boxes: Check all pull-boxes for missing or broken lids and replace if necessary. Check for proper height. Check wiring in all pull-boxes, re-splice and re-seal connections as necessary.
15. Push buttons: Check all pedestrian signs. Check pedestrian push buttons for proper operation, secure mounting, proper location and general condition. Repair as necessary.
16. Voltage and Current Readings: Check and record the controller +24VDC, total intersection current and the A. C. line voltage.
17. Annual Inventory: A written copy of the inventory of each location shall be provided to the Owner. The Contractor shall provide the appropriate information regarding the items listed on the intersection inventory sheet. Contractor shall update Exhibit A (signal inventory).
18. Repair Report: All hazardous conditions shall be corrected immediately. The Contractor shall supply the Owner with a detailed report of work done and work required for each location at which an Annual Preventive Maintenance has been completed.

TS-4 QUARTERLY PREVENTIVE MAINTENANCE (QPM)

Quarterly preventive maintenance shall be done on a quarterly basis and completed at each traffic signal location. A Quarterly Preventive Maintenance shall not be scheduled or performed at locations during the quarter for which an Annual Preventive Maintenance is scheduled.

Payment shall be executed after completion of an operation check of the following:

1. Cabinet Fan
2. Controller/Coordination
3. Conflict Monitor Indications
4. Flasher Circuits
5. Signal Timing
6. Time Base Clocks
7. Vehicle Detectors
8. Signal Indications
9. Signal Alignment
10. Pedestrian Push Buttons

11. Remove Graffiti / Tape
12. Remove Unauthorized Signs

REPAIRS: All hazardous conditions shall be corrected immediately. A worksheet documenting all work done and work required for each location shall be submitted.

TS-5 FLASHERS AND BEACONS

Prior to the beginning of each school year or other time designated by the Owner, each location will be reprogrammed for the coming school year and the following checks shall be performed at that time.

1. Check conditions of signs, poles, signal heads, and cabinet.
2. Clean lenses, reflectors, signs, and cabinet as necessary.
3. Check operation of clock, flasher, and signals.
4. Check for obstruction by trees, bushes, etc.
5. Check signals and signs for proper alignment, realign and secure as necessary.
6. Replace bulbs as necessary.
7. Submit a report to the Owner indicating all findings.

TS-6 PEDESTRIAN CROSSING

Once per year, Annual Preventive Maintenance (APM) checks shall be completed at each automated pedestrian crossing (RRFBs, etc.). The following checks shall be performed at that time:

1. Verify general operation
2. Check condition of cabinet, poles, signs, and indications
3. Check pull box splices and re-splice where necessary
4. Clean cabinet, lenses, LED strobes, reflectors, and signs as necessary
5. Check signals and signs for proper alignment
6. Check for obstruction by trees, bushes, etc.
7. Observe crosswalk markings and report excessive deterioration to the Owner
8. Submit a report to the Owner indicating all findings

TS-7 SPEED RADAR SIGNS

Once per year, Annual Preventive Maintenance (APM) checks shall be completed at each speed radar sign. The following checks shall be performed at that time:

1. Verify general operation
2. Check condition of poles, cabinet, and signs
3. Check accuracy of speed display with the use of the manufacturer

supplied tuning fork

4. Check limit settings based on posted speeds and Owner specification
5. Check signs for proper alignment
6. Clean display and signs as necessary
7. Check for obstruction by trees, bushes, etc.
8. Submit a report to the Owner indicating all findings

TS-8 ANNUAL LIGHT BULB CHANGE

All incandescent signal light bulbs at each traffic signal location will be replaced annually, costs will be charged per the Unit Cost schedule in Exhibit B. All burned out bulbs will be replaced by the Contractor at no cost to the Owner for the duration of the contract. Reported burned out bulbs will be replaced by the end of the following working day.

TS-9 SYSTEM REPORT REVIEW AND ANALYSIS

One time per year, in the month of July, the Contractor shall review all trouble call and extra work completion records in relation to the Owner's traffic signals and traffic system as a whole. These records shall span the previous 12 months and be analyzed by the Contractor to pinpoint specific historic problem areas, assess existing conditions of the individual signals and system, and define relevant signal and system upgrades. This analysis shall ensure special attention is paid to upgrades completed during the said 12-month period. A report shall be provided to the Customer which outlines specific areas of concern, defines solution options for repetitive problems, defines relevant upgrade options, and provides recommendations by the Contractor; assessment of the apparent effectiveness of upgrades completed during the said 12-month period shall also be provided.

In cases where the Contractor does not have access to the specified records, it shall be the Owner's responsibility to provide these records to the Contractor.

TS-10 UNSCHEDULED AND EMERGENCY REPAIRS

All malfunctions, and/or damage, which render the signal inoperable, or which constitute a serious hazard or inconvenience to the public shall be considered an emergency. Any damage which in the opinion of the City or other authorized persons constitutes a serious hazard to the public shall be considered an emergency. In such instances, the Contractor shall respond to the site within two hours from the time the report was received by the Contractor. Such malfunctions or damage may include, but not necessarily be limited to, situations where:

1. All red indications are out including bulbs, lenses, or LEDs, for any one traffic movement
2. Signal heads give confliction indications to any intersection approach

3. A signal has been knocked down

In instances of unscheduled repairs that are not of an emergency nature, such repairs shall be undertaken at the site within one working day, or other Owner approved schedule, after the Owner notifies Contractor of the needed repair.

All repairs shall be paid for on a time and material basis. If it is determined that an emergency repair stems from improper maintenance as identified in the quarterly and annual preventive maintenance tasks, the Contractor shall not be reimbursed for correcting the problem.

TS-11 EXTRA WORK

The term "extra work" shall be understood to mean and to include all work that may be required by the Owner which is not preventive maintenance or unscheduled and emergency repair work. This work is non-emergency in nature and will be done at a mutually agreed upon price established prior to starting work. Unauthorized extra work will not be paid for. Examples of extra work may include, but not be limited to, the following:

1. Modifications to an existing signalized intersection. This would typically describe intersection reconstruction requiring the relocation of all or part of the existing signal equipment. This would also include the installation of signal equipment not presently found at an existing signalized intersection. (Example: The installation of loop or video detectors, fire preemption).
2. Installation of equipment and/or materials for a new signal installation location, either complete or partial.
3. Changes in signal timing.
4. Painting of mast-arms, span-wire poles, control cabinets, signal heads and visors.
5. Installation of school speed limit flashers and warning beacons.

TS-12 TIME AND MATERIALS PROPOSAL

For any installations or extra work, the Contractor may submit a proposal for acceptance or rejection by the Owner. The proposal shall include estimated time, equipment, and materials. If the proposal is accepted by the Owner, the installation or extra work would be performed by the Contractor on a time and materials basis for a price not to exceed that set forth in the proposal. Changes by the Owner, which occur after the proposal has been submitted, will be considered as changes to the proposal.

TS-13 RECORDS OF MAINTENANCE

A current detailed report of all scheduled maintenance, unscheduled maintenance, repairs, and extra work will be supplied to the Owner on a monthly basis and upon demand when required. Records shall be in a convenient and easily understood format and shall include at a minimum the location, name, and agency reporting the problem or requesting the work, the time and date that the call was received, description of the work completed, and the time and date the work was completed. All such records submitted to the City shall become the property of the City. The City and its duly authorized representatives shall have access to any other records, documents, papers, and books of the Contractor that are related to this contract for the purpose of making audits, examination, excerpts, and transcriptions. Original copies shall be maintained in electronic format for the duration of this Contract.

TS-14 TIMING CHANGES

No timing changes shall be made by the Contractor unless authorized by the City except in an emergency situation such as loop failure, push button failure, emergency detour etc. The City shall be notified of such changes on the next normal working day.

2. PROCESS FOR ISSUING TASK ORDERS

The Contractor shall designate one representative (provide emergency contact number) to be available at all times (24/7/365) to the City's Project Manager for consultation and to respond to requests. The City expects that regular repair / maintenance (Category 1) task order requests will be issued on average once per week, however there is no guarantee and tasks will vary depending on trouble calls. Work under Category 2 will be naturally random, as incidents occur. For work under Category 1, the Contractor will perform the work at the unit costs proposed in Exhibit B determined in the proposal.

Category 1 Task Order Requests

The City will issue Category 1 Task Order requests, which will contain the following information:

- Date of the request and requestor
- Task order request identification number
- Location(s) of work to be done (including quadrant of intersection and plans if available)
- Items of work to be completed
- Photos to help explain the scope of work, if available
- An expected cost for the work, based on the accepted rates in the agreement

- A description, if applicable, of work that is to be done that is **not** described in the agreed- upon bid items (see below for explanation)
- An expected number of working days for the work to be completed

The task order request will come in written format, typically via email addressed to the primary contact for the Contractor. The Contractor is expected to respond within 24 hours. The Contractor will describe their cost for any work that is **not** described in the agreed-upon bid items (if applicable), provide a total cost for the work, provide edits to the requested schedule if applicable, sign the request and send back to the City. The City will review, consider the edits and modifications and either issue the request to another Contractor or countersign and send back to the Contractor within 24 hours. Upon sending the countersigned task order, the counting of working days begins.

The Contractor shall provide a 24-hour, 365-day call line to City of Louisville staff to report trouble calls and create task orders. This service shall be available to all City of Louisville employees, including the City of Louisville Police Department to report routine, but critical trouble calls such as, but not limited to flashing signals, lights not working, burned out bulbs, pedestrian push buttons, and dark signals. Emergency Work shall be performed within two hours of notification; however, during inclement weather additional time will be allowed.

Category 2 Task Order Requests

For work under Category 2, the City will provide a proposal pricing request to the Contractor. The Contractor is expected to review and, in good faith, submit comprehensive prices for each such request within ten (10) consecutive calendar days of the date of issuance of such request. The Contractor will be required to perform the work at a price and schedule established prior to starting the work. The City may designate a shorter response time depending on the nature of the work. The City, at its sole discretion, will decide whether to proceed with the task order.

The manner in which the work will be identified and assigned will be as follows:

- Individual projects will be identified and their specific scope of work will be explained in with a detailed work description, drawings, plans, specifications, the specific terms and conditions under which such work must be performed, and other pertinent materials issued to the Contractor in the form of a Category 2 Task Order Pricing Request.
- Contractor will thoroughly review the scope of work and provide a price in the format provided by the City and a project schedule responsive to each Task Order Request. The unit prices must be used for all work

that corresponds with the unit price descriptions proposed and included in Exhibit B. Work elements that are not covered by any unit prices shall be priced using the format and cost categories for labor, material, and equipment specified in Exhibit C herein. Each task order shall outline the work to be performed, a schedule that defines the work including start and end dates, and the associated fee that includes a breakdown of labor hours, material cost, and other details that may be requested by the City.

- Upon receipt of the Task Order Pricing Request worksheet from the Contractor, negotiation of non-unit price items and agreement on the total price, schedule, and any other specific requirements for the requested scope of work, the City will issue a work order for the specific project under the terms and conditions set forth therein and encumbering funds for such work. The City reserves the right to issue such a work order at the price and under the terms of the Contractor's pricing submittal, at any time before the expiration of 120 consecutive calendar days from the date the pricing submittal was received by the City. If no work order is issued and the pricing submittal is not rejected within this period, the Contractor's pricing submittal shall be deemed rejected by the City.
- Upon receipt of a task work order notice to proceed, the Contractor shall have a set number of days to commence the work as described in this section, or as agreed upon with the City.
- During the course of the work on each task order, the Contractor shall submit regular status updates and pay applications. The City shall issue payment for work completed in accordance with the terms and conditions of the contract documents.
- If additions, deletions, or other modifications to the scope of work is required or desired by the City on a particular project authorized by a task order, a task order change will be issued based on pricing prepared in the same manner described in the Task Order Request and under the terms and conditions of the Independent Contractor Agreement. The work order change will identify any increase or decrease in the cost, change in the period of performance and any other modifications to the performance requirements for that particular work order. Upon receipt of a work change order, the Contractor shall have ten (10) consecutive calendar days to commence the work, unless the City has agreed to a different schedule with the Contractor.

Adding signals to the maintenance contract shall follow the following procedure:

1. City shall notify Contractor in writing giving location and type of traffic signal.
2. Contractor shall within ten (10) calendar days of notice inspect the intersection and notify City in writing of any deficiencies in the installation.
3. When said deficiencies have been corrected, Contractor shall notify City that the signal installation is accepted for maintenance, and from the date of such notice to the City the installation shall thereafter be subject to all terms of the On-Call Traffic Signal Maintenance Contract.

Certain work issued by a task order may require additional license or certification. If an additional license or certification is needed, it will be identified in the task order. For work on task orders with a scope not covered by staff in the proposal, the Contractor may bring on additional sub-consultants

COST

The rates provided in Exhibits B and C will be used for the initial two-year Contract period. A 3% annual escalation in pricing will be considered in the third and subsequent years that the contract is extended.

In pricing a request, the bid unit prices provided are for full compensation for the work identified in the unit price description and corresponding specification section, as well as all costs associated with overhead, and any other direct or indirect costs of the work not specifically excluded. In pricing the work in a request not already identified in the unit costs, the Contractor shall provide itemized and sufficient supporting data, including calculations, measurements, cost records, production rates, equipment types and capacity, labor costs by craft and other information which the City may reasonably require in order for the City to evaluate the Contractor's pricing for work not covered by unit prices for any proposal request and work order change pricing.

Direct labor costs shall only include the cost associated with the worker who performed the work (including fringe benefits, and the Contractors actual cost for workers compensation, social security, and payroll taxes). The costs of supervision, management, and field or office overhead costs shall not be included or calculated as direct labor cost. For shop or plant components of the work, the direct labor cost shall include only the workers who work directly on the item being manufactured or the actual operators of the equipment being used to handle the items being manufactured.

Exhibit B – Maintenance, Repair, and Support Unit Costs

CATEGORY 1: Regular Maintenance and Repair Work			
Item No.	Item	Unit of Measure	Lighthouse Cost
<u>Preventative and Routine Maintenance</u>			
2	TS-3 Annual Preventative Maintenance (each traffic signal)	Each	\$ 1,000.00
3	TS-4 Quarterly Preventative Maintenance (each traffic signal)	Each	\$ 500.00
4	TS-5 Flasher and Beacon Programming and Checking (each beacon)	Each	\$ 100.00
5	TS-6 Pedestrian Crossing APM (each pedestrian crossing)	Each	\$ 250.00
6	TS-7 Speed Radar Signs (each sign)	Each	\$ 100.00
7	TS-9 System Report Review and Analysis	Lump Sum	\$ 1,000.00
8	Controller Cabinet Service (each traffic signal)	Each	\$ 250.00
9	Furnish and test Type P NEMA TS-2 Controller Cabinet	Each	\$ 20,000.00
10	Weekly checks of central system (Econolite Centracs) logs, alerts and general operating condition	Each	\$ -
11	Furnish, install timings and bench-test Econolite Cobalt NEMA TS-2 Type 1 controller	Each	\$ 1,000.00
12	TS-8 Replace incandescent signal light bulbs	Each	\$ 250.00
<u>Repair Work</u>			
13	Intersection Luminaire Replacement (each head)	Each	\$ 1,250.00
14	Repaint traffic signal pole (up to 30 ft)	Each	\$ 2,500.00
15	Remove and dispose of traffic signal equipment associated with one pole including pole, signal equipment and signs	Each	\$ 1,000.00
16	Furnish and install LED vehicle signal module	Each	\$ 250.00
17	Furnish and install LED vehicle signal head (3 Section)	Each	\$ 250.00
18	Furnish and install LED pedestrian signal countdown head	Each	\$ 250.00
19	Furnish and install vehicle signal backplate	Each	\$ 250.00
20	Furnish and install vehicle signal backplate w/retroreflective border	Each	\$ 250.00
21	Furnish and install flexible, retroreflective backplate	Each	\$ 250.00
22	Install flexible, retroreflective backplate	Each	\$ 100.00
23	Replace existing backplate with flexible, retroreflective backplate	Each	\$ 250.00
24	Furnish and install traffic signal visor	Each	\$ 250.00
25	Furnish and Install pedestrian push button (non-APS)	Each	\$ 500.00
26	Furnish and Install, configure, and test APS	Each	\$ 1,500.00
27	Install, configure, and test APS	Each	\$ 1,000.00
28	Replace pull box / junction box lid	Each	\$ 2,000.00
29	Inspect video detection configuration, modify detection zones, configure system settings, confirm proper operation	Per Approach	\$ 250.00
30	Cut in new inductive loops (one lane / 6'x40' quad presence loop)	Each	\$ 4,000.00
31	Cut in new inductive loops (one lane / advance loops only)	Each	\$ 2,500.00
32	Traffic signal turn-on support: go through punchlist, test all indications and detectors, test that timing matches timing sheet	Lump Sum	\$ 1,000.00
33	Furnish and install one 12-conductor #14AWG in existing conduit	Per LF	\$ 3.00
34	Replace existing controller in the field with new, bench-tested controller (not including furnishing or testing the controller)	Each	\$ 500.00
35	Replace existing cabinet in the field with new, bench-tested cabinet (not including furnishing or testing the cabinet)	Each	\$ 10,000.00
<u>Other</u>			
36	Cabinet testing and "burn-in"	Each	\$ 1,000.00
37	Furnish, install (including CAT 5 cabling), configure and test all-in-one video detection system (Miovision or equivalent)	Each	\$ 30,000.00
38	Install (including CAT 5 cabling), configure and test all-in-one video detection system (Miovision or equivalent)	Each	\$ 5,000.00
39	Furnish, install, configure, and test emergency vehicle pre-emption system (Opticom, or equivalent)	Each	\$ 25,000.00
40	Install, configure, and test emergency vehicle pre-emption system (Opticom, or equivalent)	Each	\$ 5,000.00
41	Furnish, install, configure, and test Battery Backup System, including cabinet, batteries and controller (Alpha UPS or equivalent)	Each	\$ 10,000.00
42	Install, configure, and test Battery Backup System, including cabinet, batteries and controller (Alpha UPS or equivalent)	Each	\$ 2,500.00
43	Completion of CDOT SB 8 Inspection Report for CDOT owned, and Louisville operated and maintained signals	Each	\$ 500.00

Exhibit C – Equipment and Staff Rates

EXHIBIT C: EQUIPMENT AND STAFF RATES

AUTHORIZED TIME AND MATERIAL COST

Item No.	Item	Unit of Measure	Lighthouse Cost
<u>Equipment</u>			
1	Bucket Truck	Hourly	\$ 50.00
2	Dump Truck	Hourly	\$ 50.00
3	Crane truck	Hourly	\$ 150.00
4	Pickup Truck, 1 Ton	Hourly	\$ 50.00
5	Generator, 3000W	Hourly	\$ 25.00
6	Conduit Rockwheel / Rocksaw, 6" (30" depth)	Hourly	\$ 25.00
7	Directional Drill Rig	Hourly	\$ 500.00
8	Excavator	Hourly	\$ 50.00
9	Jackhammer	Hourly	\$ 25.00
<u>Personnel Hourly Rate</u>			
10	Supervisor / Project Manager	Hourly	\$ -
11	Project Coordinator / Administrator	Hourly	\$ -
12	Lead Signal Maintenance Technician	Hourly	\$ 100.00
13	Signal Maintenance Technician	Hourly	\$ 100.00
14	Other IMSA Level III Technician	Hourly	\$ 100.00
15	Other IMSA Level II Technician	Hourly	\$ 100.00
16	Other IMSA Level I Technician	Hourly	\$ 100.00
17	Fiber Optic Technician	Hourly	\$ 200.00
18	Data Communications Technician	Hourly	\$ 100.00
19	Operator	Hourly	\$ 100.00
20	Laborer	Hourly	\$ -

**INDEPENDENT CONTRACTOR AGREEMENT
BY AND BETWEEN THE CITY OF LOUISVILLE
AND LIGHTHOUSE TRANSPORTATION GROUP, LLC
FOR TRAFFIC SIGNAL MAINTENANCE AND
EMERGENCY REPAIR SERVICES**

1.0 PARTIES

This INDEPENDENT CONTRACTOR AGREEMENT (this "Agreement") is made and entered into this 19th day of December, 2023 (the "Effective Date"), by and between the **City of Louisville**, a Colorado home rule municipal corporation, hereinafter referred to as the "City", and Lighthouse Transportation Group, a Limited Liability Company, hereinafter referred to as the "Contractor".

2.0 RECITALS AND PURPOSE

- 2.1 The City desires to engage the Contractor for the purpose of providing **Traffic Signal Maintenance and Emergency Repair** services as further set forth in the Contractor's Scope of Services (which services are hereinafter referred to as the "Services").
- 2.2 The Contractor represents that it has the special expertise, qualifications and background necessary to complete the Services.

3.0 SCOPE OF SERVICES

The Contractor agrees to provide the City with the specific Services and to perform the specific tasks, duties and responsibilities set forth in Scope of Services attached hereto as Exhibit "A" and incorporated herein by reference. Contractor shall furnish all tools, labor and supplies in such quantities and of the proper quality as are necessary to professionally and timely perform the Services. Contractor acknowledges that this Agreement does not grant any exclusive privilege or right to supply Services to the City.

4.0 COMPENSATION

- 4.1 The City shall pay the Contractor for Services under this Agreement a total not to exceed the amounts set forth in Exhibit "A" attached hereto and incorporated herein by this reference. For Services compensated at hourly or per unit rates, or on a per-task basis, such rates or costs per task shall not exceed the amounts set forth in Exhibit B and Exhibit C. The City shall not pay mileage and other reimbursable expenses (such as meals, parking, travel expenses, necessary memberships, etc.), unless such expenses are (1) clearly set forth in the Scope of Services, and (2) necessary for performance of the Services ("Pre-Approved Expenses"). The foregoing amounts of compensation shall be inclusive of all costs of whatsoever nature associated with the Contractor's efforts, including but not limited to salaries, benefits, overhead, administration, profits, expenses, and outside Contractor fees. The Scope of Services and payment therefor shall only be changed by a properly authorized amendment to this Agreement. No City employee has the authority to bind the City with regard to any payment for any Services which exceeds the amount payable under the terms of this Agreement.
- 4.2 The Contractor shall submit monthly an invoice to the City for Services rendered and a detailed expense report for Pre-Approved Expenses incurred during the previous month.

The invoice shall document the Services provided during the preceding month, identifying by work category and subcategory the work and tasks performed and such other information as may be required by the City. The Contractor shall provide such additional backup documentation as may be required by the City. The City shall pay the invoice within thirty (30) days of receipt unless the Services or the documentation therefor are unsatisfactory. Payments made after thirty (30) days may be assessed an interest charge of one percent (1%) per month unless the delay in payment resulted from unsatisfactory work or documentation therefor.

5.0 PROJECT REPRESENTATION

- 5.1 The City designates Geoff Nettleton as the responsible City staff to provide direction to the Contractor during the conduct of the Services. The Contractor shall comply with the directions given by Geoff Nettleton and such person's designees.
- 5.2 The Contractor designates John Behan as its project manager and as the principal in charge who shall be providing the Services under this Agreement. Should any of the representatives be replaced, particularly John Behan, and such replacement require the City or the Contractor to undertake additional reevaluations, coordination, orientations, etc., the Contractor shall be fully responsible for all such additional costs and services.

6.0 TERM

- 6.1 The initial term of this Agreement shall be twenty-four (24) months. The term of this Agreement shall be from the Effective Date to **December 31, 2025**, unless sooner terminated pursuant to Section 13, below. By mutual written amendment to this Agreement the parties may extend this Agreement for no more than three (3) successive renewal terms of twelve (12) months each. Any such amendment to extend for a renewal term shall be executed prior to the expiration of the then-current term and if not so executed, this Agreement shall terminate on the last day of the then-current term. The Contractor's Services under this Agreement shall commence on the Effective Date and Contractor shall proceed with diligence and promptness so that the Services are completed in a timely fashion consistent with the City's requirements.
- 6.2 Nothing in this Agreement is intended or shall be deemed or construed as creating any multiple-fiscal year direct or indirect debt or financial obligation on the part of the City within the meaning of Colorado Constitution Article X, Section 20 or any other constitutional or statutory provision. All financial obligations of the City under this Agreement are subject to annual budgeting and appropriation by the Louisville City Council, in its sole discretion. Notwithstanding anything in this Agreement to the contrary, in the event of non-appropriation, this Agreement shall terminate effective December 31 of the then-current fiscal year.

7.0 INSURANCE

- 7.1 The Contractor agrees to procure and maintain, at its own cost, the policies of insurance set forth in Subsections 7.1.1 through 7.1.4. The Contractor shall not be relieved of any liability, claims, demands, or other obligations assumed pursuant to this Agreement by reason of its failure to procure or maintain insurance, or by reason of its failure to procure or maintain insurance in sufficient amounts, durations, or types. The coverages required below shall be procured and maintained with forms and insurers acceptable to the City.

All coverages shall be continuously maintained from the date of commencement of Services hereunder. The required coverages are:

- 7.1.1 Workers' Compensation insurance as required by the Labor Code of the State of Colorado and Employers Liability Insurance. Evidence of qualified self-insured status may be substituted.
 - 7.1.2 General Liability insurance with minimum combined single limits of \$1,000,000 each occurrence and \$2,000,000 aggregate. The policy shall include the City of Louisville, its officers and its employees, as additional insureds, with primary coverage as respects the City of Louisville, its officers and its employees, and shall contain a severability of interests provision.
 - 7.1.3 Comprehensive Automobile Liability insurance with minimum combined single limits for bodily injury and property damage of not less than \$400,000 per person in any one occurrence and \$1,000,000 for two or more persons in any one occurrence, and auto property damage insurance of at least \$50,000 per occurrence, with respect to each of Contractor's owned, hired or non-owned vehicles assigned to or used in performance of the Services. If the Contractor has no owned automobiles, the requirements of this paragraph shall be met by each officer or employee of the Contractor providing services to the City of Louisville under this contract.
- 7.2 The Contractor's general liability insurance and automobile liability and physical damage insurance shall be endorsed to include the City, and its elected and appointed officers and employees, as additional insureds, unless the City in its sole discretion waives such requirement. Every policy required above shall be primary insurance, and any insurance carried by the City, its officers, or its employees, shall be excess and not contributory insurance to that provided by the Contractor. Such policies shall contain a severability of interests provision. The Contractor shall be solely responsible for any deductible losses under each of the policies required above.
- 7.3 Certificates of insurance shall be provided by the Contractor as evidence that policies providing the required coverages, conditions, and minimum limits are in full force and effect, and shall be subject to review and approval by the City. No required coverage shall be cancelled, terminated or materially changed until at least 30 days prior written notice has been given to the City. The City reserves the right to request and receive a certified copy of any policy and any endorsement thereto.
- 7.4 Failure on the part of the Contractor to procure or maintain policies providing the required coverages, conditions, and minimum limits shall constitute a material breach of contract upon which the City may immediately terminate this Agreement, or at its discretion may procure or renew any such policy or any extended reporting period thereto and may pay any and all premiums in connection therewith, and all monies so paid by the City shall be repaid by Contractor to the City upon demand, or the City may offset the cost of the premiums against any monies due to Contractor from the City.
- 7.5 The parties understand and agree that the City is relying on, and does not waive or intend to waive by any provision of this contract, the monetary limitations or any other rights, immunities, and protections provided by the Colorado Governmental Immunity Act, § 24-10-101 et seq., C.R.S., as from time to time amended, or otherwise available to the City, its officers, or its employees.

8.0 INDEMNIFICATION

To the fullest extent permitted by law, the Contractor agrees to indemnify and hold harmless the City, and its elected and appointed officers and its employees, from and against all liability, claims, and demands, on account of any injury, loss, or damage, which arise out of or are connected with the Services hereunder, if such injury, loss, or damage is caused by the negligent act, omission, or other fault of the Contractor or any subcontractor of the Contractor, or any officer, employee, or agent of the Contractor or any subcontractor, or any other person for whom Contractor is responsible. The Contractor shall investigate, handle, respond to, and provide defense for and defend against any such liability, claims, and demands. The Contractor shall further bear all other costs and expenses incurred by the City or Contractor and related to any such liability, claims and demands, including but not limited to court costs, expert witness fees and attorneys' fees if the court determines that these incurred costs and expenses are related to such negligent acts, errors, and omissions or other fault of the Contractor. The City shall be entitled to its costs and attorneys' fees incurred in any action to enforce the provisions of this Section 8.0. The Contractor's indemnification obligation shall not be construed to extend to any injury, loss, or damage which is caused by the act, omission, or other fault of the City.

9.0 QUALITY OF WORK

Contractor's Services shall be performed in accordance with the highest professional workmanship and service standards in the field to the satisfaction of the City.

10.0 INDEPENDENT CONTRACTOR

It is the expressed intent of the parties that the Contractor is an independent contractor and not the agent, employee or servant of the City, and that:

- 10.1. **CONTRACTOR SHALL SATISFY ALL TAX AND OTHER GOVERNMENTALLY IMPOSED RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, PAYMENT OF STATE, FEDERAL AND SOCIAL SECURITY TAXES, UNEMPLOYMENT TAXES, WORKERS' COMPENSATION AND SELF-EMPLOYMENT TAXES. NO STATE, FEDERAL OR LOCAL TAXES OF ANY KIND SHALL BE WITHHELD OR PAID BY THE CITY.**
- 10.2. **CONTRACTOR IS NOT ENTITLED TO WORKERS' COMPENSATION BENEFITS EXCEPT AS MAY BE PROVIDED BY THE INDEPENDENT CONTRACTOR NOR TO UNEMPLOYMENT INSURANCE BENEFITS UNLESS UNEMPLOYMENT COMPENSATION COVERAGE IS PROVIDED BY THE INDEPENDENT CONTRACTOR OR SOME ENTITY OTHER THAN THE CITY.**
- 10.3. Contractor does not have the authority to act for the City, or to bind the City in any respect whatsoever, or to incur any debts or liabilities in the name of or on behalf of the City.
- 10.4. Contractor has and retains control of and supervision over the performance of Contractor's obligations hereunder and control over any persons employed by Contractor for performing the Services hereunder.
- 10.5. The City will not provide training or instruction to Contractor or any of its employees regarding the performance of the Services hereunder.

- 10.6. Neither the Contractor nor any of its officers or employees will receive benefits of any type from the City.
- 10.7. Contractor represents that it is engaged in providing similar services to other clients and/or the general public and is not required to work exclusively for the City.
- 10.8. All Services are to be performed solely at the risk of Contractor and Contractor shall take all precautions necessary for the proper and sole performance thereof.
- 10.9. Contractor will not combine its business operations in any way with the City's business operations and each party shall maintain their operations as separate and distinct.

11.0 ASSIGNMENT

Contractor shall not assign or delegate this Agreement or any portion thereof, or any monies due to or become due hereunder without the City's prior written consent.

12.0 DEFAULT

Each and every term and condition hereof shall be deemed to be a material element of this Agreement. In the event either party should fail or refuse to perform according to the terms of this Agreement, such party may be declared in default.

13.0 TERMINATION

- 13.1 This Agreement may be terminated by either party for material breach or default of this Agreement by the other party not caused by any action or omission of the other party by giving the other party written notice at least thirty (30) days in advance of the termination date. Termination pursuant to this subsection shall not prevent either party from exercising any other legal remedies which may be available to it.
- 13.2 In addition to the foregoing, this Agreement may be terminated by the City for its convenience and without cause of any nature by giving written notice at least fifteen (15) days in advance of the termination date. In the event of such termination, the Contractor will be paid for the reasonable value of the Services rendered to the date of termination, not to exceed a pro-rated daily rate, for the Services rendered to the date of termination, and upon such payment, all obligations of the City to the Contractor under this Agreement will cease. Termination pursuant to this Subsection shall not prevent either party from exercising any other legal remedies which may be available to it.

14.0 INSPECTION AND AUDIT

The City and its duly authorized representatives shall have access to any books, documents, papers, and records of the Contractor that are related to this Agreement for the purpose of making audits, examinations, excerpts, and transcriptions.

15.0 DOCUMENTS

All computer input and output, analyses, plans, documents photographic images, tests, maps, surveys, electronic files and written material of any kind generated in the performance of this

Agreement or developed for the City in performance of the Services are and shall remain the sole and exclusive property of the City. All such materials shall be promptly provided to the City upon request therefor and at the time of termination of this Agreement, without further charge or expense to the City and in hardcopy or an electronic format acceptable to the City, or both, as the City shall determine. Contractor shall not provide copies of any such material to any other party without the prior written consent of the City. Contractor shall not use or disclose confidential information of the City for purposes unrelated to performance of this Agreement without the City's written consent.

16.0 ENFORCEMENT

- 16.1 In the event that suit is brought upon this Agreement to enforce its terms, the parties shall each bear and be responsible for their own attorneys' fees and court costs.
- 16.2 This Agreement shall be deemed entered into in Boulder County, Colorado, and shall be governed by and interpreted under the laws of the State of Colorado. Any action arising out of, in connection with, or relating to this Agreement shall be filed in the courts of Boulder County or the federal district court for the District of Colorado, and in no other court. [If out of state contractor: Contractor hereby waives its right to challenge the personal jurisdiction of the courts of Boulder County and the federal district court for the District of Colorado over it.] Colorado law shall apply to the construction and enforcement of this Agreement.

17.0 COMPLIANCE WITH LAWS

Contractor shall be solely responsible for compliance with all applicable federal, state, and local laws, including the ordinances, resolutions, rules, and regulations of the City; for payment of all applicable taxes; and obtaining and keeping in force all applicable permits and approvals.

18.0 INTEGRATION AND AMENDMENT

This Agreement represents the entire Agreement between the parties and there are no oral or collateral agreements or understandings. This Agreement may be amended only by an instrument in writing signed by the parties.

19.0 NOTICES

All notices required or permitted under this Agreement shall be in writing and shall be given by hand delivery, by United States first class mail, postage prepaid, registered or certified, return receipt requested, by national overnight carrier, or by email transmission, addressed to the party for whom it is intended at the following address:

If to the City:

City of Louisville
Attn: Geoff Nettleton
749 Main Street
Louisville, CO 80027
e-mail: gnettleton@louisvilleco.gov

If to the Contractor:

Lighthouse Transportation Group
Attn: John Behan
11861 Bradburn Blvd
Westminster, CO 80031
e-mail: John.Behan@Lighthouseg.org

Except for notices by email transmission, any notice required or permitted under this Agreement shall be effective when received as indicated on the delivery receipt, if by hand delivery or overnight carrier; on the United States mail return receipt, if by United States mail. Notices by email transmission shall be effective on transmission, so long as no message of error or non-receipt is received by the party giving notice. Either party may by similar notice given, change the address to which future notices or other communications shall be sent.

20.0 EQUAL OPPORTUNITY EMPLOYER

- a) Contractor will not discriminate against any employee or applicant for employment because of age 40 and over, race, sex, color, religion, national origin, disability, genetic information, sexual orientation, veteran status, or any other applicable status protected by state or local law. Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to any status set forth in the preceding sentence. Such action shall include but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notice to be provided by an agency of the federal government, setting forth the provisions of the Equal Opportunity Laws.
- b) Contractor shall be in compliance with the applicable provisions of the American with Disabilities Act as enacted and from time to time amended and any other applicable federal, state, or local laws and regulations. A signed, written certificate stating compliance with the Americans with Disabilities Act may be requested at any time during the life of this Agreement or any renewal thereof.

21.0 NO THIRD PARTY BENEFICIARIES

It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement, and all rights of action relating to such enforcement, shall be strictly reserved to City and Contractor, and nothing contained in this Agreement shall give or allow any such claim or right of action by any other third party on such Agreement. It is the express intention of the parties that any person other than City or Contractor receiving services or benefits under this Agreement shall be deemed to be an incidental beneficiary only.

22.0 SUBCONTRACTORS

Contractor may utilize subcontractors identified in its qualifications submittal to assist with non-specialized works as necessary to complete projects. Contractor will submit any proposed

subcontractor and the description of its services to the City for approval. The City will not work directly with subcontractors.

23.0 AUTHORITY TO BIND

Each of the persons signing below on behalf of any party hereby represents and warrants that such person is signing with full and complete authority to bind the party on whose behalf of whom such person is signing, to each and every term of this Agreement.

In witness whereof, the parties have executed this Agreement to be effective as of the day and year first above written.

CITY OF LOUISVILLE

By: 
Christopher M. Leh, Mayor

Attest: 
Meredyth Muth, City Clerk

CONTRACTOR:

John Behan 
Digitally signed by John Behan
DN: cn=US,
email=jb@lighthousegroup.org,
cn=Lighthouse Transportation Group, LLC,
c=US,
Date: 2023.12.12 10:48:21-0700

By: John Behan

Title: Member/Manager

Exhibit A – Scope of Services

Scope of Services

The 2024-2025 Traffic Signal Maintenance and Repairs Maintenance Contract will be used to provide preventative and routine maintenance, responsive maintenance, inspections, urgent repair of equipment, and other support associated with the City's traffic signal system. The Contractor will, in a good and workmanlike manner, furnish all labor, equipment, testing equipment, materials and personnel and do all work necessary and incidental to performing the following scope of work:

- (a) Maintenance and repair of intersection traffic signals and associated traffic control equipment;
- (b) Maintenance and repair of mid-block pedestrian signals and associated traffic control equipment;
- (c) Repair of System Master Equipment;
- (d) Repair of signal interconnect and fiber optic system;
- (e) Maintenance and repair of railroad and emergency vehicle preempt equipment;
- (f) Maintenance and repair of speed radar signs, lighted pedestrian crossings (RRFBs) and school zone flashers; and
- (g) Extra work, as, and if, requested by the City.

The scope of work to be performed is described in two categories:

1. **Regular Maintenance and Repair Work** – Typical work is completed in 1-2 hours and is expected to be completed on a unit price basis, based on type of work.
2. **Less Frequent and More Significant Work** – Typical work is completed within 8-16 hours which may include tasks such as larger repairs, equipment replacements, and response to equipment knockdowns. This scope of services includes emergency assessment of damaged poles resulting from high winds, heavy snow, car crashes, etc. The Contractor shall name their subcontractor identified for non-destructive testing of such poles. This scope does not include regular, systematic structural inspections, which the City will procure separately. Repairs in this category that have a cumulative cost over \$100,000 may not be completed under this contract and may be procured separately. Addition of new signals to the maintenance contract is included in Category 2.

The Contractor will provide these services for all existing and new traffic signals and traffic control devices and associated equipment owned and/or operated by the City of Louisville.

Special conditions of this scope of services include:

- The Contractor shall guarantee all labor, materials and workmanship incorporated into the work for a period of three years after the date of the City's acceptance of work. If, in the City's opinion, work has not been performed satisfactorily in conformance with the specifications of this Agreement, or if any other deficiencies arise in the work, the City shall notify the Contractor in writing of any deficiencies. The Contractor shall correct the deficiencies within thirty (30) days of receipt of written notice. If the Contractor fails to

correct such deficiencies within the allotted time, the City may have such deficiencies corrected at the Contractor's expense and in such case, Contractor shall pay such costs incurred by the City within 30 days of demand. The City shall additionally have the right to issue written notice to the Contractor terminating this Agreement, which note shall state the date of termination and reasons therefor. The City's remedies for Contractor breach shall be cumulative.

- When damage or malfunctions to equipment maintained by the Contractor, but not being actively worked on occurs, which is clearly beyond the control of the Contractor, the City shall pay all costs related to such occurrences at the prices established in this contract, provided suitable evidence has been presented by the Contractor. Such damage may be the result of, but not limited to, the following types of occurrences:
 - Vandalism
 - Vehicle Damage
 - Major Storm
 - Roadway Failures
 - Utility Failures
 - False Calls
 - Construction Damage
 - Equipment Failures
 - Detours
- During the course of maintenance or surveillance, the Contractor is expected to watch for and make other signal repairs that may be needed. However, if a situation is observed that requires repair, and may be billed to the City, approval by the City is required prior to beginning those repairs, except for repairs of an emergency nature.
- All street detours, partial or complete, shall be approved by the City. All construction and maintenance operations which may create hazards to vehicles, bicyclists, pedestrians, or the workers shall require traffic control devices that conform to the Manual on Uniform Traffic Control Devices (MUTCD), or as required by the City.
- As additional traffic signals are accepted by the City, those locations shall be added to the contract by the City at established prices in this contract. Billing for each additional location will begin the first full month after the location is added. An acceptance inspection of the location shall be performed by the City and Contractor prior to adding a new location to the contract as detailed below.
- It shall be the responsibility of the Contractor to stock materials and parts as may be needed for normal repair of the traffic control equipment. In addition, the Contractor shall stock the necessary controllers, poles, signals and parts necessary to restore an intersection to an operating condition on an emergency basis.
- The City will notify the Contractor in writing when any other contractor is scheduled to do any work at the locations covered under this contract. The said location(s) will temporarily be removed from the contract until the other contractor's work has been accepted by the City and the Contractor at which time the location will be reinstated.

1. TECHNICAL SPECIFICATIONS

TS-1 GENERAL DEFINITIONS

The term "TRAFFIC CONTROL EQUIPMENT" as used in these documents refers to all materials, parts, units, devices, and controls used to equip a device which controls, warns, advises or detects vehicular and/or pedestrian traffic by means of any device which is electrical, electro-mechanical, electronic or other means and includes all individual parts, unit assemblies and controls to achieve the means to control, warn, advise or detect a vehicular and/or pedestrian movement.

TS-2 (INTENTIONALLY LEFT BLANK)

TS-3 ANNUAL PREVENTIVE MAINTENANCE (APM)

Annual preventive maintenance shall be done on an annual basis and completed at each traffic signal location.

The following shall be completed:

1. Documentation: Contractor shall permanently attach on the inside of each cabinet a plastic envelope, which shall contain at least the following information: cabinet prints, phasing diagram, intersection layout sketch, controller and coordination data sheets.
2. Cabinet: Clean cabinet and components thoroughly, replace disposable filters, clean permanent filters, lubricate locks and hinges, check door seals and re-caulk if necessary. Check cabinet paint. Check and, if necessary, repair the following: thermostat and fan, cabinet light and convenience outlet.

In cases of infestation by mice, etc. the Contractor shall take appropriate safety precautions and immediately remove nesting material and debris. Additional actions shall be taken as necessary to limit the possibility for future infestation.

3. Wiring: Identify and tag all field wires, indicating phase and direction. All detector lead-in shall be properly grounded. All wiring shall be neatly arranged in the cabinet and connections shall be checked.
4. Cabinet Switches: All switches in police door and inside the cabinet shall be checked by Contractor for proper operation; repairs shall be made if necessary. These switches include flash, on/off, stop time, detector test, manual control, etc. Flash transfer relays and associated contacts shall be inspected and replaced if necessary.
5. Controller: Check all controller settings against what is stated on the data sheet and immediately report any discrepancies to the Owner. Check all indicator lamps, LEDS and LCDS for proper operation. Check all clearance intervals with a stopwatch. Observe dynamic operation, ensuring all functions to be operating properly. Check back-up batteries if applicable.

6. Conflict Monitor / MMU: Check voltage monitor operation by turning off, or disconnecting, controller. Check red fail operation by removing a load switch or flash transfer relay. Check for conflicts and conformance to NEMA specifications.

Computerized testing using an ATSI approved tester may be performed at the Owner's request and charged as per unit pricing. Computerized test results shall include monitor location, manufacturer, model, serial number, tests completed, and test date. The technician shall review these results and check for conformance with tester standards. Copies of test results shall be left in the cabinet.

7. Coordination: Check telephone and fiber lines, interconnect, and all associated equipment for proper operation. Check for proper controller manipulation by use of holds, force off, max 2, etc. Check all settings per data sheet. Check clock on coordination equipment and reset if necessary. Check back-up batteries.
8. Preempt: Test railroad preempt for proper operation, with test switch or by removing or jumping input as required. Check Opticom equipment by use of emitter from proper distance.
9. Detection: Check for proper operation of all vehicle detection.

Inductance Loops – Check all loop and micro-loop splices and re-splice and re-seal connections as necessary. Check detector amplifier settings (vary frequency to prevent cross talk). Re-tune if necessary and observe operation. Check the extend and delay functions, if applicable. Check pavement for problems which may accelerate loop failure. Reseal loops within pavement as necessary. Report all pavement failures to the Owner.

Video Detection – Check cameras for proper alignment. Check video quality. Make adjustments as necessary.

10. Signal Heads: Check all signal heads for proper height and alignment, check for damaged housings, lenses, reflectors, visors, burned out bulbs or LEDs and worn mounting hardware and report problems to the Owner.
11. Poles: Check poles for damage, need of paint. Check for missing hand-hole covers, nut covers or missing nuts and replace if necessary. Check alignment and general conditions. Report any problems to the Owner.
12. Mast arms: Check mast arms for damage, need of paint, alignment, and general condition. Report any problems to the Owner. Check for missing or damaged hardware and covers, and replace if necessary.
13. Span-wire: Check all top and bottom span-wires for excessive slack, sag, damage, fraying and proper height, adjust as necessary. Check all eyebolts, strand vices,

hangers, hardware, signs, etc. for damage or excessive wear and report problems to the Owner.

14. Pull-boxes: Check all pull-boxes for missing or broken lids and replace if necessary. Check for proper height. Check wiring in all pull-boxes, re-splice and re-seal connections as necessary.
15. Push buttons: Check all pedestrian signs. Check pedestrian push buttons for proper operation, secure mounting, proper location and general condition. Repair as necessary.
16. Voltage and Current Readings: Check and record the controller +24VDC, total intersection current and the A. C. line voltage.
17. Annual Inventory: A written copy of the inventory of each location shall be provided to the Owner. The Contractor shall provide the appropriate information regarding the items listed on the intersection inventory sheet. Contractor shall update Exhibit A (signal inventory).
18. Repair Report: All hazardous conditions shall be corrected immediately. The Contractor shall supply the Owner with a detailed report of work done and work required for each location at which an Annual Preventive Maintenance has been completed.

TS-4 QUARTERLY PREVENTIVE MAINTENANCE (QPM)

Quarterly preventive maintenance shall be done on a quarterly basis and completed at each traffic signal location. A Quarterly Preventive Maintenance shall not be scheduled or performed at locations during the quarter for which an Annual Preventive Maintenance is scheduled.

Payment shall be executed after completion of an operation check of the following:

1. Cabinet Fan
2. Controller/Coordination
3. Conflict Monitor Indications
4. Flasher Circuits
5. Signal Timing
6. Time Base Clocks
7. Vehicle Detectors
8. Signal Indications
9. Signal Alignment
10. Pedestrian Push Buttons
11. Remove Graffiti / Tape
12. Remove Unauthorized Signs

REPAIRS: All hazardous conditions shall be corrected immediately. A worksheet documenting all work done and work required for each location shall be submitted.

TS-5 FLASHERS AND BEACONS

Prior to the beginning of each school year or other time designated by the Owner, each location will be reprogrammed for the coming school year and the following checks shall be performed at that time.

1. Check conditions of signs, poles, signal heads, and cabinet.
2. Clean lenses, reflectors, signs, and cabinet as necessary.
3. Check operation of clock, flasher, and signals.
4. Check for obstruction by trees, bushes, etc.
5. Check signals and signs for proper alignment, realign and secure as necessary.
6. Replace bulbs as necessary.
7. Submit a report to the Owner indicating all findings.

TS-6 PEDESTRIAN CROSSING

Once per year, Annual Preventive Maintenance (APM) checks shall be completed at each automated pedestrian crossing (RRFBs, etc.). The following checks shall be performed at that time:

1. Verify general operation
2. Check condition of cabinet, poles, signs, and indications
3. Check pull box splices and re-splice where necessary
4. Clean cabinet, lenses, LED strobes, reflectors, and signs as necessary
5. Check signals and signs for proper alignment
6. Check for obstruction by trees, bushes, etc.
7. Observe crosswalk markings and report excessive deterioration to the Owner
8. Submit a report to the Owner indicating all findings

TS-7 SPEED RADAR SIGNS

Once per year, Annual Preventive Maintenance (APM) checks shall be completed at each speed radar sign. The following checks shall be performed at that time:

1. Verify general operation
2. Check condition of poles, cabinet, and signs
3. Check accuracy of speed display with the use of the manufacturer supplied tuning fork
4. Check limit settings based on posted speeds and Owner specification
5. Check signs for proper alignment
6. Clean display and signs as necessary
7. Check for obstruction by trees, bushes, etc.
8. Submit a report to the Owner indicating all findings

TS-8 ANNUAL LIGHT BULB CHANGE

All incandescent signal light bulbs at each traffic signal location will be replaced annually, costs will be charged per the Unit Cost schedule in Exhibit B. All burned out bulbs will be replaced by

the Contractor at no cost to the Owner for the duration of the contract. Reported burned out bulbs will be replaced by the end of the following working day.

TS-9 SYSTEM REPORT REVIEW AND ANALYSIS

One time per year, in the month of July, the Contractor shall review all trouble call and extra work completion records in relation to the Owner's traffic signals and traffic system as a whole. These records shall span the previous 12 months and be analyzed by the Contractor to pinpoint specific historic problem areas, assess existing conditions of the individual signals and system, and define relevant signal and system upgrades. This analysis shall ensure special attention is paid to upgrades completed during the said 12-month period. A report shall be provided to the Customer which outlines specific areas of concern, defines solution options for repetitive problems, defines relevant upgrade options, and provides recommendations by the Contractor; assessment of the apparent effectiveness of upgrades completed during the said 12-month period shall also be provided.

In cases where the Contractor does not have access to the specified records, it shall be the Owner's responsibility to provide these records to the Contractor.

TS-10 UNSCHEDULED AND EMERGENCY REPAIRS

All malfunctions, and/or damage, which render the signal inoperable, or which constitute a serious hazard or inconvenience to the public shall be considered an emergency. Any damage which in the opinion of the City or other authorized persons constitutes a serious hazard to the public shall be considered an emergency. In such instances, the Contractor shall respond to the site within two hours from the time the report was received by the Contractor. Such malfunctions or damage may include, but not necessarily be limited to, situations where:

1. All red indications are out including bulbs, lenses, or LEDs, for any one traffic movement
2. Signal heads give confliction indications to any intersection approach
3. A signal has been knocked down

In instances of unscheduled repairs that are not of an emergency nature, such repairs shall be undertaken at the site within one working day, or other Owner approved schedule, after the Owner notifies Contractor of the needed repair.

All repairs shall be paid for on a time and material basis. If it is determined that an emergency repair stems from improper maintenance as identified in the quarterly and annual preventive maintenance tasks, the Contractor shall not be reimbursed for correcting the problem.

TS-11 EXTRA WORK

The term "extra work" shall be understood to mean and to include all work that may be required by the Owner which is not preventive maintenance or unscheduled and emergency repair work. This work is non-emergency in nature and will be done at a mutually agreed upon price established prior to starting work. Unauthorized extra work will not be paid for. Examples of extra work may include, but not be limited to, the following:

1. Modifications to an existing signalized intersection. This would typically describe intersection reconstruction requiring the relocation of all or part of the existing signal equipment. This would also include the installation of signal equipment not presently found at an existing signalized intersection. (Example: The installation of loop or video detectors, fire preemption).
2. Installation of equipment and/or materials for a new signal installation location, either complete or partial.
3. Changes in signal timing.
4. Painting of mast-arms, span-wire poles, control cabinets, signal heads and visors.
5. Installation of school speed limit flashers and warning beacons.

TS-12 TIME AND MATERIALS PROPOSAL

For any installations or extra work, the Contractor may submit a proposal for acceptance or rejection by the Owner. The proposal shall include estimated time, equipment, and materials. If the proposal is accepted by the Owner, the installation or extra work would be performed by the Contractor on a time and materials basis for a price not to exceed that set forth in the proposal. Changes by the Owner, which occur after the proposal has been submitted, will be considered as changes to the proposal.

TS-13 RECORDS OF MAINTENANCE

A current detailed report of all scheduled maintenance, unscheduled maintenance, repairs, and extra work will be supplied to the Owner on a monthly basis and upon demand when required. Records shall be in a convenient and easily understood format and shall include at a minimum the location, name, and agency reporting the problem or requesting the work, the time and date that the call was received, description of the work completed, and the time and date the work was completed. All such records submitted to the City shall become the property of the City. The City and its duly authorized representatives shall have access to any other records, documents, papers, and books of the Contractor that are related to this contract for the purpose of making audits, examination, excerpts, and transcriptions. Original copies shall be maintained in electronic format for the duration of this Contract.

TS-14 TIMING CHANGES

No timing changes shall be made by the Contractor unless authorized by the City except in an emergency situation such as loop failure, push button failure, emergency detour etc. The City shall be notified of such changes on the next normal working day.

2. PROCESS FOR ISSUING TASK ORDERS

The Contractor shall designate one representative (provide emergency contact number) to be available at all times (24/7/365) to the City's Project Manager for consultation and to respond to requests. The City expects that regular repair / maintenance (Category 1) task order requests will be issued on average once per week, however there is no guarantee and tasks will vary depending on trouble calls. Work under Category 2 will be naturally random, as incidents occur.

For work under Category 1, the Contractor will perform the work at the unit costs proposed in Exhibit B determined in the proposal.

Category 1 Task Order Requests

The City will issue Category 1 Task Order requests, which will contain the following information:

- Date of the request and requestor
- Task order request identification number
- Location(s) of work to be done (including quadrant of intersection and plans if available)
- Items of work to be completed
- Photos to help explain the scope of work, if available
- An expected cost for the work, based on the accepted rates in the agreement
- A description, if applicable, of work that is to be done that is **not** described in the agreed-upon bid items (see below for explanation)
- An expected number of working days for the work to be completed

The task order request will come in written format, typically via email addressed to the primary contact for the Contractor. The Contractor is expected to respond within 24 hours. The Contractor will describe their cost for any work that is **not** described in the agreed-upon bid items (if applicable), provide a total cost for the work, provide edits to the requested schedule if applicable, sign the request and send back to the City. The City will review, consider the edits and modifications and either issue the request to another Contractor or countersign and send back to the Contractor within 24 hours. Upon sending the countersigned task order, the counting of working days begins.

The Contractor shall provide a 24-hour, 365-day call line to City of Louisville staff to report trouble calls and create task orders. This service shall be available to all City of Louisville employees, including the City of Louisville Police Department to report routine, but critical trouble calls such as, but not limited to flashing signals, lights not working, burned out bulbs, pedestrian push buttons, and dark signals. Emergency Work shall be performed within two hours of notification; however, during inclement weather additional time will be allowed.

Category 2 Task Order Requests

For work under Category 2, the City will provide a proposal pricing request to the Contractor. The Contractor is expected to review and, in good faith, submit comprehensive prices for each such request within ten (10) consecutive calendar days of the date of issuance of such request. The Contractor will be required to perform the work at a price and schedule established prior to starting the work. The City may designate a shorter response time depending on the nature of the work. The City, at its sole discretion, will decide whether to proceed with the task order.

The manner in which the work will be identified and assigned will be as follows:

- Individual projects will be identified and their specific scope of work will be explained in with a detailed work description, drawings, plans, specifications, the specific terms and

conditions under which such work must be performed, and other pertinent materials issued to the Contractor in the form of a Category 2 Task Order Pricing Request.

- Contractor will thoroughly review the scope of work and provide a price in the format provided by the City and a project schedule responsive to each Task Order Request. The unit prices must be used for all work that corresponds with the unit price descriptions proposed and included in Exhibit B. Work elements that are not covered by any unit prices shall be priced using the format and cost categories for labor, material, and equipment specified in Exhibit C herein. Each task order shall outline the work to be performed, a schedule that defines the work including start and end dates, and the associated fee that includes a breakdown of labor hours, material cost, and other details that may be requested by the City.
- Upon receipt of the Task Order Pricing Request worksheet from the Contractor, negotiation of non-unit price items and agreement on the total price, schedule, and any other specific requirements for the requested scope of work, the City will issue a work order for the specific project under the terms and conditions set forth therein and encumbering funds for such work. The City reserves the right to issue such a work order at the price and under the terms of the Contractor's pricing submittal, at any time before the expiration of 120 consecutive calendar days from the date the pricing submittal was received by the City. If no work order is issued and the pricing submittal is not rejected within this period, the Contractor's pricing submittal shall be deemed rejected by the City.
- Upon receipt of a task work order notice to proceed, the Contractor shall have a set number of days to commence the work as described in this section, or as agreed upon with the City.
- During the course of the work on each task order, the Contractor shall submit regular status updates and pay applications. The City shall issue payment for work completed in accordance with the terms and conditions of the contract documents.
- If additions, deletions, or other modifications to the scope of work is required or desired by the City on a particular project authorized by a task order, a task order change will be issued based on pricing prepared in the same manner described in the Task Order Request and under the terms and conditions of the Independent Contractor Agreement. The work order change will identify any increase or decrease in the cost, change in the period of performance and any other modifications to the performance requirements for that particular work order. Upon receipt of a work change order, the Contractor shall have ten (10) consecutive calendar days to commence the work, unless the City has agreed to a different schedule with the Contractor.

Adding signals to the maintenance contract shall follow the following procedure:

1. City shall notify Contractor in writing giving location and type of traffic signal.

2. Contractor shall within ten (10) calendar days of notice inspect the intersection and notify City in writing of any deficiencies in the installation.
3. When said deficiencies have been corrected, Contractor shall notify City that the signal installation is accepted for maintenance, and from the date of such notice to the City the installation shall thereafter be subject to all terms of the On-Call Traffic Signal Maintenance Contract.

Certain work issued by a task order may require additional license or certification. If an additional license or certification is needed, it will be identified in the task order. For work on task orders with a scope not covered by staff in the proposal, the Contractor may bring on additional sub-consultants

COST

The rates provided in Exhibits B and C will be used for the initial two-year Contract period. A 3% annual escalation in pricing will be considered in the third and subsequent years that the contract is extended.

In pricing a request, the bid unit prices provided are for full compensation for the work identified in the unit price description and corresponding specification section, as well as all costs associated with overhead, and any other direct or indirect costs of the work not specifically excluded. In pricing the work in a request not already identified in the unit costs, the Contractor shall provide itemized and sufficient supporting data, including calculations, measurements, cost records, production rates, equipment types and capacity, labor costs by craft and other information which the City may reasonably require in order for the City to evaluate the Contractor's pricing for work not covered by unit prices for any proposal request and work order change pricing.

Direct labor costs shall only include the cost associated with the worker who performed the work (including fringe benefits, and the Contractors actual cost for workers compensation, social security, and payroll taxes). The costs of supervision, management, and field or office overhead costs shall not be included or calculated as direct labor cost. For shop or plant components of the work, the direct labor cost shall include only the workers who work directly on the item being manufactured or the actual operators of the equipment being used to handle the items being manufactured.

Exhibit B – Maintenance, Repair, and Support Unit Costs

EXHIBIT B: TRAFFIC SIGNAL MAINTENANCE, REPAIR, & SUPPORT UNIT COSTS

CATEGORY 1: Regular Maintenance and Repair Work

Item No.	Item	Unit of Measure	Lighthouse Cost
<u>Preventative and Routine Maintenance</u>			
2	TS-3 Annual Preventative Maintenance (each traffic signal)	Each	\$ 1,000.00
3	TS-4 Quarterly Preventative Maintenance (each traffic signal)	Each	\$ 500.00
4	TS-5 Flasher and Beacon Programming and Checking (each beacon)	Each	\$ 100.00
5	TS-6 Pedestrian Crossing APM (each pedestrian crossing)	Each	\$ 250.00
6	TS-7 Speed Radar Signs (each sign)	Each	\$ 100.00
7	TS-9 System Report Review and Analysis	Lump Sum	\$ 1,000.00
8	Controller Cabinet Service (each traffic signal)	Each	\$ 250.00
9	Furnish and test Type P NEMA TS-2 Controller Cabinet	Each	\$ 20,000.00
10	Weekly checks of central system (Econolite Centracs) logs, alerts and general operating condition	Each	\$ -
11	Furnish, install timings and bench-test Econolite Cobalt NEMA TS-2 Type 1 controller	Each	\$ 1,000.00
12	TS-8 Replace incandescent signal light bulbs	Each	\$ 250.00
<u>Repair Work</u>			
13	Intersection Luminaire Replacement (each head)	Each	\$ 1,250.00
14	Repaint traffic signal pole (up to 30 ft)	Each	\$ 2,500.00
15	Remove and dispose of traffic signal equipment associated with one pole including pole, signal equipment and signs	Each	\$ 1,000.00
16	Furnish and install LED vehicle signal module	Each	\$ 250.00
17	Furnish and install LED vehicle signal head (3 Section)	Each	\$ 250.00
18	Furnish and install LED pedestrian signal countdown head	Each	\$ 250.00
19	Furnish and install vehicle signal backplate	Each	\$ 250.00
20	Furnish and install vehicle signal backplate w/retroreflective border	Each	\$ 250.00
21	Furnish and install flexible, retroreflective backplate	Each	\$ 250.00
22	Install flexible, retroreflective backplate	Each	\$ 100.00
23	Replace existing backplate with flexible, retroreflective backplate	Each	\$ 250.00
24	Furnish and install traffic signal visor	Each	\$ 250.00
25	Furnish and Install pedestrian push button (non-APS)	Each	\$ 500.00
26	Furnish and Install, configure, and test APS	Each	\$ 1,500.00
27	Install, configure, and test APS	Each	\$ 1,000.00
28	Replace pull box / junction box lid	Each	\$ 2,000.00
29	Inspect video detection configuration, modify detection zones, configure system settings, confirm proper operation	Per Approach	\$ 250.00
30	Cut in new inductive loops (one lane / 6'x40' quad presence loop)	Each	\$ 4,000.00
31	Cut in new inductive loops (one lane / advance loops only)	Each	\$ 2,500.00
32	Traffic signal turn-on support: go through punchlist, test all indications and detectors, test that timing matches timing sheet	Lump Sum	\$ 1,000.00
33	Furnish and install one 12-conductor #14AWG in existing conduit	Per LF	\$ 3.00
34	Replace existing controller in the field with new, bench-tested controller (not including furnishing or testing the controller)	Each	\$ 500.00
35	Replace existing cabinet in the field with new, bench-tested cabinet (not including furnishing or testing the cabinet)	Each	\$ 10,000.00
<u>Other</u>			
36	Cabinet testing and "burn-in"	Each	\$ 1,000.00
37	Furnish, install (including CAT 5 cabling), configure and test all-in-one video detection system (Miovision or equivalent)	Each	\$ 30,000.00
38	Install (including CAT 5 cabling), configure and test all-in-one video detection system (Miovision or equivalent)	Each	\$ 5,000.00
39	Furnish, install, configure, and test emergency vehicle pre-emption system (Opticom, or equivalent)	Each	\$ 25,000.00
40	Install, configure, and test emergency vehicle pre-emption system (Opticom, or equivalent)	Each	\$ 5,000.00
41	Furnish, install, configure, and test Battery Backup System, including cabinet, batteries and controller (Alpha UPS or equivalent)	Each	\$ 10,000.00
42	Install, configure, and test Battery Backup System, including cabinet, batteries and controller (Alpha UPS or equivalent)	Each	\$ 2,500.00
43	Completion of CDOT SB 8 Inspection Report for CDOT owned, and Louisville operated and maintained signals	Each	\$ 500.00

Exhibit C – Equipment and Staff Rates

EXHIBIT C: EQUIPMENT AND STAFF RATES

AUTHORIZED TIME AND MATERIAL COST

Item No.	Item	Unit of Measure	Lighthouse Cost
<u>Equipment</u>			
1	Bucket Truck	Hourly	\$ 50.00
2	Dump Truck	Hourly	\$ 50.00
3	Crane truck	Hourly	\$ 150.00
4	Pickup Truck, 1 Ton	Hourly	\$ 50.00
5	Generator, 3000W	Hourly	\$ 25.00
6	Conduit Rockwheel / Rocksaw, 6" (30" depth)	Hourly	\$ 25.00
7	Directional Drill Rig	Hourly	\$ 500.00
8	Excavator	Hourly	\$ 50.00
9	Jackhammer	Hourly	\$ 25.00
<u>Personnel Hourly Rate</u>			
10	Supervisor / Project Manager	Hourly	\$ -
11	Project Coordinator / Administrator	Hourly	\$ -
12	Lead Signal Maintenance Technician	Hourly	\$ 100.00
13	Signal Maintenance Technician	Hourly	\$ 100.00
14	Other IMSA Level III Technician	Hourly	\$ 100.00
15	Other IMSA Level II Technician	Hourly	\$ 100.00
16	Other IMSA Level I Technician	Hourly	\$ 100.00
17	Fiber Optic Technician	Hourly	\$ 200.00
18	Data Communications Technician	Hourly	\$ 100.00
19	Operator	Hourly	\$ 100.00
20	Laborer	Hourly	\$ -

Subject: Presentation: Xcel Briefing to Louisville City Council
Presentations are informational only. While Council may ask questions and have discussion, no action will be taken by Council. There will be 1 round of public comment.

Date: February 17, 2026

Prepared By: Diana Langley, City Manager

Presented By: Diana Langley, City Manager

Summary:

Receive a presentation from Nick Cole, Boulder Area Manager for Community & Local Government Affairs, for Xcel Energy, regarding improvement work planned for Louisville.

Background / Prior Discussions:

With the recurring unplanned power outages on the west side of town, staff engaged with Nick Cole, the Boulder Area Manager for Community & Local Government Affairs for Xcel Energy (Xcel), to determine the cause. Mr. Cole was helpful in following up with Xcel staff to determine the cause and required repairs. As part of those conversations, Mr. Cole offered to present to the City Council planned Xcel improvements for Louisville.

Development Proposal:

N/A

Analysis:

The presentation covers three topic areas:

- Power outages
- Wildfire investments and improvements
- Distribution System Plan improvements with a focus on Louisville investments

Council Work Plan:

This item aligns with the City Council's Safety and Economic Vitality Priorities. Safe, reliable power is essential to serve Louisville's current and future residents and businesses.

Fiscal Impact:

There is no fiscal impact.

Alternatives:

N/A

Recommendation:

Receive a presentation from Nick Cole, Boulder Area Manager for Community & Local Government Affairs, for Xcel Energy, regarding improvement work planned for Louisville.

Attachments:

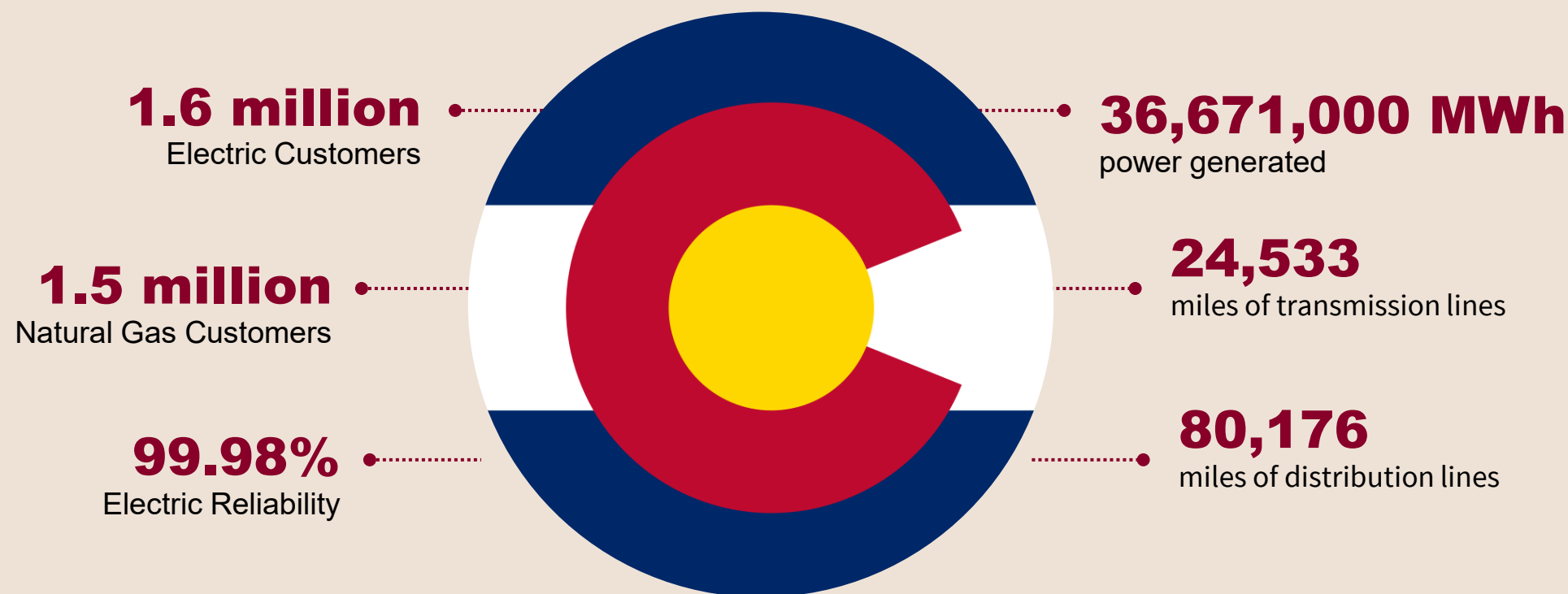
1. 02/17/2026 Xcel Presentation - Louisville

LOUISVILLE CITY COUNCIL BRIEFING

FEBUARY 17TH



Delivering safe, reliable, affordable, and clean energy to Coloradoans



Why Do Outages Occur?

1

**Severe
Weather**

2

**Vegetation /
Trees**

3

**Vehicle
Accidents**

4

**Equipment-Related
Upgrade or Failure**

5

**Wildlife /
Other Objects**

6

**Undergrounding /
Hit Lines**

Outage Classifications

Xcel Energy classifies outages according to the industry definitions defined in the Institute of Electrical and Electronic (IEEE) standards.

Momentary Outage

- Outage that is 5 minutes or less in duration.

Sustained Outage

- Outage that is greater than 5 minutes in duration.

Planned Outage

- Outages that are customer or public official-requested or the company has provided advance notice to the customer.

Major Event

- A set of outages which occurred during a specific time and location which combined, exceeds historically expected outage duration for at least on day.



OVERVIEW OF PUBLIC SAFETY POWER SHUTOFF

During extreme or critical wildfire risk conditions, or if we’re working near active wildfires, we may need to temporarily turn off electric service to customers in targeted areas.

This is a risk reduction strategy known as a Public Safety Power Shutoff (PSPS).

Proactively shutting off power is not a step we take lightly. A PSPS is only considered for specific areas when the following three factors are forecast:



Extreme Winds
Unusually strong or damaging winds that can bring down power lines and significantly increase fire spread potential.

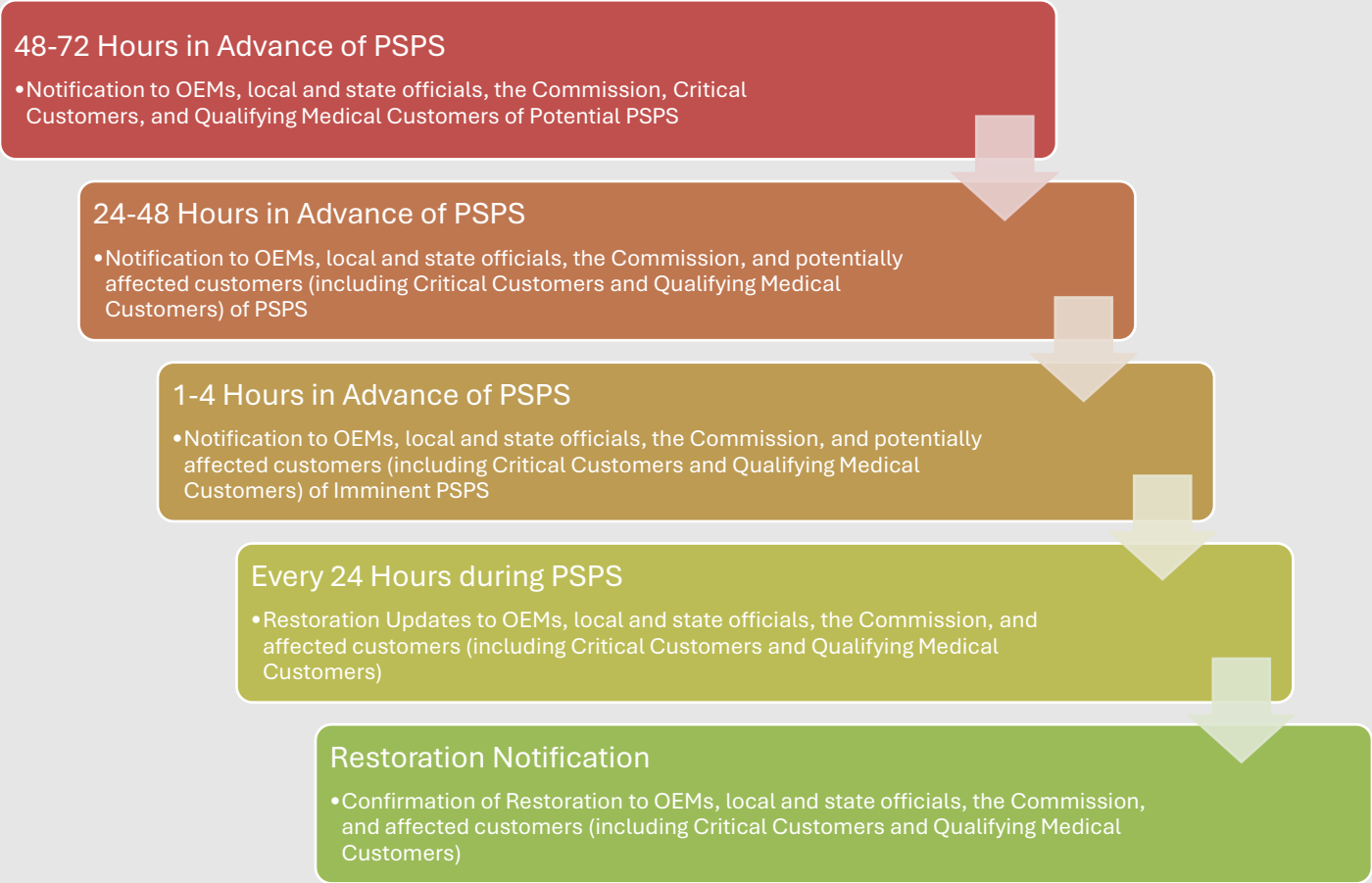


Low Relative Humidity
Very dry air conditions that allow fires to ignite and grow rapidly.



Very Dry Fuels
Vegetation that is critically dry and susceptible to ignition and rapid fire growth.

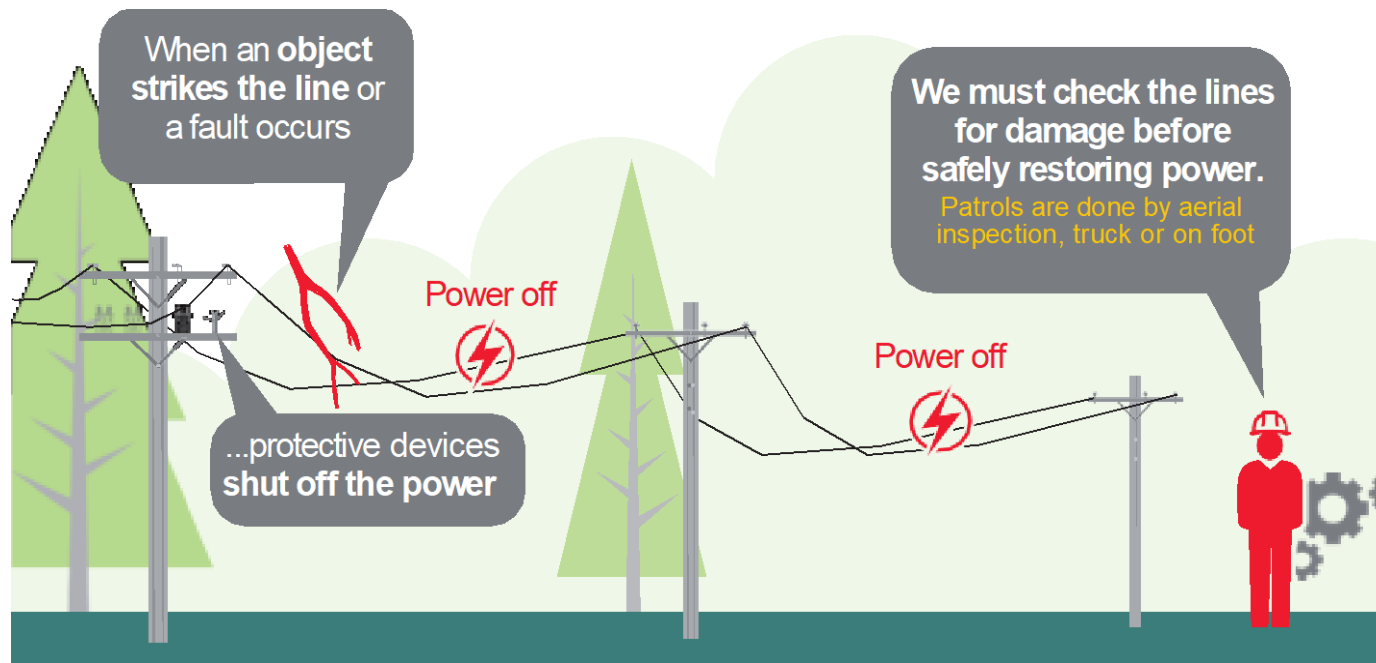
PSPS Communication



Spotlight: Enhanced Powerline Safety Settings (EPSS)

EPSS is a proven wildfire mitigation tool.

It allows for power lines to remain in-service during periods of elevated wildfire risk, with protection settings enabled.



When EPSS is activated, power lines are more sensitive and can quickly stop the flow of energy if an issue is detected, like a tree branch or other object touching the line. When that occurs, the power will remain off until our crews can inspect the line to make sure it's safe to turn it back on.

It is intended to enhance public safety during heightened risk conditions, but it means power outages are likely to occur more frequently, and if they do, are likely to last longer because crews need to patrol the line before restoring power.

EPSS is used in risk zones identified by the CO State Forest Service and risk probability models considering facts like weather, housing density, terrain, miles of overhead lines.

Comparing EPSS to PSPS

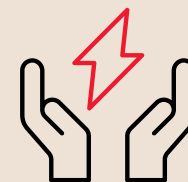
Both EPSS and PSPS are only used when the temperature, wind speed, relative humidity, and available fuel sources indicate a high risk for wildfires.

Enhanced Powerline Safety Settings (EPSS)



- EPSS allows for power lines to remain in-service during periods of elevated wildfire risk with protection settings enabled—unless an object actively causes a fault on the line.

Public Safety Power Shutoff (PSPS)



- In a PSPS event, power is proactively shut off for safety. This is not a step we take lightly.
- PSPS is a mitigation tool used when risk cannot be adequately reduced by EPSS and other methods.

Xcel Energy is continually investing in and building out our systems to limit the size, scale, and duration of potential power disruptions.



Preparing for Outages

Building a Home Emergency Kit

- Acquire a first aid kit of sufficient size for the household and keep it stocked.
- Stock up on batteries and consider purchasing portable chargers and communications devices that do not require electricity, such as a battery-powered radio or a phone not reliant on electricity.
- Write down emergency numbers and critical contact information.

Medical and Food Considerations

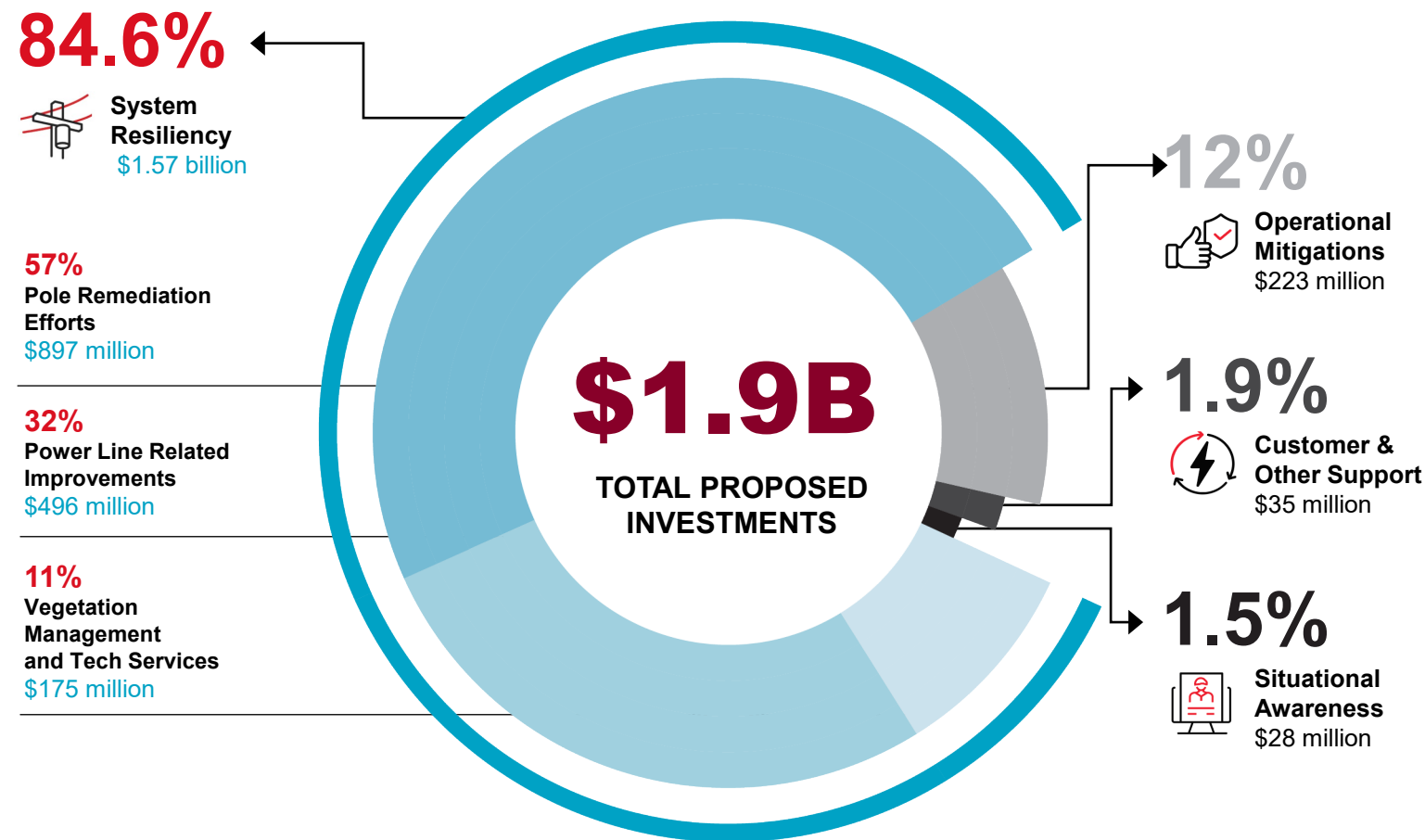
- Keep an emergency supply of prescription and non-prescription medications on hand, and plan for medications, like insulin, that require refrigeration.
- Fully charge personal medical devices and ensure a backup power source is available for electrically powered medical equipment.
- Purchase non-perishable food (and a manual can opener if needed) and bottled water.

If outages occur, it's important to have access to the most recent updates about power restoration.

Customers should make sure their account information and communications preferences are up to date through the **My Xcel Energy mobile app** or visiting the **Xcel Energy website**.



Wildfire Investments & Improvements



System Resiliency

50
miles of underground power lines

10,000
pole replacements, with a focus on higher risk areas



Operational Mitigations

100%
feeders enabled with Enhanced Powerline Safety Settings (EPSS) capability for higher risk areas



Situational Awareness

3x
the number of AI-enabled wildfire monitoring cameras

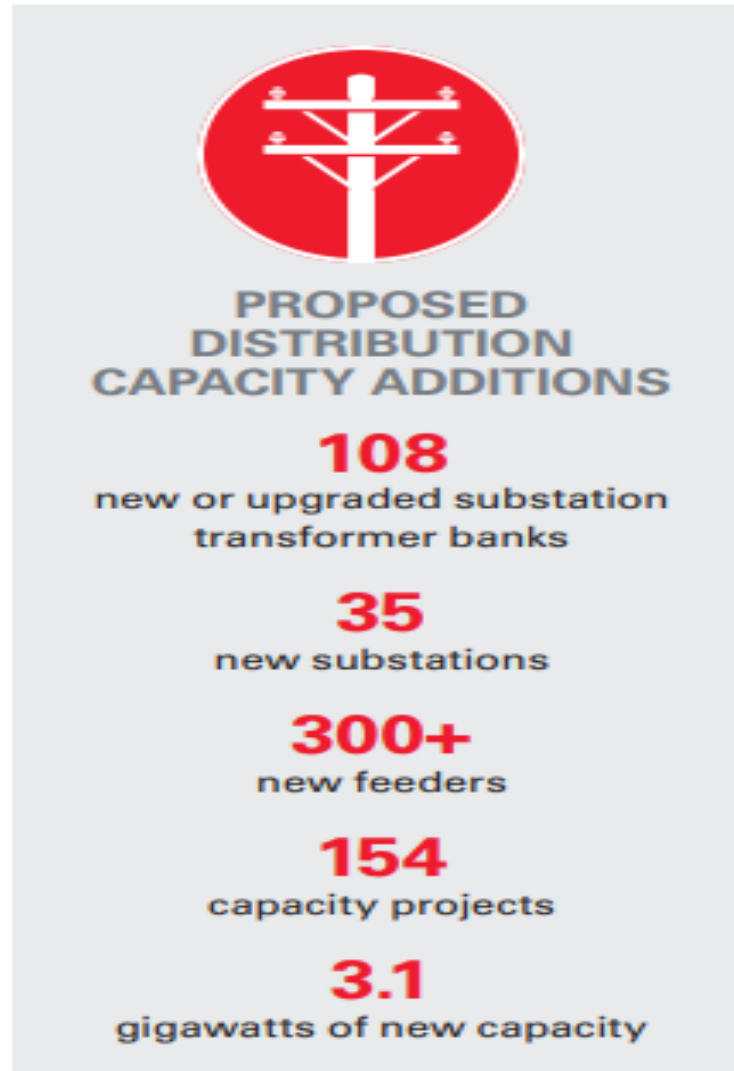
29,000
non-traditional fault detection sensors deployed

Distribution System Plan

PUC approved DSP on December 15, 2025. \$1.3 billion dollars will be spent on distribution system investments between 2026-2028.

Louisville Investments

- New transformer will be added in 2027
- 2 additional feeders in 2027
- Expanding a feeder from substation serving the city
- Phase balancing to support reclosers in the area
- Scoping of additional projects





Subject: Presentation: Wildfire and Conflagration Risk Assessment -
Louisville Fire Protection District
Presentations are informational only. While Council may ask questions and have discussion, no action will be taken by Council. There will be 1 round of public comment.

Date: February 17, 2026

Prepared By: Rob Zuccaro, Director

Presented By: Louisville Fire Protection District / Ember Alliance

Summary:

The Louisville Fire Protection District (LFPD) has engaged The Ember Alliance to complete a Wildfire and Conflagration Risk Assessment (WCRA) for the City of Louisville. The Ember Alliance will be presenting the final WCRA to the City at this meeting.

Background / Prior Discussions:

The LFPD commissioned the WCRA to better understand potential wildfire and conflagration risks throughout the community and identify actionable items that the LFPD, the City, and community members can take to improve wildfire preparedness and resilience. The final report was completed by The Ember Alliance with support from Dr. Hussam Mahmoud/InFoRM LLC.

The Ember Alliance will present the final WCRA report and recommendations. The LFPD and Ember Alliance will also be hosting a community open house on Wednesday, February 18th from 5:30 to 7:00pm at Louisville Fire Station No. 1, 1240 Main Street.

Development Proposal:

n/a

Analysis:

n/a

Council Work Plan:

The WCRA supports the City Council Workplan priority on Safety, and informs the action items related to Preparedness, development of a Wildland Urban Interface (WUI) Code and Potential Citywide Defensible Space.

Fiscal Impact:

n/a

Alternatives:

n/a

Recommendation:

n/a

Attachments:

1. FINAL_Louisville WCRA Document
2. Louisville WCRA City Council Presentation



2026



CITY OF LOUISVILLE

BOULDER COUNTY, COLORADO

Wildfire and Conflagration Risk Assessment

City of Louisville Wildfire and Conflagration Risk Assessment 2026

PREPARED FOR LOUISVILLE FIRE PROTECTION DISTRICT

895 VIA APPIA WAY, LOUISVILLE, COLORADO 80027



PREPARED BY THE EMBER ALLIANCE

1631 E LINCOLN AVE, FORT COLLINS, CO 80524



AND



Cover photo credit: Big Heart Film

Preamble

This document and the action inspired by this effort would not be possible without the dedication of outgoing Chief John Willson and the support of incoming chief Kevin Milan. Chief Willson was integral in the emergency response to and recovery from the 2021 Marshall Fire that impacted residents across Louisville. His extensive experience, serving as the Louisville Fire Protection District Chief for 10 years, and empathetic approach to leadership provided a strong foundation for the community to rebuild upon. This document coincides with the district's change in command from Chief Willson to Chief Milan and sets the stage for continued humility and commitment to learning, characteristics that underpin the district, past and present.

Message from the Chiefs

Wildfires represent one of the most significant natural hazards affecting ecosystems, human settlements, and economic activities worldwide. Their frequency and intensity have been increasing due to a combination of climatic changes, land-use patterns, and human activities. Understanding wildfire risk is essential for developing effective mitigation strategies, safeguarding communities, and ensuring sustainable land management practices.

This document aims to assess wildfire risk by integrating environmental and climatic factors into a comprehensive analytical framework. It emphasizes the importance of predictive modeling to identify high-risk zones and prioritize resource allocation. By evaluating both hazard and vulnerability components, the research seeks to provide actionable insights for policymakers, emergency managers, and land-use planners.

The findings of this assessment will contribute to informed decision-making, enhance resilience against wildfire impacts, and support the development of adaptive strategies in the face of evolving climate conditions.

John Willson

John Willson, Fire Chief (Retired)

Kevin Milan

Kevin Milan, Fire Chief

Louisville Fire Protection District

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Acronyms

AGNI-NAR	Asynchronous Graph Nexus Infrastructure for Network Assessment of WUI Risk
BOCO	Boulder County
BWC	Boulder Watershed Collective
COAL	Colorado All Lands assessment by the USFS
CO-WRA	Colorado Wildfire Risk Assessment by the CSFS
CSFS	Colorado State Forest Service
CWPP	Community Wildfire Protection Plan
DFPC	Division of Fire Prevention and Control
EMS	Emergency Medical Staff
FAC	Fire Adapted Community
FEMA	Federal Emergency Management Agency
HIZ	Home Ignition Zone
HOA	Homeowner's Association
IIBHS	Insurance Institute for Business & Home Safety
LFPD	Louisville Fire Protection District
MPP	Most Probable Path
NCEI	National Centers for Environmental Information
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Association
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
TEA	The Ember Alliance
USFS	U.S. Forest Service
WCRA	Wildfire and Conflagration Risk Assessment
WUI	Wildland-Urban Interface
WEA	Wireless Emergency Alerts
WRA	2023 Wildfire Hazard and Risk Assessment of Louisville Public Lands

Refer to the **Glossary** on page 72 for definitions of the words and phrases used throughout this document

Executive Summary

Overview

Wildfire risk in the City of Louisville is driven by a convergence of grassland fuels, extreme wind events, dense development patterns, and interconnected neighborhoods. The 2021 Marshall Fire demonstrated that wildfire impacts in Louisville can rapidly escalate into urban conflagrations, where structure-to-structure fire spread overwhelms suppression capacity and results in widespread losses. This Wildfire and Conflagration Risk Assessment was developed to better understand these risks and identify actionable strategies to reduce structure ignition, improve preparedness, and support long-term community resilience.

Analytical Approach

This assessment incorporated advanced urban conflagration modeling developed by Dr. Hussam Mahmoud and his team. The AGNI-NAR model (Asynchronous Graph Nexus Infrastructure for Network Assessment of Wildland-Urban Interface Risk) simulates wildfire spread through networks of vegetation and structures by accounting for the complex relationships that govern fire spread from vegetation to structures, structure to structure, and structure to vegetation. Most fire behavior models were developed for wildland fire and cannot be used to model urban conflagrations. The potential impacts of mitigation measures around structures and on public land were also assessed.

Key Findings

1. **Wind is key in fire behavior.** Weather conditions, particularly wind speed and direction, have a tremendous impact on potential fire spread and structure vulnerability during a conflagration.
2. **Risk of structure loss during conflagration is widespread.** Many structures across Louisville have the potential to experience damage from wildfire and associated urban conflagrations under high and extreme wind speeds. Vegetation-to-home and home-to-home fire spread could cause conflagrations to reach into the interior of the city.
3. **Home ignition zone (HIZ) mitigation is important, and participation is more important than perfection.** Widespread home hardening and defensible space is **critical** to reduce the potential for structure loss. Community-level action is required, especially in areas with closely spaced structures, more flammable building materials, and more established vegetation near structures. More homeowners and businessowners doing meaningful work to mitigate risk is more effective than some people doing all the work.
4. **Public land management is helping.** Ongoing vegetation management by the City of Louisville in strategic locations on public land and other shared spaces is making the community safer.
5. **Vegetation mitigation should be targeted.** Additional vegetation management in strategic areas could further reduce fire growth and structure vulnerability in parts of the city. High quality treatments in high priority areas are more effective than indiscriminately treating vegetation.

Recommendations and Implementation

There is an immediate need for this community to undertake proactive measures to mitigate wildfire risk to protect lives and property. Strategic recommendations provided in this report are organized into short-, mid-, and long-term actions to reflect varying levels of effort, cost, and coordination. Near-term actions focus on education, outreach, and adoption of existing best practices for HIZ mitigation. Mid- and long-term actions emphasize expanding mitigation capacity, developing funding mechanisms, supporting vulnerable populations, and sustaining landscape-scale resilience. These recommendations supplement the 2024 Boulder County CWPP and 2023 Wildfire Hazard Assessment for the City of Louisville.

This WCRA supports Louisville's continued progress toward becoming a Fire Adapted Community—one in which residents, HOAs, LFPD, city leadership, and partners work together to reduce ignition potential, limit structure-to-structure fire spread, and more safely coexist with wildfire. By pairing advanced modeling with practical, community-centered strategies, Louisville is better positioned to reduce future wildfire losses and strengthen long-term resilience.

Introduction

Purpose and Need for a WCRA

Wildfire and Conflagration Risk Assessments (WCRAs) improve understanding of how fire behaves in urban and suburban landscapes and identify actionable strategies to reduce the risk of structure ignition. Information from the WCRA process—including analyses, discussions, documents, and data—supports both planning and operational decision-making during wildfires and potential urban conflagrations. WCRAs also help residents and communities prioritize mitigation measures.

“The practice of modifying the built environment to growing wildfire risk requires multidisciplinary understanding of wildfire behavior, structural ignition vulnerabilities, urban resilience, and landscaping vegetation.” – Calkin et al. 2023

The project area for the 2025 Louisville WCRA encompasses approximately eight square miles within the City of Louisville, including the planned Redtail Ridge commercial complex, which began construction in spring 2025 and will continue beyond completion of this assessment. Louisville is situated along the eastern base of the Rocky Mountain Front Range, between the metropolitan centers of Denver and Boulder, in southeastern Boulder County.

Louisville lies within the ancestral lands of the Cheyenne, Arapaho, and Ute First Nations, and today is a diverse, growing community shaped by a mixture of residential neighborhoods, commercial areas, open space, and transportation corridors.

This WCRA represents a collaborative effort facilitated by The Ember Alliance, a Colorado nonprofit dedicated to advancing fire management, community engagement, and climate resilience. The project integrates urban conflagration modeling developed by Dr. Hussam Mahmoud of Colorado State University, Vanderbilt University, and InFoRM, LLC. By combining advanced fire modeling with sample data on home ignition zone (HIZ) conditions, which includes building material and defensible space, the assessment offers a detailed understanding of wildfire behavior and structure vulnerability in urban and suburban landscapes.

The purpose of the 2025 Louisville WCRA is to strengthen wildfire preparedness by identifying vulnerable areas, analyzing ignition and spread potential under extreme weather conditions, and developing customized mitigation strategies that reflect Louisville’s unique built environment and climate risks.

Project Goals

- Improve preparedness for urban conflagration through a combined scientific vulnerability analysis and on-the-ground assessments.
- Understand how vegetation on public land and other shared spaces and HIZ conditions influence structure vulnerability.
- Identify and prioritize areas of greatest risk within Louisville’s neighborhoods.
- Develop customized mitigation strategies tailored to the city’s building patterns, parcel configurations, and shared exposures.
- Provide actionable guidance for residents, homeowners associations (HOAs), and neighborhoods to reduce structure ignition and property loss.
- Inform discussions about Wildland-Urban Interface (WUI) boundaries and how they apply within Louisville’s varied landscape, guided by outputs from this assessment.

Together, these goals support a whole-community approach to wildfire preparedness, emphasizing the shared responsibility of residents, HOAs, LFPD, city departments, and regional partners.

This WCRA is intended as a practical tool for the LFPD, the City of Louisville, partner organizations, HOAs, community liaisons, and residents. It provides essential insights into how wildfire and urban conflagration can behave in Louisville's built environment and outlines strategies to reduce ignition potential, structure-to-structure fire spread, and community vulnerability.

Fire behavior results from complex interactions among fuels, weather, topography, and building arrangements. While wildfire spread in natural vegetation is well studied, urban conflagration introduces additional dynamics—ember cast, building materials, fencing continuity, and structural spacing. The model used for this assessment (AGNI-NAR; Asynchronous Graph Nexus Infrastructure for Network Assessment of Wildland-Urban Interface Risk) is a novel, state-of-the-art tool for modeling urban conflagrations that has been validated against several recent conflagrations, including the 2018 Camp Fire, 2020 Glass Fire, 2021 Marshall, and 2023 Lahaina Fire (Chulahwat et al., 2022; Chulahwat and Mahmoud, 2024; Mahmoud, 2024b).

In 2023, the Lynker Corporation and The Ember Alliance completed a [Wildfire Hazard and Risk Assessment of Louisville Public Lands \(WRA\)](#), providing recommendations for vegetation management and mitigation on open space and City-owned facilities. This 2025 Louisville WCRA complements that work by focusing on residential areas and the broader built environment, delivering targeted strategies for households and neighborhoods. Recommendations in this WCRA are informed by and aligned with several overlapping and ongoing planning initiatives, including:

- [2024 Boulder County Community Wildfire Protection Plan \(CWPP\)](#)
- 2024 Boulder County Conflagration Operational Response Plan
- [2026 Louisville Comprehensive Plan \(in preparation\)](#)
- [2023 Wildfire Risk Assessment of Louisville Public Lands](#)

Through alignment with these efforts, the WCRA supports a coordinated, regionally consistent approach to wildfire and conflagration risk reduction.

Growing Concerns over Urban Conflagration

Urban conflagrations are wildland fires that transition into the built environment and escalate into destructive, self-sustaining structure-to-structure fire events (Calkin et al., 2023; Giammanco et al., 2023). While often initiated by wildfire in undeveloped or semi-natural vegetation, the most devastating impacts occur once fire enters neighborhoods—where dense development, combustible building materials, and interconnected fuel pathways allow fires to grow beyond the capacity of firefighting resources. The 2021 Marshall Fire is a primary example of an urban conflagration.

Historic and contemporary urban conflagrations share four common elements:

1. **Drought conditions** that dry vegetation and structures, increasing ignition potential.
2. **Extreme weather**, particularly sustained winds, which drive ember storms, accelerate fire spread, and overwhelm suppression efforts.
3. **Dense development constructed with combustible materials**, enabling radiant heat transfer and direct structure-to-structure ignition.
4. **Fuel pathways**—including vegetation, fences, landscaping, accessory structures, mulch beds, and other combustible materials—that connect fires between structures.

Urban conflagrations can be viewed as a specific, severe expression of Wildland–Urban Interface (WUI) fire behavior (see the **Wildland–Urban Interface Section** for an explanation of the WUI continuum). While all WUI fires involve interactions between natural and built environments, not all WUI events become urban conflagrations. Urban conflagrations emerge when conditions align to create cascading ignitions that exceed firefighting capacity. Louisville's development patterns, landscape, and the experience of the Marshall Fire indicate that the city is susceptible to urban conflagration.



Figure 1. An illustration of the stepwise progression of how a single ignition can escalate into a community-wide disaster. Sources: (Giammanco et al., 2023), adapted from (Cohen, 2008).

The Urban Conflagration Cascade

Urban conflagrations develop through a series of cascading events (**Table 1**):

1. Ignition source: A wildfire, downed power line, structure fire, or other ignition contacts receptive fuels. In Louisville, dry grasses, landscaping, wooden fencing, and wind-driven embers provide abundant opportunities for ignition.

2. Extreme fire behavior: Under severe weather, fuel, and topographic conditions, fire intensity and spread accelerate rapidly. High winds carry embers long distances, ignite spot fires, and generate multiple simultaneous ignitions across neighborhoods. These conditions characterized the 2021 Marshall Fire and are expected to occur more frequently under projected climate conditions.

3. Residential fires from multiple pathways: Once fire reaches the built environment, structures themselves become fuels. **Figure 2** shows how fire enters communities through several types of ignition pathways. These pathways create many ignitions in close proximity—the conditions in which structure-to-structure fire spread becomes likely. During the 2021 Marshall Fire, numerous homes ignited not from the original wildfire front but from adjacent burning structures or ember accumulations.

4. Fire Protection resources become overwhelmed: Even well-staffed fire departments and districts struggle when dozens or hundreds of structures ignite nearly simultaneously. Fire spread occurs faster than responders

can intervene, particularly when extreme winds prevent aerial support or compromise firefighter safety. The demand for suppression resources exceeds available capacity.

5. Fire protection effectiveness decreases: At this stage, traditional suppression becomes ineffective or nearly impossible. Congested streets, radiant heat, collapsing structures, blowing embers, and insufficient water supply can limit the ability of firefighters to operate safely or prevent additional home ignitions.

6. Urban or suburban conflagration catastrophe: When ignitions outpace suppression capacity, a self-sustaining, fast-moving urban firestorm develops. Structures burn in succession, and the fire becomes governed largely by building fuels, heat transfer, and wind—not vegetation. This is the defining condition of an urban conflagration.

The 2021 Marshall Fire followed this pathway: once the fire entered Louisville’s neighborhoods, multiple ignition pathways—fences, ornamental vegetation, attached structures, and direct structure-to-structure spread—drove rapid escalation beyond what suppression resources could control.

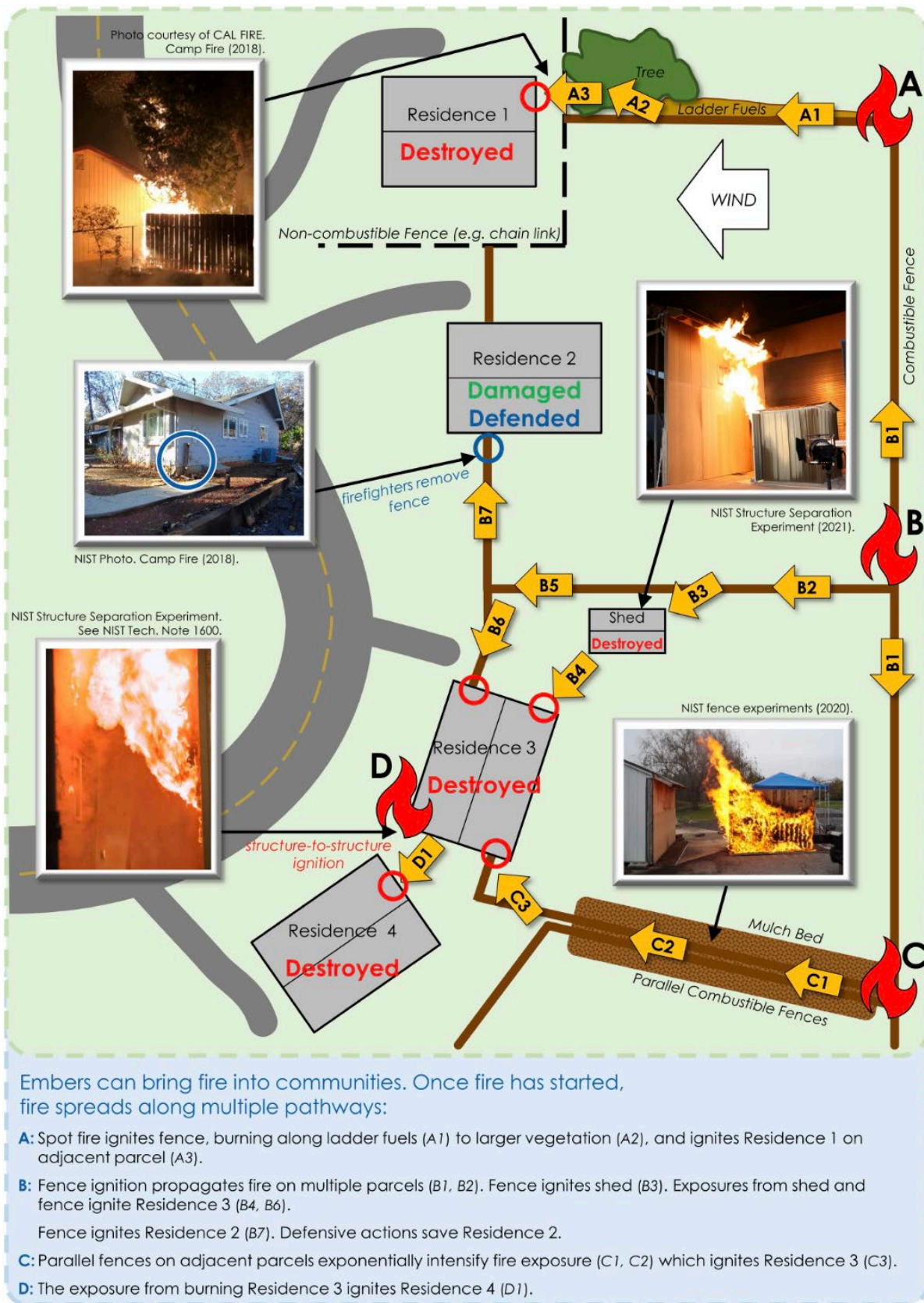


Figure 2. Fire spread along pathways in a community can affect neighbors even if individuals have completed home hardening and defensible space for their own property. This type of fire spread can lead to urban conflagrations that outpace ability of firefighters to respond. Source: National Institute of Standards and Technology (Maranghides et al., 2022).

Background

Louisville Fire Protection District and the City of Louisville

The Louisville Fire Protection District (LFPD) spans roughly 15.5 square miles in Boulder County, including the project area within the City of Louisville, which covers 8 square miles. The landscape of Louisville is dominated by flat areas, native grasslands and shrublands, and urban development. Elevations in Louisville range from 5,250 to 5,530 feet, though elevations in Boulder County extend to over 14,000 feet. This WCRA was prepared for the City of Louisville, not the entire response area of LFPD.

LFPD operates three fire stations and is a combination fire department, staffed by career and volunteer firefighters, administrative and maintenance staff, and emergency medical services (EMS) personnel. The City of Louisville is bordered by Lafayette, Broomfield, Superior, and unincorporated Boulder County. LFPD frequently coordinates with fire protection districts in these jurisdictions to provide auto aid and joint response to incidents.

Approximately 2,600 acres of land in the City of Louisville is publicly managed and overseen by a variety of agencies, including the City of Louisville Parks, Recreation, and Open Space Department and Boulder County Parks & Open Space. Many open spaces, parks, picnic areas, and public recreation areas are scattered throughout the city, with numerous connecting trails that require cooperative management and planning to maintain.

In 2023, the Lynker Corporation and The Ember Alliance completed a [Wildfire Hazard and Risk Assessment of Louisville Public Lands \(WRA\)](#), providing recommendations for vegetation management and mitigation on public lands and City-owned facilities. This 2025 Louisville WCRA complements that work by focusing on residential areas and the broader built environment, delivering targeted strategies for households and neighborhoods. At the time of this document's preparation, the City of Louisville was also developing a WUI map, which incorporates analyses tied to this project.

Since the 2023 WRA, and in response to lessons learned from the 2021 Marshall Fire, the City of Louisville and Boulder County have implemented numerous wildfire preparedness measures, including:

- Enhanced emergency notification systems, including expanded use of [BOCO Alert](#), public sign-up campaigns, and wider adoption of Wireless Emergency Alerts (WEA) across Boulder County.
- Creation of evacuation zones for Boulder County.
- Designation of trails for evacuation use during emergencies.
- Adoption of an indices-based wildfire response model to deploy more resources on high-risk days.
- Acquisition of additional wildfire suppression equipment for staff and volunteers.
- Completion of tabletop exercises to prepare for large-scale incidents.
- Passage of a citywide [Fire Hardening Building Code](#), with requirements for roofing, fencing, decks, gutters, siding, and eaves.
- Availability of [Individual Home Assessments](#) through Boulder County Wildfire Partners and LFPD.
- Implementation of wildfire-wise and water-wise landscaping at LFPD Station 2.
- Creation of wildfire home mitigation educational materials and events for residents.
- Ongoing use of mowing, cattle grazing, and goat grazing for vegetation management in open space areas.
- Increased fuel reduction and noxious weed management along trails and fence lines.

- Accomplishment of 94% of all tasks assigned to the OpenSpace Division in the City of Louisville Department of Parks, Recreation, and Open Space for high, moderate, and low risk fire areas from the 2023 WRA.
- Partnership with Colorado Natural Resources Conservation Services (NRCS), Bird Conservation of the Rockies, CU Boulder Earth Lab, Colorado State Forest Service (CSFS), Boulder Watershed Collective (BWC), CSU Extension, and Boulder County Fireshed.
- City of Louisville Open Space Division in the Department of Parks, Recreation, and Open Space is working with the University of Colorado Boulder, CU Boulder Earth Lab, Boulder County Parks and Open Space, and City of Boulder Open Space and Mountain Parks to better understand how grassland fuels vary across space and time and the effectiveness and consequences of potential management methods for reducing fire risk.

Additional countywide accomplishments can be found in the [2024 Boulder County Community Wildfire Protection Plan \(CWPP\)](#).



Photo credit: louisvilleco.gov

Wildland-Urban Interface

Wildfires cause billions of dollars in suppression costs and destroy thousands of homes in the United States each year (Bayham et al., 2022; Higuera et al., 2023). In recent years, some of the most destructive, deadly, and costly wildfires have occurred, driven in part by the continued expansion of housing into the WUI. This risk is further intensified by severe fire weather conditions linked to climate change (Caton et al., 2016).

Nearby examples of fires that severely impacted residents in the WUI include:

- 2020 Cameron Peak Fire – destroyed 469 structures.
- 2020 East Troublesome Fire – destroyed at least 366 structures.
- 2021 Marshall Fire – destroyed over 1,000 structures.

The WUI is any area where the built environment meets or intermingles with wildfire-prone vegetation—locations where wildfire can transition between natural vegetation and human-made structures, resulting in impacts to the community (Mowry and Johnston, 2018). The 2021 Marshall Fire demonstrates that wildfires can burn through grasslands and into the built environment, morphing into an urban conflagration with uncontrollable structure-to-structure ignitions (Giammanco et al., 2023).

WUI areas occur along a continuum from wildland to urban densities (**Figure 3**). The built environment includes homes and businesses, infrastructure and utilities, roadways and access routes, and geographic features that can aid wildfire suppression, such as roads and ridgetops (*Healthy Forest Restoration Act*, 2003)

When wildfire transitions into a densely built area and begins rapid structure-to-structure spread, the event becomes an urban conflagration. Residents and workers in the WUI must understand both the direct wildfire threat and the potential for such conflagrations. At the time of writing, the City of Louisville was developing a WUI map, incorporating analyses conducted for this project.

According to the 2024 [Wildfire Risk to Communities](#) analysis by the U.S. Forest Service (USFS), Louisville has a greater wildfire likelihood than 85% of communities in the United States (USFS, 2024a). Over the past 50 years, immigration to Colorado’s Front Range has increased the number of occupied structures within this landscape, which was historically short-grass prairie, fire-adapted ponderosa pine forests, and riparian ecosystems. This growth has expanded both the density and geographic extent of the WUI, raising the risk of structure loss and increasing the likelihood of fire ignitions.

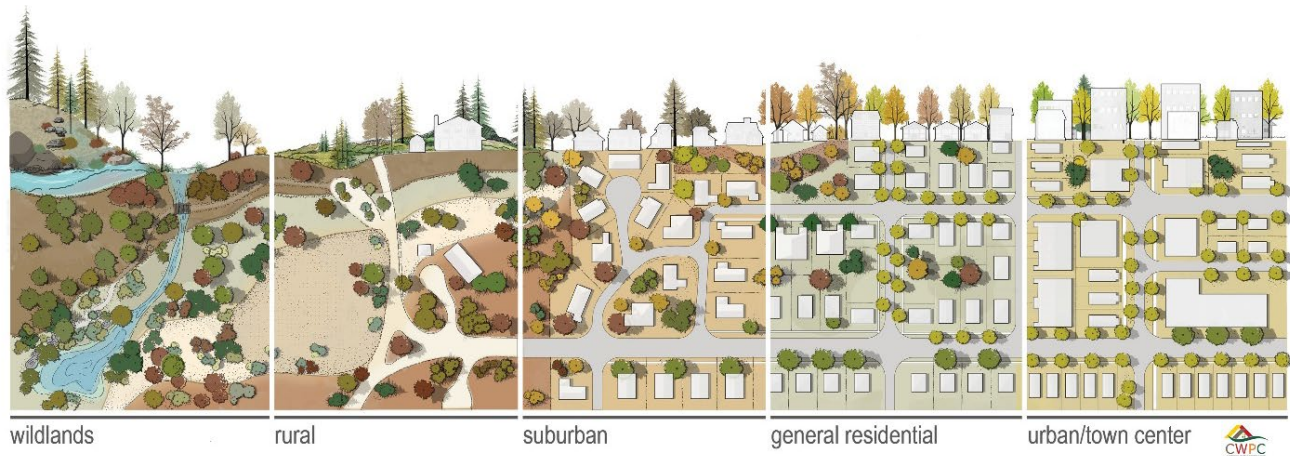


Figure 3. The WUI exists along a continuum of wildland to urban. Source: Community Wildfire Planning Center.

Fire History Along the Colorado Front Range

Before the era of organized fire suppression, wildfires regularly shaped Colorado's Front Range landscapes. Whether ignited by Indigenous peoples or natural causes, frequent, low-severity fires were common in grasslands, shrublands, and ponderosa pine and dry mixed-conifer forests prior to European settlement in the 1850s. Some wildlife species also benefit from recently burned ecosystems, where lower tree densities and an abundance of understory vegetation create favorable habitat (Kalies et al., 2012; Pilliod et al., 2006).

Much of the area around Louisville was once covered in Western Great Plains foothill and piedmont grassland and Western Great Plains shortgrass prairie (Decker et al., 2020). Grazing by native ungulates (deer, elk, pronghorn, and bison), foraging and burrowing activity of prairie dogs, and fires started by lightning and Native Americans were important disturbances in these ecosystems. Regular grazing and fires occurring every 5 to 25 years maintained patchy fuels and high biodiversity in grasslands prior to Euro-American settlement (Milchunas et al., 2014; Schulz et al., 2014). Higher frequency fires in ponderosa pine ecosystems along the Colorado Front Range were associated with proximity to grasslands due to the ability of grassland vegetation to dry out and carry rapidly spreading wildfire during dry years (Gartner et al., 2012).

Since the late 19th century, vegetation conditions and housing density have changed dramatically along the Colorado Front Range (**Figure 4**). Western Great Plains foothill piedmont grasslands and western Great Plains shortgrass prairie are some of the most severely degraded ecosystems in the state due to urban and suburban development, agricultural activities, fire exclusion, altered animal grazing, fragmentation, and invasion by non-native species (Decker et al., 2020). Grasslands invaded by cheatgrass and smooth brome have more abundant fine fuels, greater fuel continuity, and lower fuel moisture earlier in the summer than native grasslands, thereby creating conditions susceptible to fast-moving wildfires (Davies and Nafus, 2012; Fusco et al., 2019).

Annual and seasonal variation in the abundance and moisture content of grassland vegetation is extreme in the area around the City of Louisville (**Figure 5**), and this variation significantly impacts the risk of wildfire in grassland ecosystems. Wildfires occur more commonly in grasslands during especially dry years along the Colorado Front Range, and they can be more likely 1-2 years after seasons with abundant grass growth caused by above-average moisture availability (Gartner et al., 2012). Many catastrophic wildfires in Colorado's history have occurred on dry and windy days, particularly when wind gusts exceeding 60 mph, resulting in rapidly spreading fires that outpace the ability of firefighters to respond and make wildfire suppression nearly impossible (Haas et al., 2015).

Catastrophic wildfires are becoming more common due to a combination of climate change, dense wildland vegetation, extreme heat and high winds, unplanned ignitions, and housing developments in the WUI (Haas et al., 2015; Parks et al., 2016). Fast-moving and destructive wildfires are most common in grassland-dominated vegetation (Balch et al., 2024), and wildfires in grasslands and shrublands destroy more homes in the WUI than wildfires in forests across the United States (Radeloff et al., 2023). Several large wildland fires have occurred in Boulder County over the past 15 years, with many wildfires resulting in home loss, and some in tragic loss of life. Notable recent wildfires include:

- 2024 Stone Canyon Fire
- 2021 Marshall Fire
- 2020 Cal-Wood Fire and Lefthand Canyon Fire
- 2016 Cold Springs Fire
- 2010 Fourmile Canyon Fire

In particular, the 2021 Marshall Fire serves as a clear example of urban conflagration risk to the City of Louisville. The 2021 Marshall Fire on December 31, 2021, was preceded by a wet spring that promoted abundant growth of vegetation followed by months of hot and dry conditions resulting in high to severe fire

danger. The fire was further exacerbated by sustained winds of 50 to 60 mph and gusts of 70 to 100 mph. A detailed [Facilitated Learning Analysis for the Marshall Fire](#) was completed by the Colorado Division of Fire Prevention and Control (DFPC) in 2022/2023 (Holstrom et al., 2023). For more information on wildfire history and fire behavior in Boulder County, see the [2024 Boulder County CWPP](#).

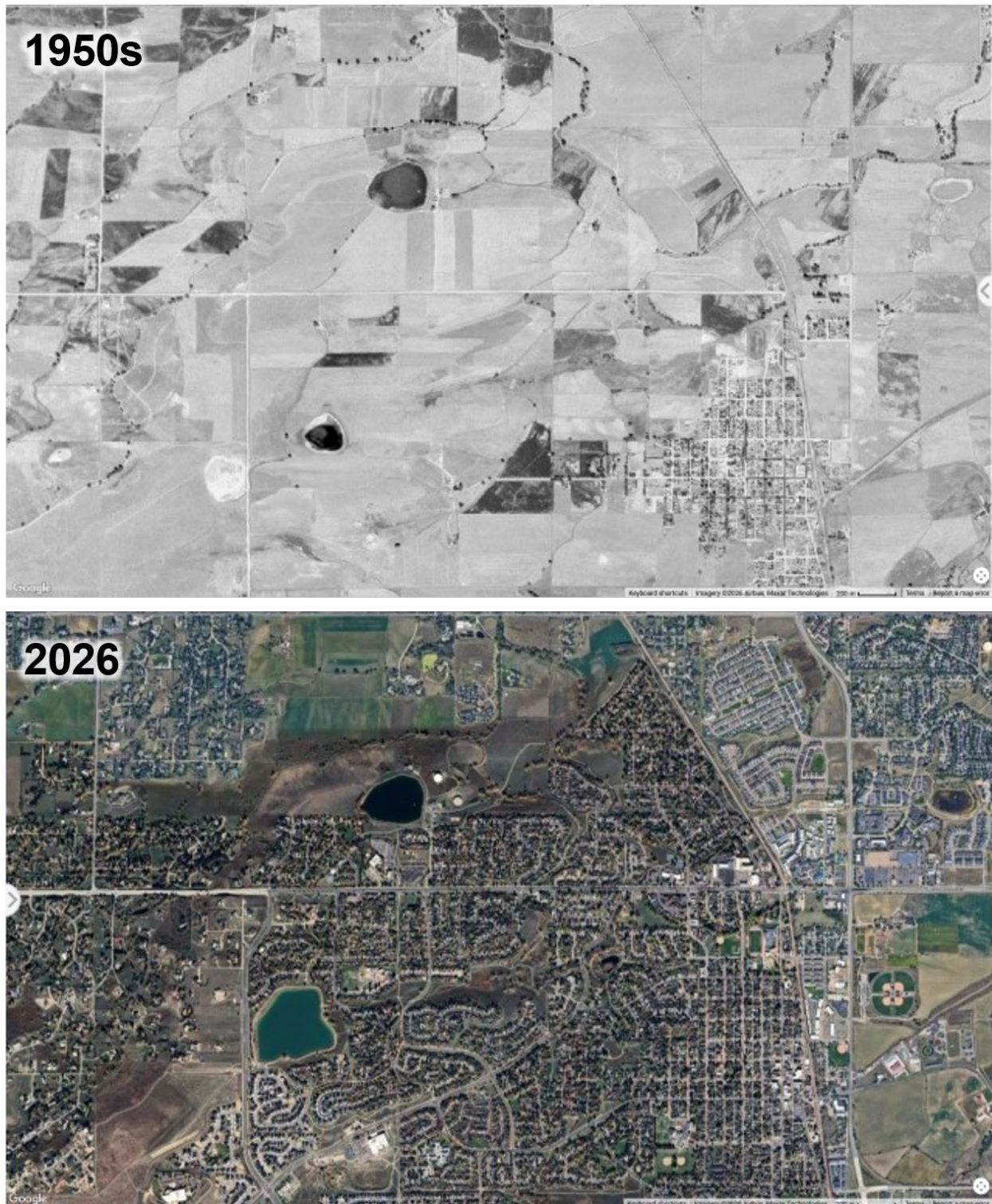
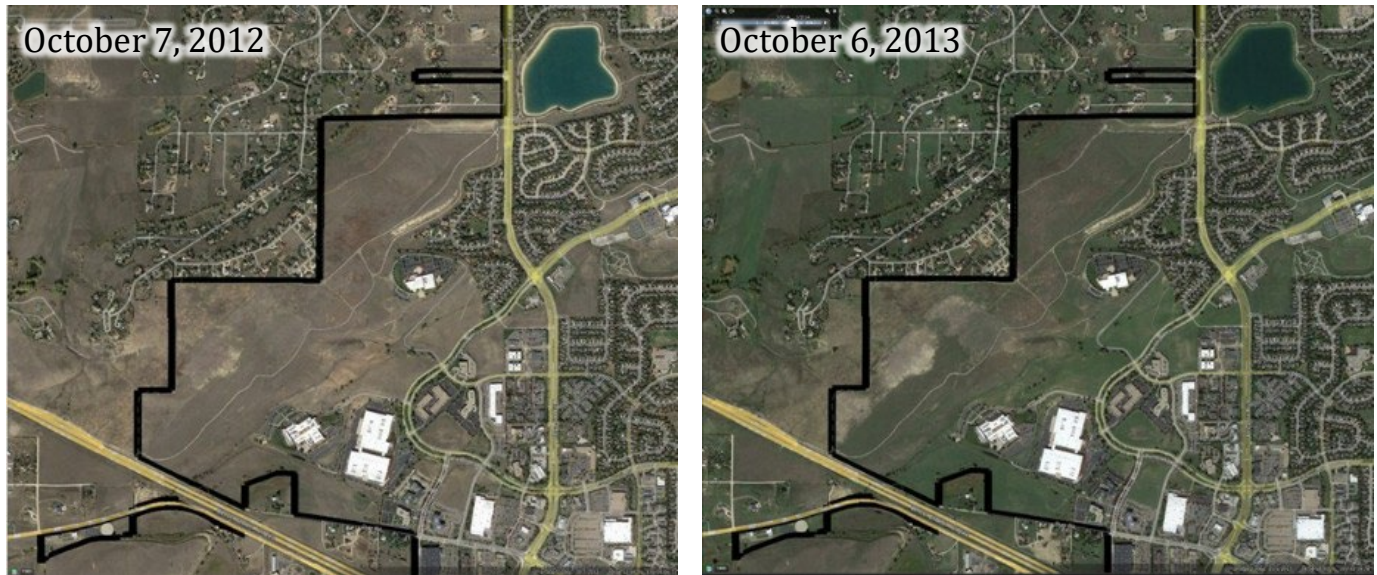


Figure 4. Urban development along the Colorado Front Range over the past 75 years has dramatically altered the landscape and increased the chance of fires in the WUI. Source: [Landscape Explorer](#) and Google Earth imagery.

Annual variation

Western portion of the City of Louisville



Seasonal variation

Eastern portion of the City of Louisville

Image taken May 3, 2025 | Image taken March 3, 2025



Figure 5. There is significant variation in fuel load and moisture content in grassland fuels in the area around Louisville on an annual and seasonal basis. Large, fast-moving wildfires are more common during years with exceptionally hot and dry weather. The 2021 Marshall Fire occurred during a year with prolonged hot and dry conditions. Image sources: Google Maps.

Urban Conflagration Modeling

Overview of AGNI-NAR Conflagration Model

In this study, fire spread in and around the City of Louisville was modeled using the AGNI-NAR mode (Asynchronous Graph Nexus Infrastructure for Network Assessment of Wildland-Urban Interface Risk) (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018). The model assesses fire propagation through intermixed fuel of structures and vegetation and simulates fire propagation from vegetation to vegetation, structure to vegetation, vegetation to structure, and structure to structure via convection, radiation, and ember spotting (**Figure 6**) (Mahmoud, 2024a). AGNI-NAR accounts for relevant community-specific characteristics, including wind conditions, community layout, individual structural features, and the surrounding wildland and managed vs. unmanaged urban vegetation.

Commonly used fire behavior models like FlamMap, Wildfire Analyst, and FSim were developed and tested for fire behavior in wildland vegetation. Some modifications and secondary analyses can be done to approximate spread of wildfires into urban and suburban areas using these models (CSFS and Technosylva, 2023; Napoli et al., 2022b). However, unlike AGNI-NAR, these models do not account for the complex relationships that govern fire spread from vegetation to structures, structure to structure, and structure to vegetation.

AGNI-NAR permits modeling of wildfire spread into populated areas like Louisville in a novel way that aligns well with observed home loss during several recent fires in the WUI, including the 2021 Marhsall Fire (Chulahwat et al., 2022; Chulahwat and Mahmoud, 2024; Mahmoud, 2024b). See more information on model validation in **Appendix A. Methodology for Urban Conflagration Modeling**.

Benefits of modeling fire behavior with AGNI-NAR for the City of Louisville are the ability to identify clusters of homes with the greatest vulnerability to fire, areas of vegetation with the greatest potential to transmit fire into the community, and impacts of fuel mitigation in public land and other shared spaces on potential vulnerability to wildfire, as well as impacts of mitigation in the HIZ.

Important Considerations about Conflagration Modeling Predictions

The urban conflagration model AGNI-NAR provides a robust and novel way to assess fire transmission in the WUI. The model captures fire spread from vegetation to structure, structure to structure, and structure to vegetation in ways that common fire behavior models cannot.

Keep these considerations in mind while absorbing findings from this project:

- **Wildfire behavior is complex, and models are a simplification of reality.** It is recommended to use this conflagration analyses to understand relative risk across the City of Louisville and not as an indication of a single property's risk.
- **This analysis looks at cumulative fire boundaries**, which means maps show potential impacts from 1,000 different fire ignition scenarios. Maps **do not** depict spread and damages that might occur during a single fire event.
- **Results are specific to the City of Louisville and cannot be generalized to other WUI communities.** A power of the AGNI-NAR model is its ability to capture complex interactions between topography, wind, vegetation, and structures unique to a specific community, and the model output was calibrated based on observations from the 2021 Marshall Fire.
- **This analysis used housing density and building materials present in 2025.** This project does not attempt to recreate what happened during the Marshall Fire. The goal was to look forward and promote further improvements towards becoming a fire adapted community.

Results presented in this report differ in purpose, findings, and implications to analyses for the 2022 Colorado Wildland Fire Risk Assessment (CO-WRA) from CSFS and the 2022 Colorado All Lands Assessment (COAL) from the U.S. Forest Service (CSFS and Technosylva, 2023; Napoli et al., 2022b). Analyses from the 2022 CO-WRA and COAL are useful for assessing potential fire intensity for wildland fires, relative differences in the likelihood of wildfires, and relative differences in wildfire risk to the WUI and other highly valued resources and assets across the state of Colorado.

Predictions from the 2022 CO-WRA do not represent the level of risk for urban conflagration known to exist across much of Louisville, as evidenced by damage done during the 2021 Marshall Fire. Some areas that experienced home loss from the 2021 Marshall Fire are predicted as having none, lower, low, or moderate risk by the 2022 CO-WRA and COAL (Holstrom et al., 2023). Although the 2022 CO-WRA analyses occurred after the 2021 Marshall Fire, the prediction of lower risk in much of Louisville is not a product of post-2021 modifications to vegetation by modelers to account for impacts of the Marshall Fire. For all of these reasons, results from the 2022 CO-WRA are not directly comparable to predictions of conflagration presented in this report.

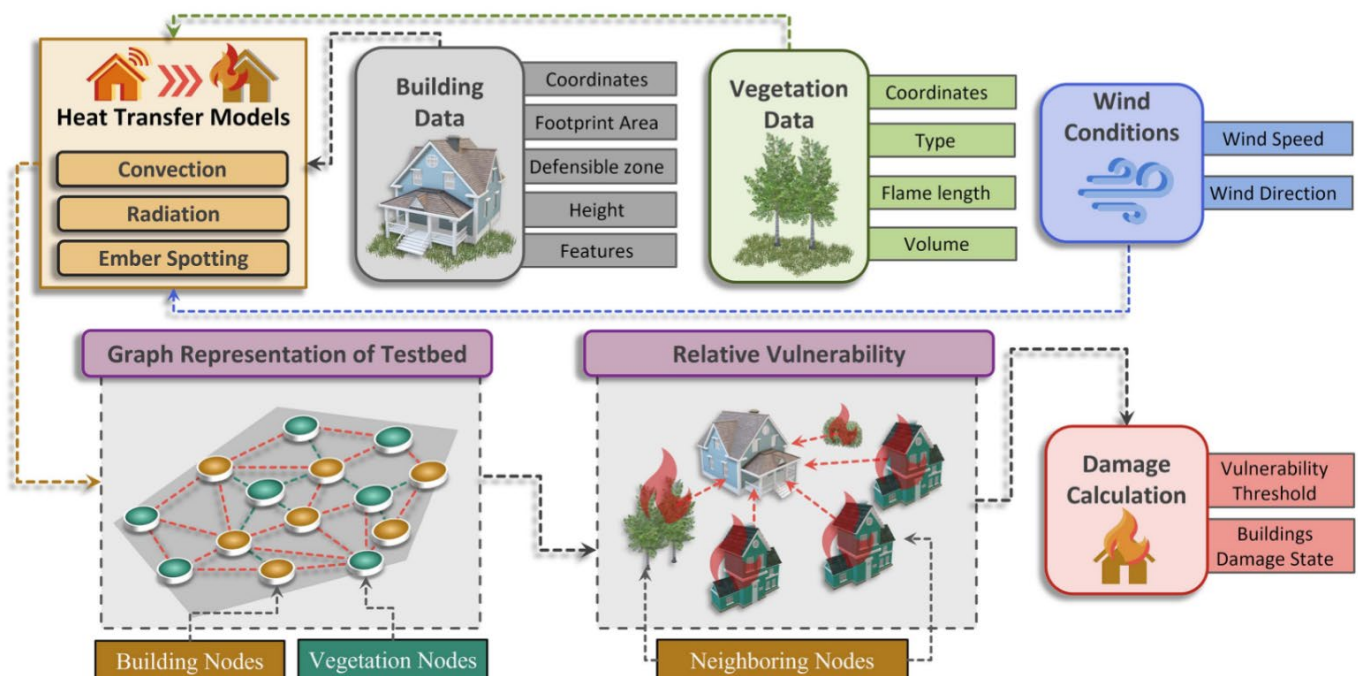


Figure 6. Illustration of the AGNI-NAR model. Community buildings and vegetation are depicted as a network of connected fuel with heat transfer mechanisms (convection, radiation, and ember spotting) accounted for between all ignitable fuels (Chulahwat and Mahmoud, 2024).

Types of Analyses and Output

Two types of analysis are conducted by AGNI-NAR to determine the potential fire perimeter and the vulnerability of structures to wildfire. With known ignition point(s) or line(s), the fire perimeter is determined using the most probable path (MPP) analysis. Once the fire perimeter is known, the expected damage to structures within the perimeter is determined using the relative vulnerability analysis. Experience by AGNI-NAR model developers with modeling various historical events indicates that buildings with relative vulnerability less than 0.7 have a low likelihood of burning. The model also predicts transmission capacity, which identifies vegetation with the greatest potential to transmit fire to adjacent vegetation. See more information on AGNI-NAR analyses and output in **Appendix A. Methodology for Urban Conflagration Modeling**.

Individual Fire Perimeters vs. Cumulative Fire Zone

It is critical to understand the differences between fire perimeters for individual ignition scenarios and cumulative fire zones when interpreting the results from AGNI-NAR analyses for the City of Louisville. The results presented in this document are for the cumulative fire zone, which is an aggregation of all MPPs resulting from 1,000 scenarios with random ignition locations (**Figure 7**). Resulting fire perimeters and relative vulnerability of structures vary depending on ignition location due to meaningful variation in fire transmission based on fire origin. This report relies on cumulative fire zones because the exact location of a future fire event cannot be anticipated. Relying on a few individual ignition scenarios would ignore fire transmission and vulnerability that might occur in other parts of Louisville were an ignition to occur elsewhere.

The objectives of assessing relative vulnerability across Louisville and the potential impact of mitigation actions required a focus on cumulative fire zones. However, the use of cumulative fire zones requires careful interpretation of maps presented in this document. **Maps of the cumulative fire zone do not represent the predicted fire perimeter for a single event, and maps of relative vulnerability of structures to urban conflagrations do not represent potential vulnerability and structure loss during a single event.** Estimates of the percentage of structures with a lower chance of burning (relative vulnerability < 0.7) **do not** represent the percentage of homes that could survive during a single fire event. For example, an estimated percentage of structures with a lower chance of burning of 75% suggests that three-fourths of structures have lower risk to ignition if exposed to a fire. It **does not** suggest that 75% of structures might survive during a single fire event; not all structures included in the cumulative fire zone are likely to experience fire from the same fire event. See more information on formulation and interpretation of the cumulative fire zone in **Appendix A. Methodology for Urban Conflagration Modeling**.

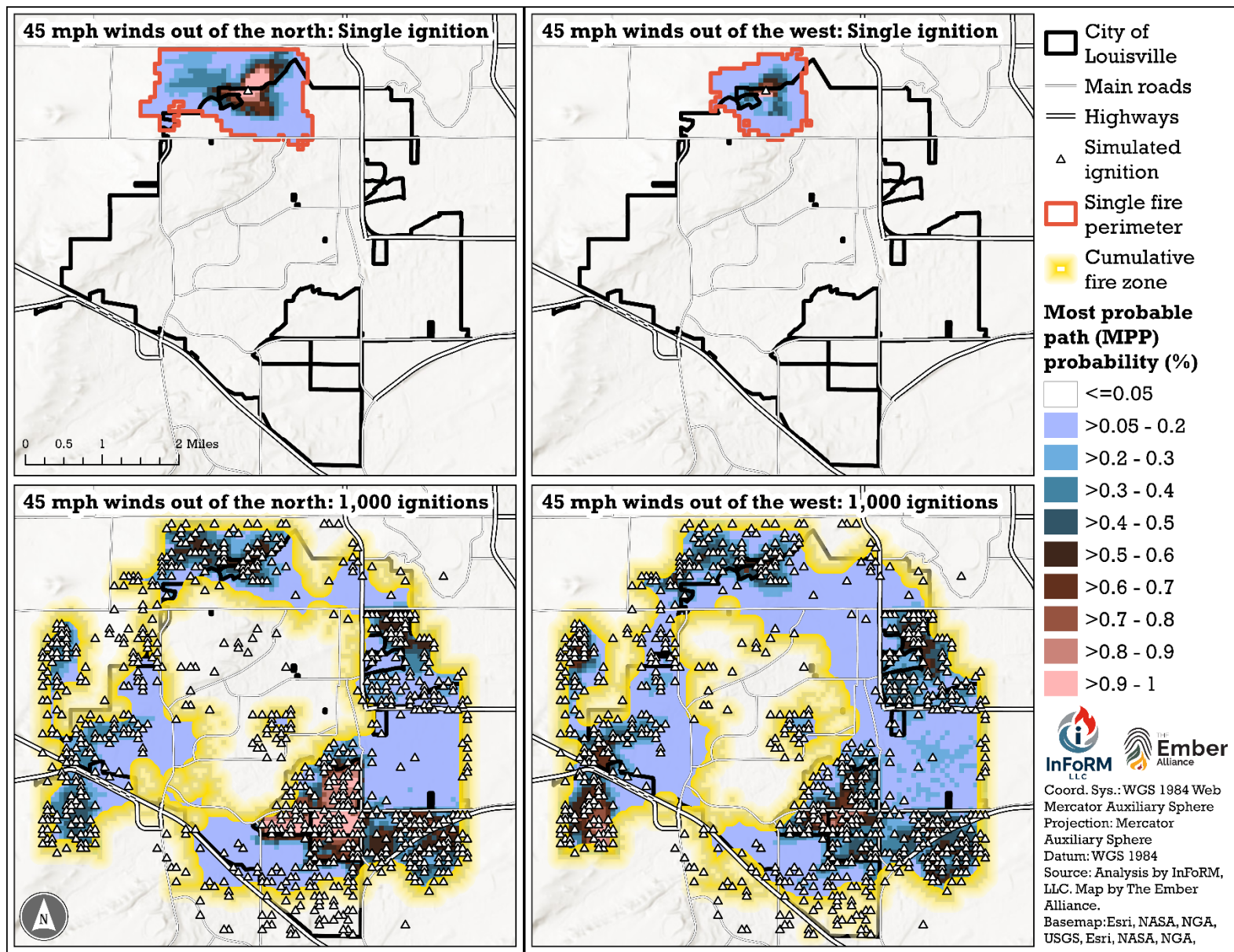


Figure 7. Individual fire perimeters and MPP probabilities for a single ignition scenario (maps at left) compared to cumulative fire zones and MPP probabilities based on 1,000 scenarios with random ignition locations (maps at right) under 45-mph winds blowing out of the north (upper maps) and winds blowing out of the west (lower maps). **Cumulative fire zones were utilized for results presented in this report.**

Model Input for the City of Louisville

The AGNI-NAR model requires information on topography, vegetation, and weather conditions—inputs also required by fire behavior models such as FSIM and FlamMap. Additionally, the model requires information on structure locations, building material, and fuels in defensible space zones 1 and 2. See details on model input for the City of Louisville in **Appendix A. Methodology for Urban Conflagration Modeling**.

All fire modeling for this project assumed very dry fuel conditions (3% 1-hour fuel moisture, 4% 10-hour fuel moisture, and 5% 100-hour fuel moisture). An assumption made for this project was that simulated wildfires occur when agricultural fields have not been harvested or recently grazed and have abundant, dry grass, meaning they have the potential to burn and transmit wildfire. The 35-acre 104th Fire on January 5, 2026, in Louisville illustrated that fires do ignite and spread on land used for agricultural purposes.

Wind speed scenarios for this project were 45 and 85 miles/hour (20-foot wind speeds) with winds blowing out of the west (270°) and with winds blowing out of the north (0°). Selected wind scenarios were based on historic weather data observed in the Louisville area from the National Oceanic and Atmospheric Administration (NOAA) [National Centers for Environmental Information \(NCEI\)](#).

Structure locations were acquired from the Boulder County [Assessor's Property Data Download](#), Federal Emergency Management Agency data, and manual quality assurance by The Ember Alliance. Information on characteristics in the HIZ for each structure, which includes building construction, vegetation in defensible zone 1 (0-5 feet from structures), and defensible space zone 2 (5-30 feet from structures), were collected from the Boulder County Assessor Data and an on-the-ground assessment conducted by The Ember Alliance (details provided in **Appendix A. Methodology for Urban Conflagration Modeling**). Examples of different fuel loads in defensible space zones 1 and 2 in the City of Louisville are depicted in **Figure 8**.

Inputs for this analysis used housing density and building materials present in 2025. The baseline scenario evaluated vegetation conditions present in 2025 but assuming no vegetation mitigation by the City of Louisville. An additional scenario specifically considered and evaluated the impact of ongoing vegetation mitigation. This project does not attempt to recreate what happened during the Marshall Fire. The goal was to look forward and promote further improvements towards becoming a fire adapted community.

Modeling Scenarios

Several scenarios were evaluated to explore the impact of the future [Redtail Ridge development](#), potential HIZ mitigation, and ongoing and potential vegetation management on public land, shared land, and ditches. Scenarios were evaluated for 45 mph winds out of the west and out of the north.

Scenarios were evaluated with different levels of HIZ mitigation strength (i.e., percent reduction in potential ignitability as measured by building factor) and different levels of participation in HIZ mitigation practices (i.e., percentage of structures experience mitigation) to understand their impact on cumulative fire zones and likelihood of damage to buildings. A scenario was also evaluated assuming that every structure had no fuel in defensible space zone 1. The goal was to assess the potential impact of this type of WUI building code on fire spread and structure vulnerability to wildfire.

Nine scenarios were evaluated with different amounts of vegetation management on open space, other shared land, such as parks and greenbelts, and ditches. For example, one scenario considered ongoing vegetation management by the City of Louisville Department of Parks, Recreation, and Open Space, and another focused on the impact of linear fuel treatments such as mowing along the perimeter of public land and clearing vegetation along ditches. See details on modeling scenarios for this project in **Appendix A. Methodology for Urban Conflagration Modeling**.

High fuel loads in defensible space zones 1 and 2



Moderate fuel loads in defensible space zones 1 and 2



Low fuel loads in defensible space zones 1 and 2



Figure 8. Examples of high, medium, and low fuel loads in defensible space zones 1 and 2 observed in the City of Louisville. Photo credit: The Ember Alliance.

Important Considerations and Caveats

The AGNI-NAR model provides a robust and novel way to assess fire transmission in the WUI. The model captures fire spread from vegetation to structure, structure to structure, and structure to vegetation in ways that common fire behavior models cannot. As with any model, there are critical considerations and caveats that must be understood when interpreting predictions.

While reading about the findings from the WCRA for the City of Louisville, keep the following points in mind:

- **Wildfire behavior is complex, and models are a simplification of reality.** It is recommended to use this conflagration analyses to understand relative risk across the City of Louisville and not as an indication of a single property's risk.
- **This analysis looks at cumulative fire zones,** which means maps show potential impacts from 1,000 different fire ignition scenarios. Maps **do not** depict spread and damages that might occur during a single fire event.
- **Results are specific to the City of Louisville and cannot be generalized to other WUI communities.** The power of the AGNI-NAR model is its ability to capture complex interactions between topography, wind, vegetation, and structures unique to a specific community, and the model output was calibrated based on observations from the 2021 Marshall Fire.

Key Findings

After reviewing model output, the WCRA Core Team identified the following key findings supported by advanced conflagration modeling for the City of Louisville. Each finding is described and illustrated with supporting figures in the following sections.

1. **Wind is key in fire behavior.** Weather conditions, particularly wind speed and direction, have a tremendous impact on potential fire spread and structure vulnerability during a conflagration.
2. **Risk of structure loss during conflagration is widespread.** Many structures across Louisville have the potential to experience damage from wildfire and associated urban conflagrations under high and extreme wind speeds. Vegetation-to-home and home-to-home fire spread could cause conflagrations to reach into the interior of the city.
3. **HIZ mitigation is important, and participation is more important than perfection.** Widespread home hardening and defensible space is critical to reduce the potential for structure loss. Community-level action is required, especially in areas with closely spaced structures, more flammable building materials, and more established vegetation near structures. More homeowners and businessowners doing meaningful work to mitigate risk is more effective than some people doing all the work.
4. **Public land management is helping.** Ongoing vegetation management by the City of Louisville in strategic locations on public land and other shared spaces is making the community safer.
5. **Vegetation mitigation should be targeted.** Additional vegetation management in strategic areas could further reduce fire growth and structure vulnerability in parts of the city. High quality treatments in high priority areas are more effective than indiscriminately treating vegetation.

Weather Conditions Significantly Impact Potential Fire Spread

Weather conditions, particularly wind speed and direction, have a tremendous impact on potential fire spread and structure vulnerability during a conflagration (Chulahwat and Mahmoud, 2024). Under mild wind speeds of 10 mph, the model suggests very low potential for fire spread (results not shown), moderate potential for spread under 45 mph winds, and widespread potential under extreme wind speeds of 85 mph (**Figure 9**). Winds blowing out the west have a greater potential for fire spread than winds out of the north. There are less pathways for fire to travel from vegetation from north to south than from west to east.

Areas with a high likelihood of burning include large tracts of grassland that are managed by the City of Louisville, City of Lafayette, City of Boulder, or Boulder County, or jointly managed. Several of these properties are actively managed with grazing, hay production, or dryland crop production which can reduce the potential for fire to spread across these properties during certain times of the year. An assumption made for this project was that simulated wildfires occur when agricultural fields have not been harvested or recently grazed and have abundant, dry grass, meaning they have the potential to burn and transmit wildfire. The 35-acre 104th Fire on January 5, 2026, in Louisville illustrated that fires do ignite and spread on land used for agricultural purposes



This project modeled wildfires and associated conflagrations occurring when fuels are very dry and agricultural fields have not been harvested or recently grazed. Photo credit: Top image of Mayhoffer Farm in Boulder County from the [2021 Mayhoffer Farm Management Plan](#) by Boulder County, City of Lafayette, and City of Louisville, and bottom image of Harney-Lastoka Open Space from the City of Lafayette.

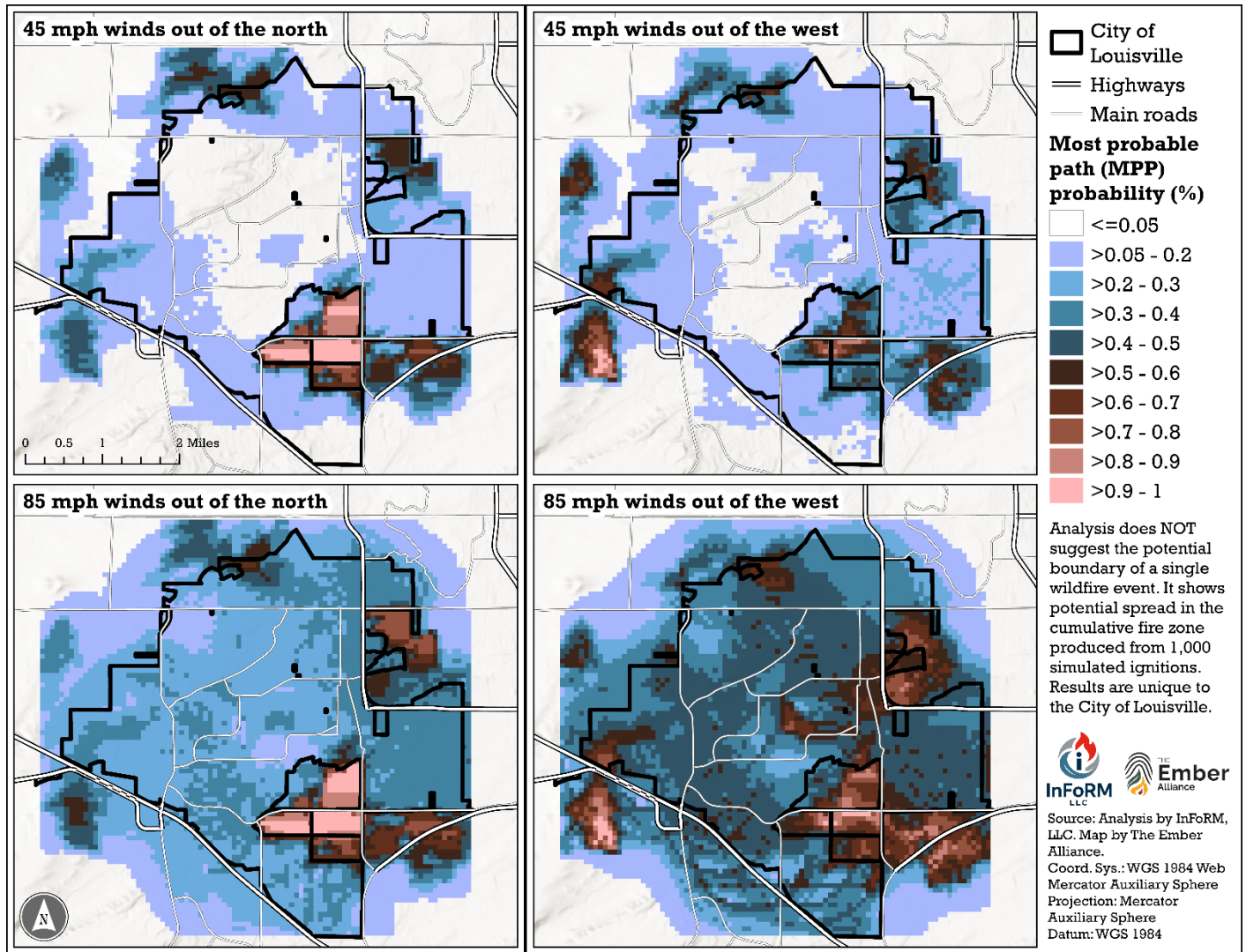


Figure 9. Most probable path (MPP) probabilities in the cumulative fire zone under very dry fuels and 45 mph winds (upper maps) or 85 mph winds (lower maps) and out of the north (left maps) or out of the west (right maps). MPP probabilities indicate the likelihood of a fire reaching an area, with high values indicating a high likelihood. Areas with an MPP probability of <0.1 were excluded from the cumulative fire zone. This analysis does not indicate the potential boundary of a single fire event—it depicts potential pathways of fire spread within the cumulative fire zone based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

Structure Vulnerability is High Across Much of Louisville

Many structures across Louisville have the potential to experience damage from wildfire and associated urban conflagrations under high and extreme wind speed. Remember, this analysis does not predict the vulnerability of homes during a single conflagration—it's looking at potential exposure in the cumulative fire zone (see description in the **section Individual Fire Perimeters vs. Cumulative Fire Zone**). Structure vulnerability is higher if winds blow out of the west instead of out of the north during a conflagration. Under 45 mph wind speeds, 38% of structures in the cumulative fire zone have a high vulnerability if they were to be encountered by a conflagration with winds blowing out of the west, and 28% of structures have high vulnerability with winds blowing out of the north. Under 85 mph wind speeds, structure vulnerability is widespread and ubiquitous, with 92% of structures having high vulnerability under winds from the west and 84% under winds from the north (Figure 10).

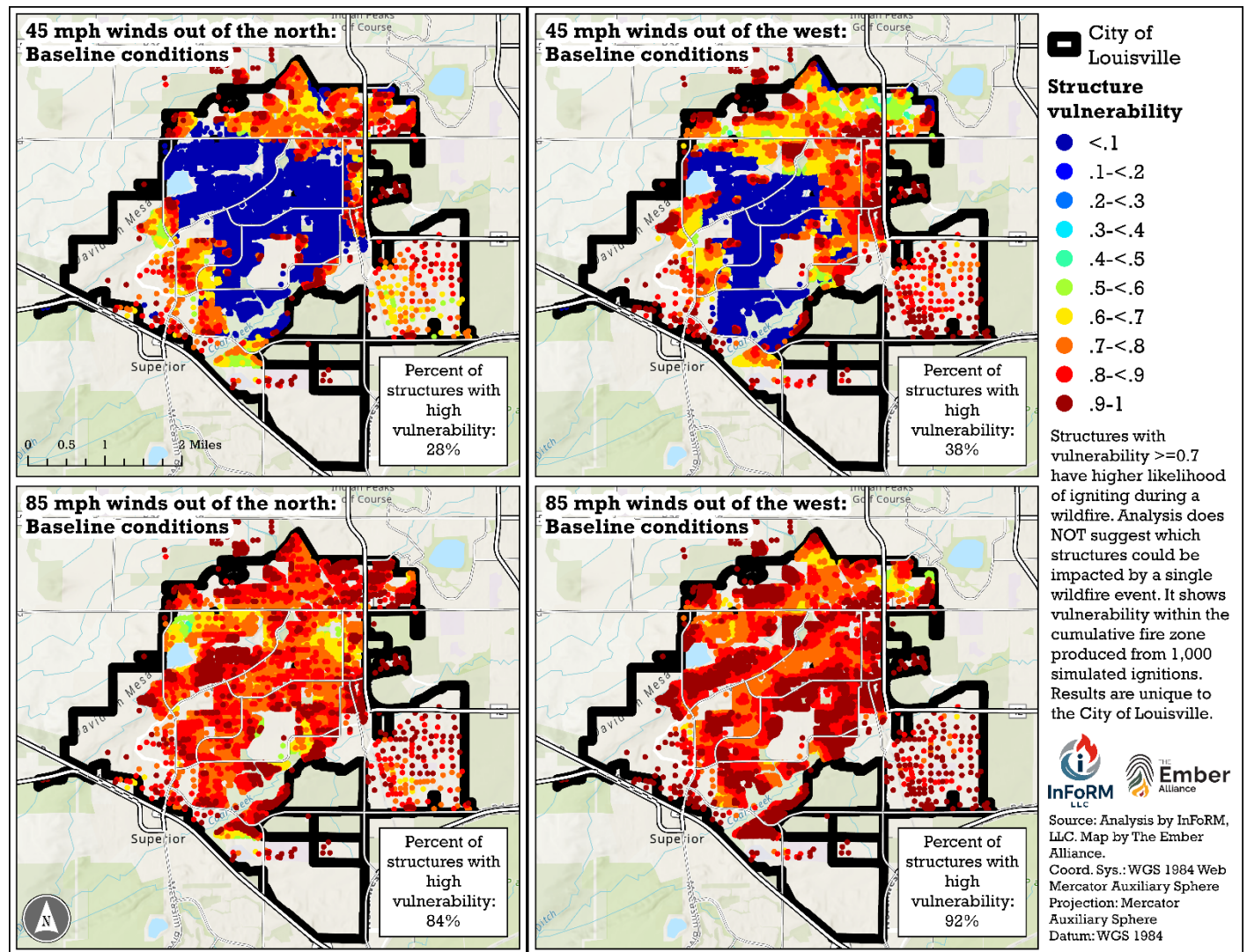


Figure 10. Structure vulnerability in the cumulative fire zone under very dry fuels and 45 mph winds (upper maps) or 85 mph winds (lower maps) and out of the north (left maps) or out of the west (right maps). Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

The potential for urban conflagration to impact structures across the City of Louisville is driven by multiple, interacting factors, including HIZ characteristics, the proximity of structures, the orientation of structures within a neighborhood, the type, distribution, and arrangement of vegetation in and around neighborhoods, topography, and fire weather. A key strength of the AGNI-NAR conflagration model is its ability to incorporate these interacting variables. This section highlights some factors that contribute to higher risk of structure ignition in different parts of the City of Louisville, but **keep in mind that multiple interacting factors influence risk, and there is not one single variable that explains structure risk at any given location in the city.** Structure vulnerable in one part of the city can originate from high risk and fire transmission capacity in other parts of the city that allow for continuous fire spread via vegetation-to-vegetation, vegetation-to-structure, structure-to-structure, and structure-to-vegetation ignitions.

In general, structure vulnerability is higher around the edges of the city in areas adjacent to large tracts of public land or agricultural fields, where homes are closer together, housing density is higher, and in areas with older homes that have more flammable construction material and more established vegetation in the home ignition zone (**Figure 11; Table 1**). If wildland fire were to transition into urban conflagration, even structures south of West South Boulder Road and in the downtown area could experience damage. Areas impacted by the 2021 Marshall Fire still have elevated vulnerability, especially if winds blow out of the west during a conflagration. The small separation distance between structures in some neighborhoods impacted by the Marshall Fire and their proximity to publicly and privately owned grasslands help account for the higher risk in these areas.

The Colorado State Forest Service recommends focusing on mitigation within the first three rows of homes in the WUI in areas adjacent to grasslands (CSFS et al., 2024); however, this analysis suggests that more than three rows of homes are vulnerable to urban conflagration and could benefit from HIZ mitigation in parts of Louisville. The model suggests the highest structure vulnerability in the first two to three rows of homes around Warembourg Open Space, but structure vulnerability around North and Davidson Mesa Open Spaces extends far beyond the first three rows of homes.

Structures that are closer to other structures also have a higher likelihood of ignition and initiating home-to-home ignition. Almost 85% of structures in the City of Louisville are within 30 feet of other structures, which increases their potential for ignition from adjacent structures according to research by the National Institute of Standards and Technology (Maranghides et al., 2022). About 18% of the structures are extremely close to other structures (<6 feet apart). Structures that are extremely close to other structures are scattered across the city, but there is a higher abundance of extremely close structures in the northeastern part of Louisville and in the neighborhoods northeast of Dutch Creek Park and north of Avista hospital (**Appendix A. Figure 35**). These areas also have high structure vulnerability to ignition under 45 mph winds.

Counterintuitively, the model predicts high vulnerability for structures in the Colorado Tech Center and the commercial district in southwestern Louisville. Higher structure vulnerability in these areas is largely due to the high potential for fire to spread in the surrounding grasslands. There is also burnable fuel scattered among buildings in the Colorado Tech Center. Roofing material in these business areas were listed as being rubber membrane by the Boulder County Assessor, and ignition-resistance of rubber membrane was modeled as lower than all roofing material other than cedar shake. Research reviewed by InFoRM, LLC suggests that rubber membrane roofs perform worse than other class A roofs like asphalt, clay, concrete, and metal. However, buildings in commercial districts in the City of Louisville most likely have a low likelihood of ignition due to their construction material. Many commercial buildings survived the 2021 Marshall Fire despite receiving abundant embers. At the same time, if embers were able to enter a commercial building, the outcome could be destructive.

Future changes to vegetation and additional structures in the planned Redtail Ridge development are unlikely to have a significant impact on wildfire fire spread or structure vulnerability (**Figure 12**). Conversion of grassland vegetation into manicured landscaping interrupted by parking lots and roads would reduce the capacity of this area to transmit wildfire, but with predominant winds coming from the west or the north, it is unlikely that wildfires would spread through this property and into the City of Louisville. Structures planned for the Redtail Ridge development are far from any existing structures and unlikely to initiate structure-to-structure spread outside the development. Vulnerability to structures on the Redtail Ridge development is limited to several planned structures along the margins of the property that are closer to undeveloped farmland and grasslands.



Many structures in commercial areas in the City of Louisville were built with ignition-resistant material and have low fuel loads near structures. During the 2021 Marshall Fire, vegetation burned in some parking lots of buildings, but commercial structures stood strong against wildfire. This analysis likely overpredicts the vulnerability of commercial buildings, but there is a potential for damage to buildings in business districts if embers penetrate buildings during urban conflagrations. Photo credit: The Ember Alliance.

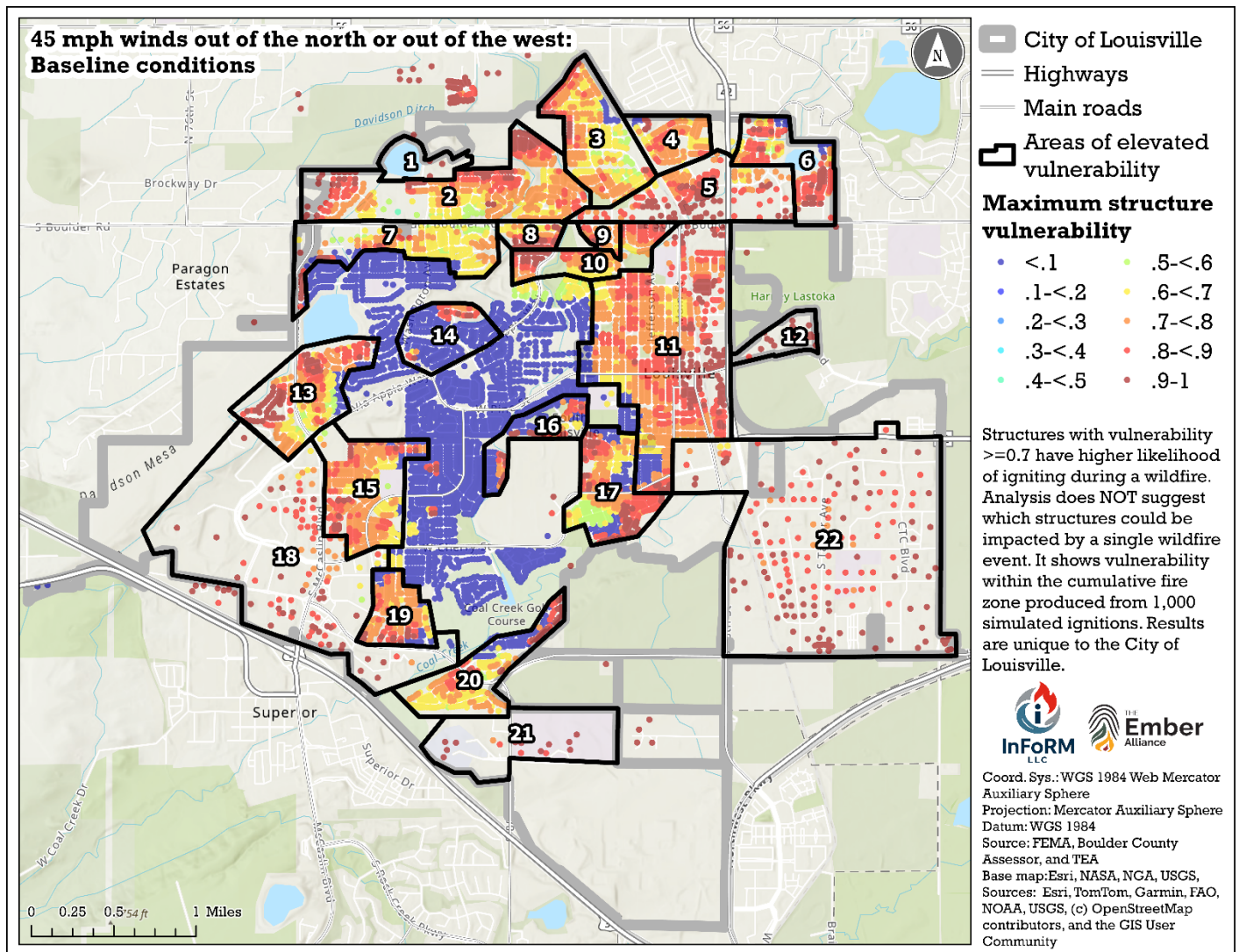


Figure 11. Areas within the City of Louisville with elevated structure vulnerability. Structure vulnerability displayed on this map is the maximum vulnerability for each structure from 45 mph winds out of the west or out of the north. Key risk factors in each area are described in **Table 1**. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. It shows potential vulnerability if a fire were to reach that structure based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

Table 1. The potential for urban conflagration to impact structures across the City of Louisville is driven by multiple, interacting factors, including HIZ characteristics, the proximity of structures, the orientation of structures within a neighborhood, the type, distribution, and arrangement of vegetation in and around neighborhoods, topography, and fire weather. This table highlights some notable factors that contribute to higher risk of structure ignition in different parts of the City of Louisville (see **Figure 11** for the ID and location of different areas of elevated vulnerability). **IMPORTANT: Keep in mind that multiple interacting factors influence risk, and there is not one single variable that explains structure risk at any given location in the city.** Structure vulnerable in the areas described below can originate from high risk and fire transmission capacity in other parts of the city that allow for continuous fire spread via vegetation-to-vegetation, vegetation-to-structure, structure-to-structure, and structure-to-vegetation ignitions.

ID for area of elevated vulnerability: General location / description	Notable risk factors
1: City of Louisville Water Treatment Plant	Proximity to large grasslands, shrublands, and ditches lined with vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.
2: Neighborhoods in northwestern Louisville	High housing density and some exceptionally close structures (<6 feet apart) and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding, fencing, elevated wood decks, and moderate to high fuel loads in defensible space zone 1 and zone 2. Proximity to large grasslands, shrublands, and ditches lined with vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures. Steep north-facing slope along north edge of neighborhood and moderate slopes interspersed throughout area.
3: Neighborhoods in north-central Louisville	High housing density and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding and fencing and some with elevated wood decks and moderate to high fuel loads in defensible space zone 1 and zone 2. Proximity to large grasslands, shrublands, and ditches lined with vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures.
4: Neighborhood between BNSF Railway and Kaylix Avenue	High housing density and exceptionally close structures (<6 feet apart). HIZ risk factors: Very few due to relatively new construction with more fire-resistant material and low fuel loads in defensible space zone 1 and zone 2. Interspersed burnable vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures.
5*: Commercial mix north of E. South Boulder Rd	Some close structures (<30 feet apart). HIZ risk factors: Most structures with moderate fuel loads in defensible space zone 1 and zone 2.
6: Neighborhoods around Hecla Lake	High housing density and exceptionally close structures (<6 feet apart). HIZ risk factors: Many structures with combustible fencing and patio covers, and some structures with moderate fuel loads in defensible space zone 1 and zone 2. Interspersed burnable vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures.

ID for area of elevated vulnerability: General location / description	Notable risk factors
7: Neighborhoods south of W. South Boulder Road and north of Coal Creek Elementary School	High housing density and many close structures (<30 feet apart), especially in eastern portion of area. HIZ risk factors: Many structures with combustible fences and moderate to high fuel loads in defensible space zone 1 and zone 2, some structures with elevated wood decks, combustible siding, and combustible patio covers. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.
8: Manufactured home neighborhood south of E. South Boulder Road	High housing density and many close structures (<30 feet apart). HIZ risk factors: Manufactured homes have a higher potential for ignition depending on construction material and other characteristics, such as elevated wood decks and moderate to high fuel loads in defensible space zone 1 and zone 2. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.
9: Condos and townhomes south of E. South Boulder Road	High housing density and many close structures (<30 feet apart). HIZ risk factors: Many structures with elevated wood decks, combustible siding, and combustible detached garages, and some structures with combustible fencing and moderate fuel loads in defensible space zone 1 and zone 2. Proximity to large grasslands, shrublands, and ditches.
10: Neighborhoods around Lake and Pirates Parks	High housing density, some exceptionally close structure (<6 feet apart), and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding, combustible fencing, and moderate to high fuel loads in defensible space zone 1 and zone 2, and some structures with elevated wood decks. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.
11: Downtown Louisville	High housing density, some exceptionally close structure (<6 feet apart), and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding, combustible fencing, detached garages, single-pane windows, and moderate to high fuel loads in defensible space zone 1 and zone 2, and some structures with elevated wood decks. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.
12: Louisville Wastewater Treatment Plant	HIZ risk factors: Very few due to fire-resistant construction material and low fuel loads in defensible space zone 1 and zone 2. Proximity to open space used for grazing and/or agriculture with a relatively high capacity to transmit fire to adjacent vegetation and structures depending on the time of year and amount of vegetation growth.
13: Neighborhoods northeast of Davidson Mesa and south of Harper Lake	High housing density, some exceptionally close structure (<6 feet apart), and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible fencing and patio covers and some with combustible siding and elevated wood decks. Proximity large grasslands with a relatively high capacity to transmit fire to adjacent vegetation and structures. Moderate slopes interspersed throughout area.
14^: Neighborhoods on and along Tyler Avenue	High housing density, some exceptionally close structure (<6 feet apart), and many close structures (<30 feet apart). HIZ risk factors: Many structures with elevated wood decks, combustible siding, combustible fencing, combustible patio covers, and moderate to high fuel loads in defensible space zone 1 and zone 2. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.

ID for area of elevated vulnerability: General location / description	Notable risk factors
	Proximity to grasslands and other vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures. Moderate slopes interspersed throughout area and along Tyler Avenue.
15: Neighborhoods west of Fireside Elementary School	High housing density, some exceptionally close structure (<6 feet apart), and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding, combustible fencing, and moderate to high fuel loads in defensible space zone 1 and zone 2, and some structures with elevated wood decks and combustible patio covers. Interspersed burnable vegetation with a moderate capacity to transmit fire to adjacent vegetation and structures.
16: Neighborhoods north of Warembourg Open Space	High housing density and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding, combustible fencing, and moderate to high fuel loads in defensible space zone 1 and zone 2, and some with combustible patio covers and elevated wood decks. Proximity to large grassland and ditches lined with vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures.
17: Neighborhoods east of Warembourg Open Space	High housing density and exceptionally close structure (<6 feet apart). HIZ risk factors: Many structures with combustible siding, combustible fencing, and moderate to high fuel loads in defensible space zone 1 and zone 2, and some with combustible patio covers and elevated wood decks. Proximity to large grassland, riparian vegetation, and ditches lined with vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures.
18*: Commercial area in southwestern Louisville	HIZ risk factors: Very few due to fire-resistant construction material and low fuel loads in defensible space zone 1 and zone 2. Proximity to large grasslands with a relatively high capacity to transmit fire to adjacent vegetation and structures. Moderate slopes along boundary with Davidson Mesa.
19: Condos and townhomes west of Coal Creek Golf Course	High housing density, some exceptionally close structure (<6 feet apart), and many close structures (<30 feet apart). HIZ risk factors: Many structures with combustible siding and combustible fencing, and some with elevated wood decks, combustible patio covers, and moderate to high fuel loads in defensible space zone 1 and zone 2.
20: Neighborhoods south of Coal Creek Golf Course	High housing density and exceptionally close structure (<6 feet apart). HIZ risk factors: Many structures with elevated wood decks, combustible siding, and moderate to high fuel loads in defensible space zone 1 and zone 2, and some with combustible fences and combustible patio covers. Interspersed burnable vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures. Proximity to riparian vegetation and open space used for grazing and/or agriculture with a relatively high capacity to transmit fire to adjacent vegetation and structures depending on the time of year and amount of vegetation growth. Moderate slopes interspersed throughout area.
21: Avista Adventist Hospital and Monarch PK-8 and High School	HIZ risk factors: Very few due to fire-resistant construction material and low fuel loads in defensible space zone 1 and zone 2. Interspersed burnable vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures.

ID for area of elevated vulnerability: General location / description	Notable risk factors
	Proximity open space used for grazing and/or agriculture with a relatively high capacity to transmit fire to adjacent vegetation and structures depending on the time of year and amount of vegetation growth. Moderate slopes interspersed throughout area.
22*: Colorado Tech Center	HIZ risk factors: Very few due to fire-resistant construction material and low fuel loads in defensible space zone 1 and zone 2, with the exception of a few structures that have moderate fuel loads in defensible space zone 1. Interspersed burnable vegetation with a relatively high capacity to transmit fire to adjacent vegetation and structures. Proximity to large open space used for grazing and/or agriculture with a relatively high capacity to transmit fire to adjacent vegetation and structures depending on the time of year and amount of vegetation growth.

*The core team for this project feels that structure exposure of commercial buildings is most likely lower than that predicted by this analysis due to the ignition-resistant material used on these buildings and large parking lots surrounding structures.

^The core team for this project feels that structure exposure along and around Tyler Avenue is likely higher than what was predicted by this analysis. There is abundant burnable vegetation along the moderately steep slope along this road, and if an ignition were to start at the bottom of the hill, and winds were to align with the slope, there is a potential for structure ignition.

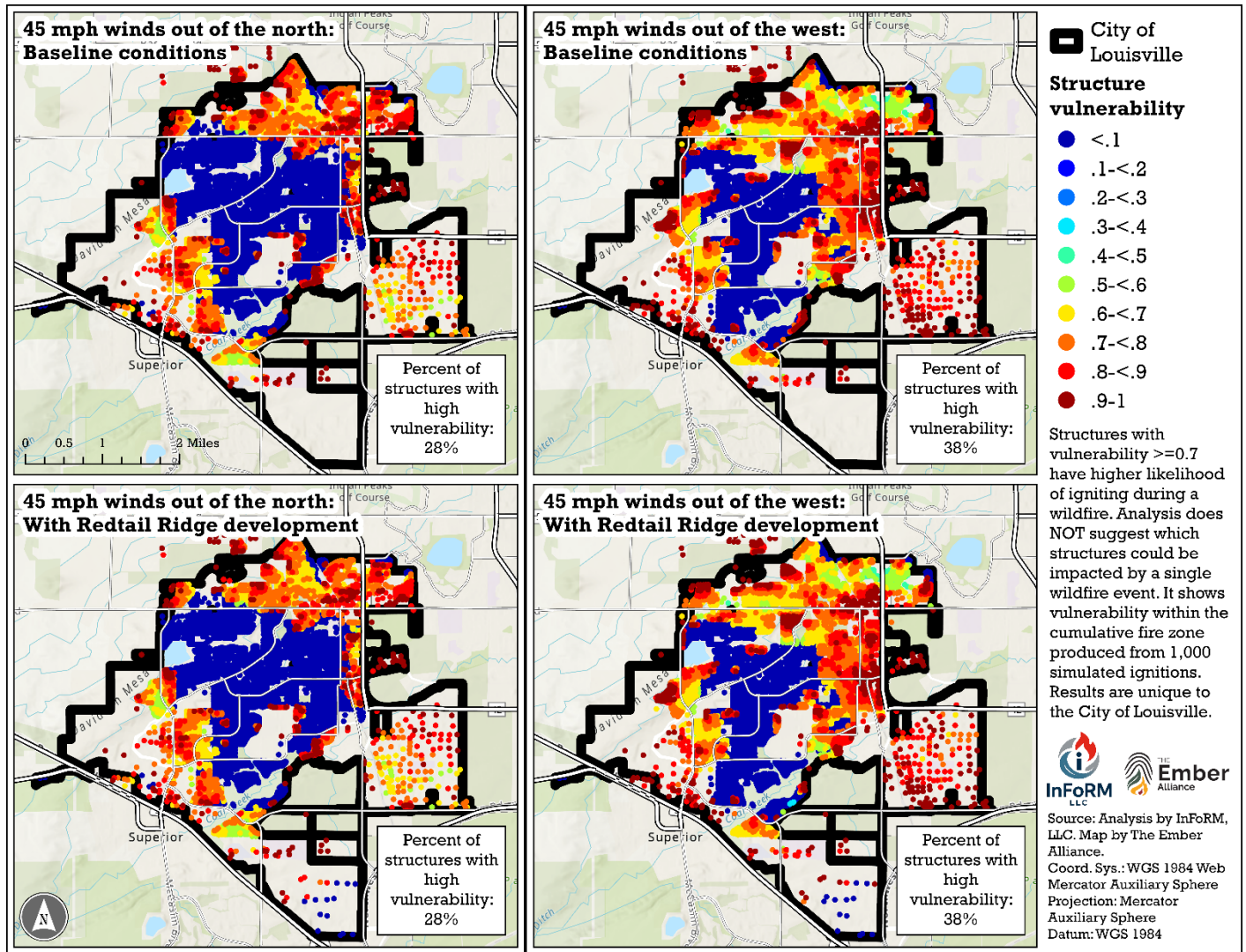


Figure 12. Structure vulnerability in the cumulative fire zone under very dry fuels and 45 mph winds out of the north (left maps) or out of the west (right maps) with baseline conditions (upper maps) or with vegetation changes and additional structures in the future Redtail Ridge development (lower maps). Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. It shows potential vulnerability if a fire were to reach that structure based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

Widespread HIZ Mitigation is Critical to Reduce Wildfire Risk

HIZ mitigation, including home hardening and defensible space, is **crucial** to reducing the potential for fire growth and structure loss during urban conflagrations. For example, a city-wide requirement for mitigation in the defensible space zone 1 could reduce the percent of structures vulnerable to damage from wildfire in the cumulative fire zone from 28% to 3% with 45 mph winds out of the north and from 38% to 6% for winds out of the west (**Figure 13**). Research shows that homes with adequate defensible space, reduced structural ignitability, and supportive firefighter access are far more likely to survive major wildfire incidents (IIBHS, 2019; Knapp et al., 2021; Maranghides et al., 2022; Syphard et al., 2014; Troy et al., 2022).

Community-level action is critical to reduce structure vulnerability across the city. More homeowners and businessowners doing some work to mitigate risk is more effective than some people doing all the work. The percentage of homes with lower vulnerability to wildfire is more strongly affected by the percentage of structures that are mitigated than the degree of mitigation done (**Figure 14**). Once structure ignitability is halved due to mitigation measures ¹, additional mitigation work has only marginal benefits at reducing community-wide structure vulnerability. However, increasing participation in HIZ mitigation has continual benefits, even under moderate degrees of HIZ mitigation (i.e., 25% reduction in structure ignitability). This analysis suggests that requiring at least 75% of structures in the cumulative fire area to undertake moderate degrees of HIZ mitigation could increase the percentage of structures with low vulnerability to wildfire from 62% to 86% under 45 mph winds out of the west (**Figure 14**). Research from the National Institute of Standards & Technology reinforce the finding that widespread compliance with HIZ mitigation is critical to reduce risk in high-density communities (Maranghides et al., 2022). **Risk from wildfire cannot be eliminated, but actions by residents, business owners, land managers, and other partners can reduce risk and increase the chance that homes stand strong to wildfire.**

Widespread commitment to HIZ mitigation across the City of Louisville will likely require enforceable regulations that address both new construction and replacement of building features on existing structures, as well as voluntary participation and local action to support homeowners and businessowners. Targeted HIZ mitigation is especially important in neighborhoods adjacent to large tracts of grassland and shrublands and in neighborhoods with closely spaced structures, more flammable building material, and more established vegetation near structures (**Figure 11; Table 1**). See the **Recommendations Section** for more information on recommendations to encourage HIZ mitigation, such as involving homeowner's associations in discussions about and action around HIZ mitigation to galvanize progress at the neighborhood level.

Home Ignition Zone Considerations

- The CSFS defines the HIZ as the structure (structural ignitability) AND the space surrounding it (defensible space)
- Home hardening addresses structural ignitability while targeted mitigation practices address defensible space
- *Meaningful* HIZ work on your home or property will depend on what home hardening or targeted mitigation has or has not been done

¹ Structure ignitability is measured in terms of its building factor—a score ranging from 0 to 1 for each structure to indicate its relative potential of ignition based on its condition for ten HIZ characteristics (see **Appendix A. Table 2**). Higher building factors are associated with a higher likelihood of ignition if a fire encounters that structure. Structure ignitability can be reduced in numerous ways by modifying conditions in the ten HIZ characteristics, for example, removing vegetation in defensible space zone 1 or zone 2 or replacing single-pane windows with double-pane windows.

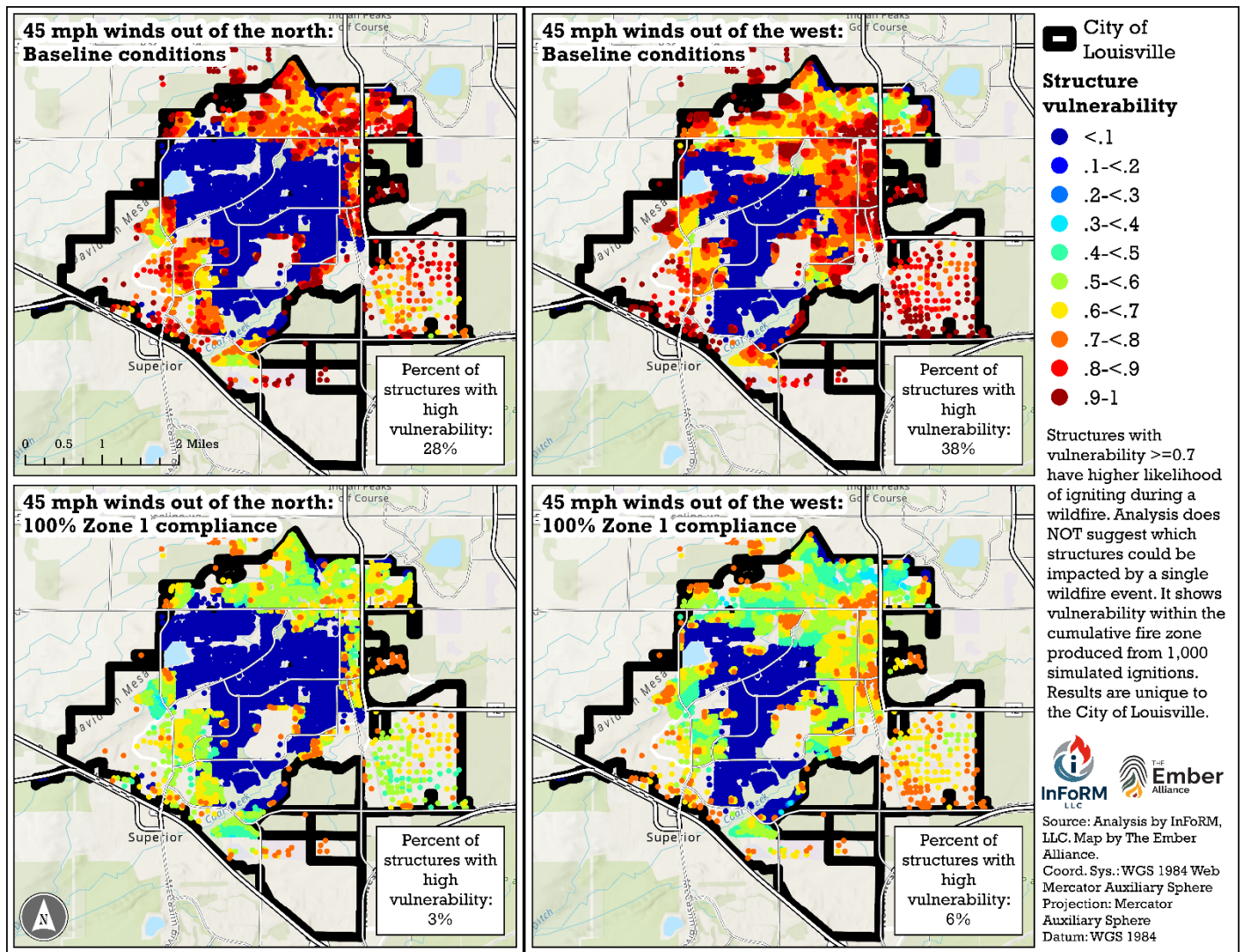


Figure 13. Structure vulnerability in the cumulative fire zone under very dry fuels and 45 mph winds out of the north (left maps) or out of the west (right maps) with baseline conditions (upper maps) or with full compliance with mitigation in defensible space zone 1 (lower maps). Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. It shows potential vulnerability if a fire were to reach that structure based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community. Mitigation in defensible space zone 1 mitigation might not have the same magnitude of impact in other WUI communities.

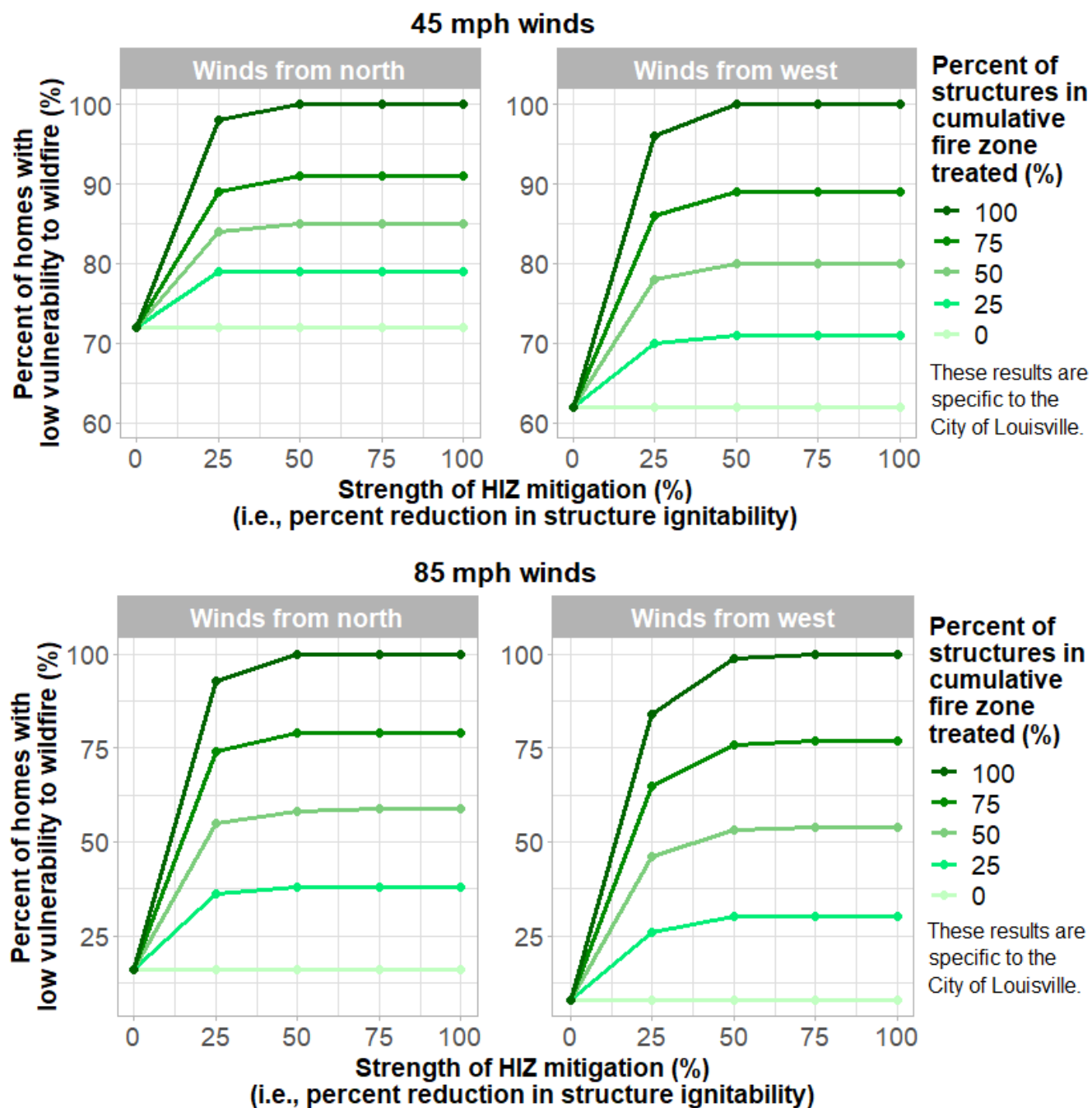


Figure 14. Impact of the strength of home ignition zone mitigation and the percent of structures treated on the percent of structures in the cumulative fire zone with low vulnerability to wildfire under 45 mph winds (upper graphs) and 85 mph winds (lower graphs). Notice difference in scale on the vertical axis (y-axis). The analysis suggests that increasing the percentage of structures treated has a bigger impact on increasing structure resistance to wildfire across the community than the strength of HIZ mitigation. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community. The degree of HIZ mitigation and participation HIZ mitigation might *not* have the same magnitude of impact in other WUI communities. **Important: When the percentage of homes with low vulnerability to wildfire is predicted as 100%, this does NOT indicate that there is no potential for structure loss from wildfire. Risk from wildfire cannot be eliminated, but HIZ mitigation by residents and business owners can reduce risk and increase the chance that homes stand strong to wildfire.**

Vegetation Management by the City of Louisville is Reducing Wildfire Risk

Ongoing vegetation management in strategic locations on public land and other shared spaces is making the community safer. The City of Louisville Department of Parks, Recreation, and Open Space has undertaken mowing, grazing, herbicide, and ditch management on higher-risk properties following the 2023 Wildfire Hazard Assessment (City of Louisville, 2023). Information on ongoing wildfire mitigation treatments on City of Louisville open space lands is available through the [Open Space Wildfire Mitigation Story Map](#).

Based on model predictions, the city's investment in vegetation management is having the intended impact of reducing risk to the community from wildfire. This is especially true if winds blow out of the north during a conflagration event and under high wind speeds (45 mph)—the percent of structures with high vulnerability to wildfire drops from 28% for baseline conditions to 10% factoring in ongoing vegetation management (**Figure 15**). However, the ability of vegetation management to reduce structure vulnerability is less notable under extreme wind speeds (85 mph) (**Figure 16**).

Ongoing vegetation management in North Open Space, including the removal of vegetation along ditches and cattle and goat grazing, might reduce the potential for fire to enter adjacent neighborhoods. This in turn might reduce the potential for urban conflagrations to reach downtown, thus lowering structure vulnerability across a large portion of the city. Vegetation management in Davidson Mesa is also reducing the potential for wildfires to become urban conflagrations, particularly under 45 mph winds out of the north. Under 45 mph winds out of the west, fires might still spread into neighborhoods west of South McCaslin Boulevard, partially because Davidson Mesa is connected to adjacent, privately-owned grasslands. Vegetation management that spans property ownership is critical for mitigating wildfire risk.



The City of Louisville Department of Parks, Recreation, and Open Space undertakes significant work every year to address wildfire risk while balancing the many uses and benefits of public land. One of their recent projects involved goat grazing at North Open Space to reduce fuel loads. Photo credits: City of Louisville.

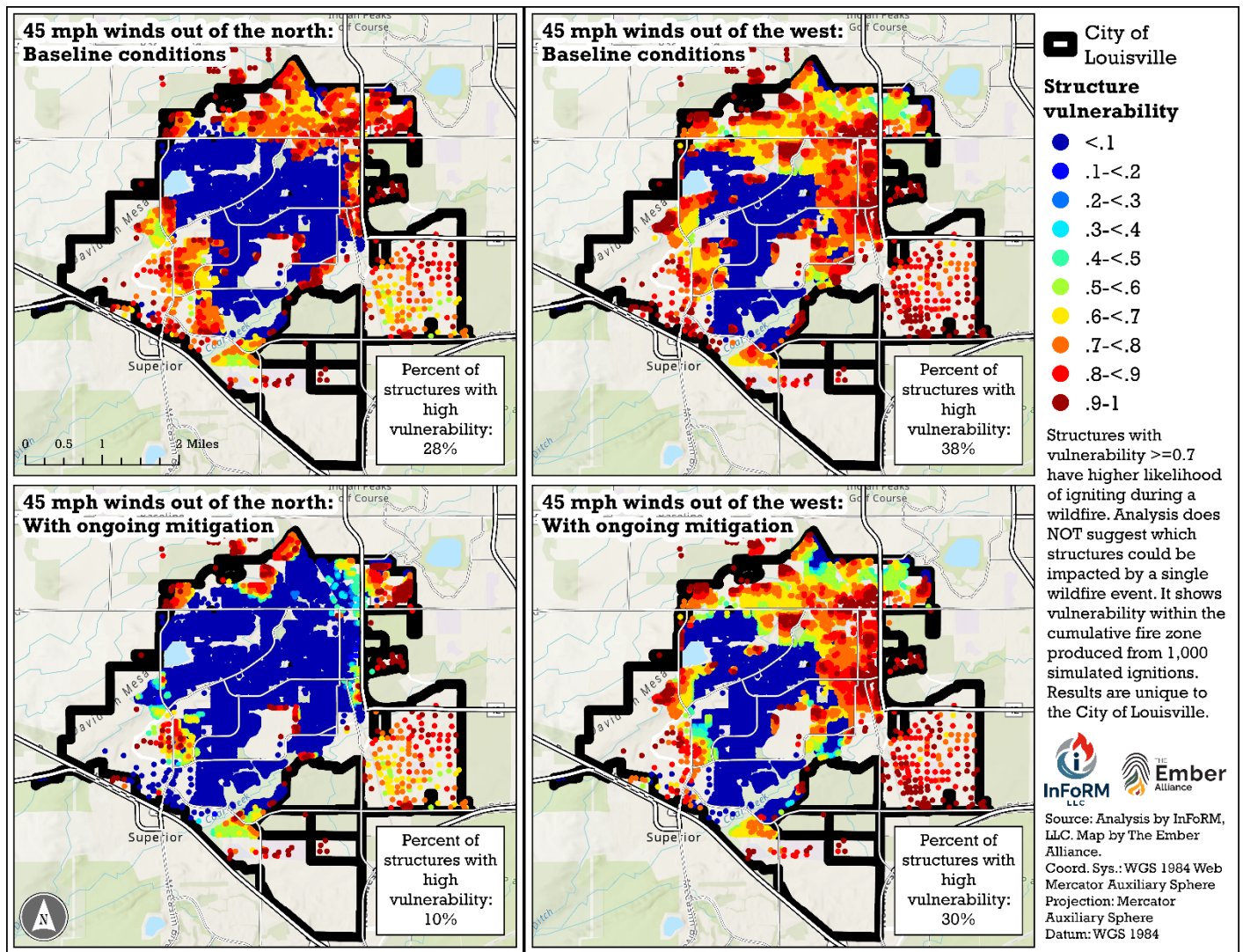


Figure 15. Structure vulnerability in the cumulative fire zone under very dry fuels and 45 mph winds out of the north (left maps) or out of the west (right maps) with baseline conditions (upper maps) or with ongoing vegetation mitigation by the City of Louisville Department of Parks, Recreation, and Open Space. Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. It shows potential vulnerability if a fire were to reach that structure based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

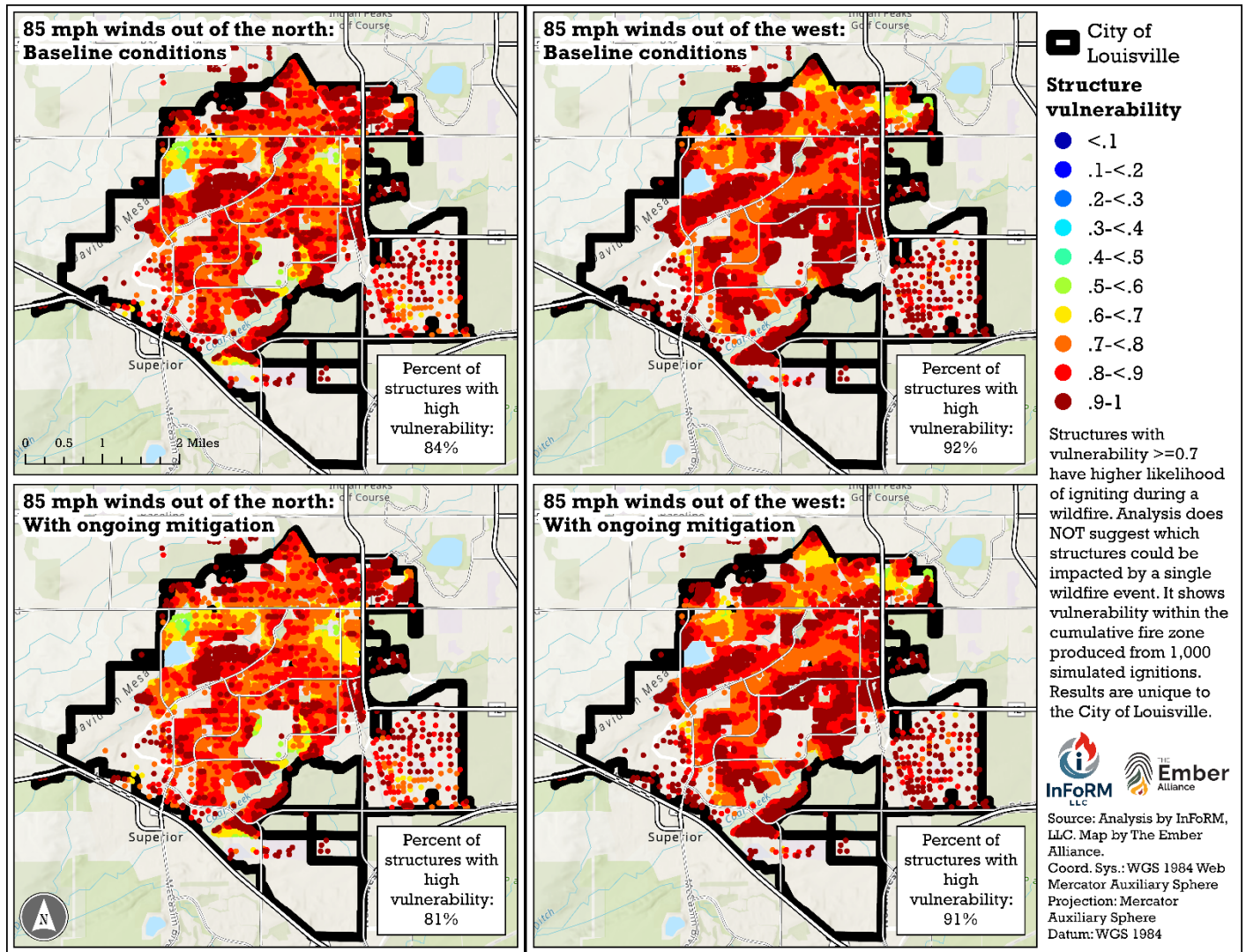


Figure 16. Structure vulnerability in the cumulative fire zone under very dry fuels and 85 mph winds out of the north (left maps) or out of the west (right maps) with baseline conditions (upper maps) or with ongoing vegetation mitigation by the City of Louisville Department of Parks, Recreation, and Open Space. Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. It shows potential vulnerability if a fire were to reach that structure based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

Additional Strategic Management Could Benefit the Community

Additional vegetation management in strategic areas could further reduce potential fire growth and structure vulnerability in parts of the city. The scenario that considered ongoing vegetation management plus additional treatments on properties identified as having low to extreme risk in the 2023 Wildfire Hazard Assessment (scenario 4) increased the percentage of structures with low vulnerability compared to ongoing management (scenario 1) from 90 to 92% for winds out of the north and 70 to 74% for winds out of the west (**Figure 17**).

Additional linear fuel treatments can also reduce structure vulnerability across the community, especially treatments along north-south running ditches. Reducing the likelihood that fires spread out of the west and into downtown can substantially decrease the potential for losses from wildfires.

High-quality treatments in high-priority areas are more effective than indiscriminately treating vegetation. Not all vegetation needs to be treated; modeling suggests that once 40% of vegetation is treated there is less additional benefit (**Figure 18**). Interestingly, the treatments that target vegetation regardless of their risk, for example, the scenario that focused on only linear fuel treatments along the perimeters of all public land and along all ditches resulted in vegetation modification on 22% of vegetation in the city but resulted in a lower percentage of homes being resilient to wildfire than ongoing management which requires vegetation modification on only 6% of the vegetation. Treating all public land indiscriminately requires vegetation modification on 51% of vegetation but results in a lower percentage of homes being resilient to wildfire than targeting treatments on the 40% of burnable vegetation that has a higher potential to transmit wildfire into the community.

Public land that might benefit from ongoing and expanded vegetation management are presented in **Table 2**. These areas have a high transmission capacity and are adjacent to structures with higher vulnerability, meaning they have a higher potential to transport fire to adjacent vegetation and potentially ignite nearby structures. Collaboration between the City of Louisville Parks, Recreation, and Open Space Department (in coordination with other relevant City of Louisville Departments) and adjacent private landowners to expand treatments could also protect the community from wildfires. In particular, additional treatments on private property adjacent to Davidson Mesa could lower vulnerability of adjacent structures if winds blow out of the west during wildfire.

Remember that vegetation mitigation can reduce wildfire risk to structures, but it does not guarantee structures will stand strong during wildfires. Hazards in the HIZ, the proximity of homes, connectivity of vegetation with structures, and other variables have significant impacts on structure exposure, as demonstrated by this analysis.

There are also benefits and tradeoffs to different actions to mitigate wildfire risk, and there are no management strategies that can optimize all values for public land and minimize wildfire risk at the same time. Reducing wildfire risk and restoring native grasslands often requires a variety of approaches including prescribed fire, grazing, and herbicide (Germino et al., 2016; Palit and DeKeyser, 2022). Social values, ecological impacts, feasibility, cost, and likelihood of success must be considered when deciding where to conduct different management options.

Given the range of benefits provided by public land and the uncertainty around wildfire occurrence and fuel treatment effectiveness, the best frameworks for enhancing wildfire resilience are those that have co-benefits in addition to wildfire risk reduction. For example, restoring native grasslands can create landscapes that burn with lower intensity than those invaded by non-native grasses while also creating wildlife habitat and increasing biodiversity. For more information on different mitigation strategies and their pros and cons, see the [2023 Louisville Wildfire Hazard Assessment](#) (City of Louisville, 2023), the Storymap on [grassland management in Boulder County](#), and the website on [wildfire fuels management practices in grass-dominated landscapes](#) from CSFS, Southern Rockies Fire Science Network, and Great Plains Fire Science Exchange (CSFS et al., 2024).

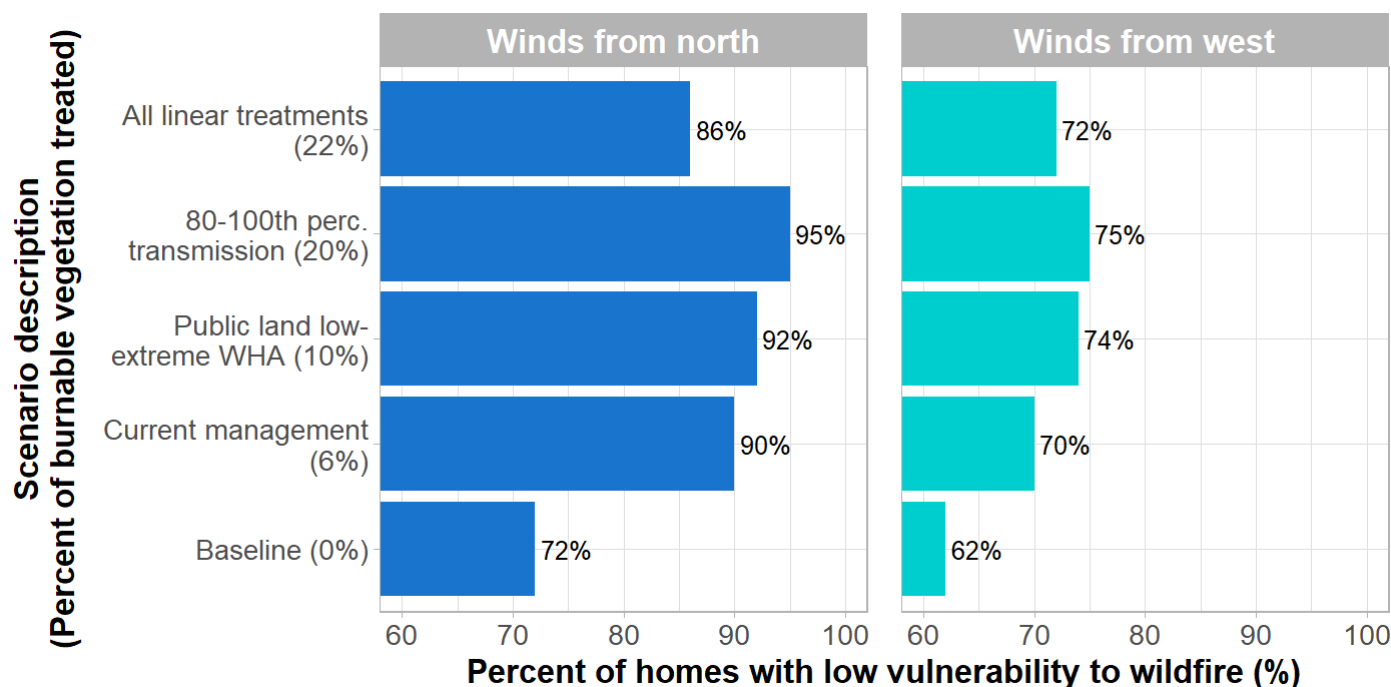


Figure 17. Impact of different vegetation mitigation scenarios on the percentage of structures in the cumulative fire boundary with low vulnerability to wildfire under 45 mph winds out of the north or out of the west. Results suggest that current vegetation management is increasing the percent of homes with low vulnerability to wildfire and that additional strategic work on properties identified in the 2023 Wildfire Hazard Assessment (WHA) for the City of Louisville and/or vegetation with the top 20th percentile transmission risk could further increase this percentage, particularly if winds were to blow from the north during a conflagration. Vegetation mitigation scenarios are described in **Appendix A. Methodology for Urban Conflagration Modeling**. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.



Removing vegetation in high-risk areas such as ditches with a potential to transmit wildfire to adjacent vegetation and nearby structures can further reduce wildfire risk in the City of Louisville. This ditch could benefit from removal of dead woody material and pruning of shrubs. The City of Louisville partners with the [Boulder County Ditch Wildfire Mitigation Program](#) to manage vegetation along ditches in the community. Through this partnership, Goodhue Ditch and Davidson Highline Lateral were treated in 2025. Photo credit: The Ember Alliance.

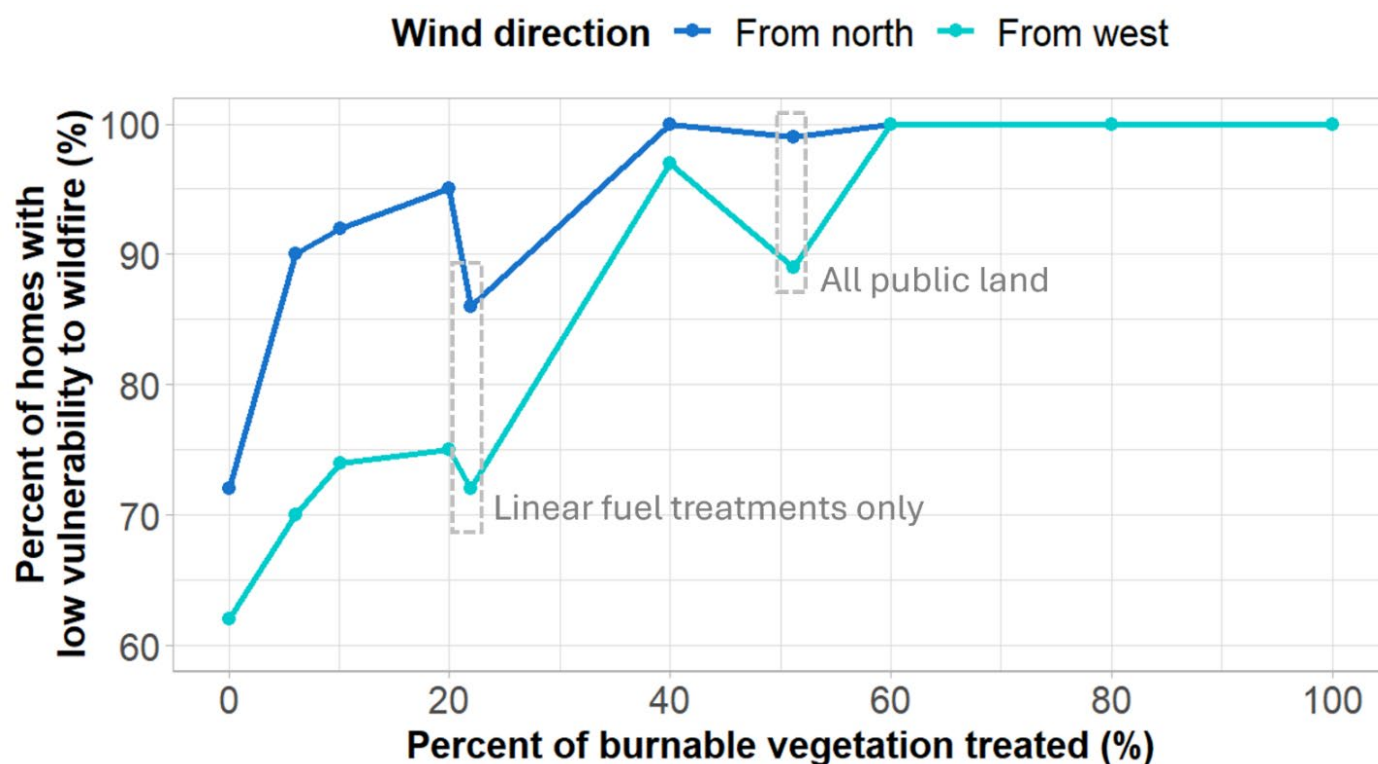


Figure 18. Impact of treating a greater percentage of burnable vegetation on the percent of structures in the cumulative fire boundary with low vulnerability to wildfire under 45 mph winds out of the north versus out of the west. Results suggest that indiscriminately locating treatments without considering risk, such as conducting all linear fuel treatments or treating all public land, is less effective than strategic treatments that occur on fewer, high-priority acres. Once 40% of burnable vegetation is treated, there are no additional benefits in terms of increasing the percentage of homes with low vulnerability. Vegetation mitigation scenarios are described in **Appendix A. Methodology for Urban Conflagration Modeling**. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community. **Important: When the percentage of homes with low vulnerability to wildfire is predicted as 100%, this does NOT indicate that there is no potential for structure loss from wildfire.** Risk from wildfire cannot be eliminated, but vegetation management on public land and other shared spaces and HIZ mitigation by residents and business owners can reduce risk and increase the chance that homes stand strong to wildfire.

Table 2. Public land where additional or continuing vegetation management might reduce wildfire risk in the community. These areas have a high transmission capacity and are adjacent to structures with higher vulnerability based on this analysis, meaning they have a higher potential to transport fire to adjacent vegetation and potentially ignite nearby structures. Keep in mind, there are benefits and tradeoffs to different actions to mitigate wildfire risk, and there are no management strategies that can optimize all values for public land and minimize wildfire risk at the same time. That vegetation mitigation can reduce wildfire risk to structures, but it does not guarantee structures will stand strong during wildfires. Hazards in the HIZ, the proximity of homes, connectivity of vegetation with structures, and other variables have significant impacts on structure exposure.

Property	Ownership ²	Strategic alignment
Admor Open Space ¹	Joint	
Bowes Open Space ¹	Joint	Identified as a priority in the 2024 Boulder County CWPP.
Callahan Open Space ¹	Joint	
Damyantovich Open Space	City of Louisville	Identified as a priority in the 2023 Wildfire Hazard Assessment for the City of Louisville. Mitigation such as grazing and mowing are ongoing on this property.
Davidson Mesa Open Space ¹	City of Louisville	Identified as a priority in the 2023 Wildfire Hazard Assessment for the City of Louisville and the 2024 Boulder County CWPP. Mitigation such as grazing and ditch mitigation are ongoing on this property.
Gallucci Open Space ¹	City of Boulder	Identified as a priority in the 2024 Boulder County CWPP, and priority grazing project for City of Boulder resilient landscapes in 2025.
Harney-Lastoka Open Space ¹	Joint	
Mayhoffer Farm Open Space ¹	Joint	
North Open Space ¹	City of Louisville	Identified as a priority in the 2023 Wildfire Hazard Assessment for the City of Louisville and the 2024 Boulder County CWPP. Mitigation such as grazing and ditch mitigation are ongoing on this property.
City of Louisville Water Treatment Plant	City of Louisville	Identified as a priority in the 2023 Wildfire Hazard Assessment for the City of Louisville and the 2024 Boulder County CWPP.
Nyland Open Space	City of Lafayette	Identified as a priority in the 2024 Boulder County CWPP.
O'Connor-Hagman Open Space ¹	City of Boulder	Identified as a priority in the 2024 Boulder County CWPP.
Steinbach Open Space ¹	City of Boulder	Identified as a priority in the 2024 Boulder County CWPP.
Trillium Open Space ¹	Joint	
Warembourg Open Space ¹	Joint	

¹ Portions of these properties are actively managed with grazing, hay production, or dryland crop production which can reduce the potential for fire to spread across these properties during certain times of the year. An assumption made for this project was that simulated wildfires occur when agricultural fields have not been harvested or recently grazed and have abundant, dry grass, meaning they have the potential to burn and transmit wildfire. The 35-acre 104th Fire on January 5, 2026, in Louisville illustrated that fires do ignite and spread on land used for agricultural purposes.

² Properties with joint ownership are jointly owned by Boulder County, City of Lafayette, and City of Louisville.

Becoming a Fire Adapted Community

General Description

It is recommended that the LFPD, the City of Louisville, HOAs, and residents intentionally embrace the principles of a Fire Adapted Community (FAC). The National Wildfire Coordinating Group (NWCG) defines a Fire Adapted Community as “a human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire.” This concept, further supported by the Fire Adapted Communities Learning Network ([FAC Net](#)) emphasizes that wildfire resilience is not achieved through any single program or entity, but through a coordinated, whole-community effort that integrates mitigation, preparedness, response, and recovery.

A Fire Adapted Community is not one that avoids fire entirely, but one that acknowledges wildfire as an inevitable part of the Colorado Front Range and actively develops the social, built, and ecological systems needed to reduce negative impacts (**Figure 19**). In Louisville, becoming fire adapted requires collaboration across all levels of the community. LFPD’s leadership in risk communication, preparedness education, and technical guidance is essential, but so is the participation of residents, HOAs, neighborhood groups, the City of Louisville, and regional partners.

This WCRA establishes the analytical foundation for Louisville’s fire adaptation by identifying ignition pathways, shared vulnerabilities, and priority mitigation areas. The next steps rely on on-the-ground action and an ongoing commitment to reducing risk at every scale—from the individual household to the entire community (**Figure 20**). Implementing defensible space, completing home-hardening upgrades, coordinating neighborhood mitigation, aligning HOA standards with best practices, and supporting vegetation management on public lands all contribute to the community’s progression toward fire adaptation.

Becoming a Fire Adapted Community also means developing the capacity to sustain these efforts. This includes establishing neighborhood and HOA-level leadership structures, building communication networks, developing long-term maintenance plans, and strengthening coordination between LFPD, city departments, and residents. Fire adaptation is an ongoing process: it evolves with changing conditions, new development, updated science, and lessons learned from events such as the 2021 Marshall Fire.

Research demonstrates that mitigation actions taken by individuals can catalyze action by neighbors and shift community norms toward collective responsibility (Brenkert-Smith et al., 2013). This social dimension is core to the FAC framework—wildfire resilience grows as residents support one another, share resources, and build a culture where preparedness is expected, not exceptional. Across the Mountain West, communities that have embraced FAC principles have seen measurable reductions in wildfire impacts and faster recovery when fires occur.

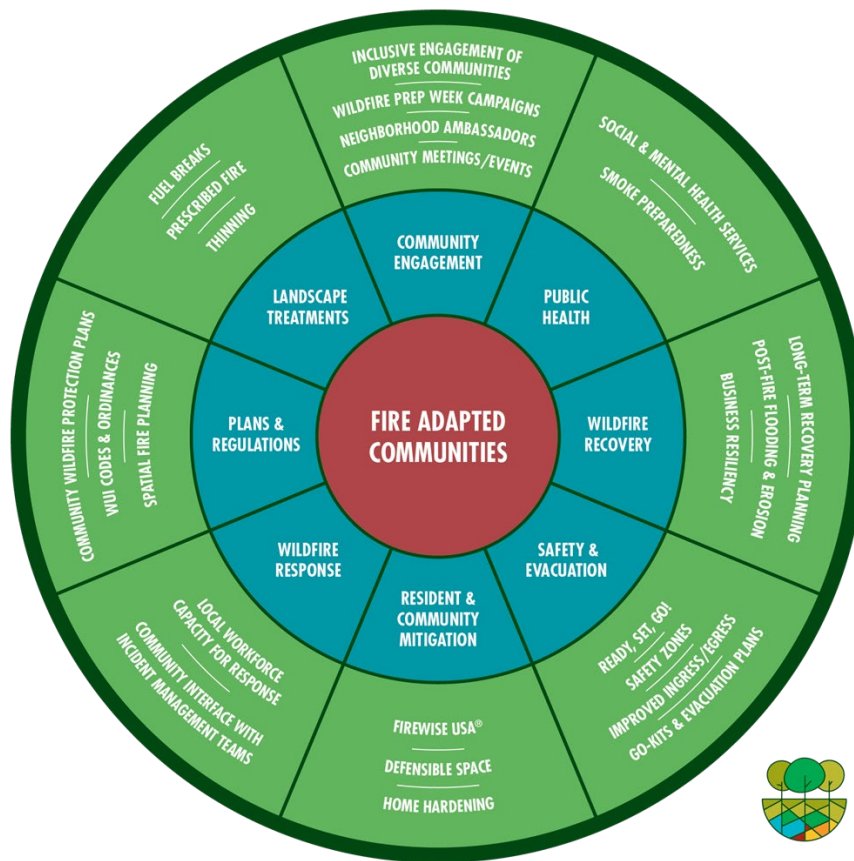


Figure 19. The Fire Adapted Communities graphic provides specific programs and activities that communities can take to reduce their wildfire risk and increase their resilience. Source: [Fire Adapted Community Learning Network](#).

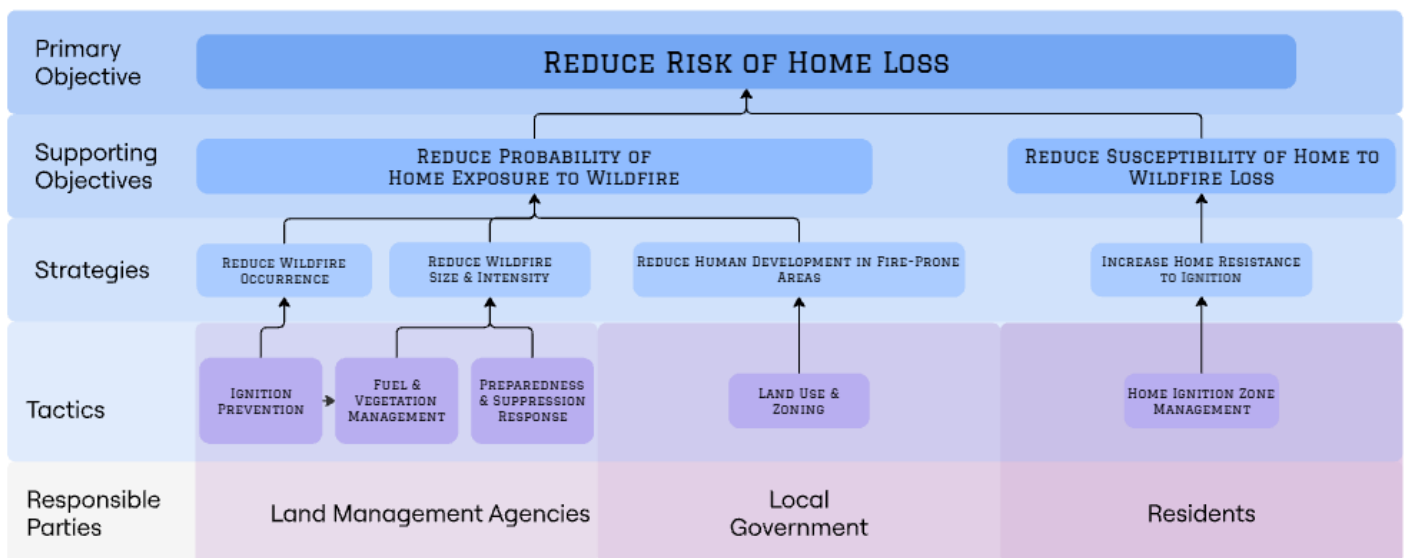


Figure 20. Conceptual model highlighting the primary objective and actions for reducing the risk of home loss as a result of wildfire. The risk of home loss is jointly determined by the probability of home exposure to wildfire and the susceptibility of home to wildfire, which in turn are influenced by other factors. Actions and responsibilities for strategically managing risk factors vary across land management agencies, local government, and private landowners. Source: diagram from (Calkin et al., 2014), modified by The Ember Alliance.

Recommendations

The following strategic actions outline opportunities for residents, LFPD, the City of Louisville, neighborhood organizations, public land managers, and non-profit partners to advance the community's wildfire resilience using the findings of this WCRA. Some actions are short-term and require minimal financial investment but depend on a meaningful shift in community norms—embracing collective responsibility and prioritizing coordinated mitigation. Other actions are mid- or long-term, are more resource-intensive, and will require sustained collaboration, grant pursuit, and the pooling of community capacity to implement significant changes over time.

Many of these recommendations are aspirational and will necessitate expanded staffing, funding, and collaboration, along with sustained commitment from community leaders and residents. Progress will be incremental, and success will depend on patience, persistence, and shared ownership of the work. This report does not prescribe a specific sequence or timeline for implementation, nor should the absence of a recommendation be interpreted as discouraging additional mitigation efforts. Communities are encouraged to adapt these actions to their local context, priorities, and available resources.

Short-term	• Highest potential for immediate return-on-investment. • Can be implemented within the current capacity (i.e., current staffing and funding levels). • Can occur with little to no expansion to staff and programs. • Can capitalize on current relationships.
Mid-term	• Requires moderate expansion of financial and implementation capacity. • Requires new cooperative relationships. • Requires greater level of coordination among partners.
Long-term	• Requires multi-year planning and funding. • Requires substantial expansion of financial and implementation capacity. • Requires substantial coordination among partners.

Recommendation	Details	Responsibility	Resources
Short-term			
Embrace the concept of Fire Adapted Communities	Defined by the National Wildfire Coordinating Group (NWCG) as “a human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire.” This concept can guide residents, fire practitioners, and communities through a holistic approach to becoming more resilient to fire.	LFPD, Agency Partners, Community Groups, HOAs, Residents	Fire Adapted Communities Resource Hub
Ensure compliance with the City of Louisville Fire Hardening Code	Residents undertaking new construction, additions, or replacing structure features should comply with the City of Louisville Fire Hardening Code, including requirements related to ignition-resistant building materials, design, and construction practices that reduce wildfire risk. Regulations and enforcement are critical to widespread adoption of meaningful HIZ mitigation practices.	Residents	City of Louisville Fire Hardening Code
Finalize WUI delineation and associated WUI code	The city needs to finalize modifications to the WUI delineation proposed by the State of Colorado and determine where to require class 1 and class 2 WUI code in 2026. Results from this analysis suggest that regulations for defensible space zone 1 across the WUI could meaningfully reduce community-wide risk to wildfire. Effective risk reduction will require HIZ mitigation for new buildings but also for existing structures.	City of Louisville Planning Department, Community Development, and Building Code Board of Appeals	Colorado Wildland-Urban Interface Code
Finalize and implement wildfire preparedness education campaign	The City of Louisville is working with a contractor to develop outreach material and an education campaign specific to the community to promote wildfire preparedness.	City of Louisville City Manager’s Office (Recovery & Resilience Division)	Recovery & Resilience Division Website
Continue implementing mitigation actions on parks and open space	The City of Louisville Parks, Recreation, and Open Space Department has been undertaking vegetation mitigation and ecosystem restoration following the 2023 Wildfire Hazard and Risk Assessment of Louisville Public Lands (WRA). This work requires an annual commitment to maintenance and new treatments, funding such as the Strategic Fuels Mitigation Grant can be leveraged for this work.	City of Louisville Parks, Recreation, and Open Space Department	2023 WRA, Strategic Fuels Mitigation Grant

Continue organizing outreach & education engagements	Coordinate with Wildfire Partners to deliver targeted outreach and education on wildfire risk reduction, defensible space creation, home hardening practices, and community mitigation programs.	LFPD, City of Louisville City Manager's Office (Recovery & Resilience Division), HOAs, Community Liaisons	Wildfire Partners Outreach & Education
Conduct targeted outreach and support in higher-risk areas	Contact residents, business owners, and HOAs in high-risk areas indicated in the Key Findings Section to discuss risk factors and identify high-priority mitigation actions.	LFPD	See Structure Vulnerability is High Across Much of Louisville (Figure 11 and Table 1)
Sign-up for emergency notifications	Sign up for emergency alerts from Boulder County.	Residents	BOCO Alerts
Get an individual home assessment	An individual home assessment provides property-specific guidance on actions homeowners can take to reduce wildfire risk. LFPD conducts individual home assessments upon request.	Residents	Contact LFPD Directly
Mitigate the HIZ, complete home hardening, and create defensible space actions	The City of Louisville and Wildfire Partners provide a variety of resources for understanding actions you can take on your property. See the Mitigate the Home Ignition Zone Section for a high-level overview of these actions. Funding from Wildfire Partners Rebate Programs can help accomplish this work.	Residents	Wildfire Partners Mitigation Basics , Wildfire Partners Rebate Programs , City of Louisville Fire Hardening Code
Get involved with your HOA	Shared responsibility starts at the neighborhood level. See the Homeowners Associations Section for more details on how to engage with your HOA.	Residents	Use Wildfire Partners and Firewise USA® as engagement frameworks, COCO Community Wildfire Mitigation Best Practices
Create linked defensible space	Work with neighbors with overlapping HIZ to create safer conditions and better tactical opportunities for firefighters.	Residents	See the Linked Defensible Space Section for more details.
Participate in community advising	Take advantage of subject matter experts and best practices for understanding mitigation strategies and shared responsibility at the neighborhood level.	HOAs, Neighborhood Liaisons, Agency Partners, Mitigation Planning Groups	See the Community Advising Section for more details, Wildfire Partners Community Advising
Get involved with community mitigation planning	Work with Wildfire Partners through a formal process to create a cohesive and actionable strategy around wildfire mitigation for your neighborhood.	HOAs, Community Liaisons, Residents	See the Community Mitigation Planning Section for more details, Wildfire Partners Community Mitigation

Apply for a Firewise USA® site designation	Work within your neighborhood to meet a voluntary set of requirements that can help get you funding for mitigation action.	HOAs, Community Liaisons, Residents	See the Firewise USA® Section for more details, NFPA Firewise USA®
Organize HIZ Tours	Organize community-wide home hardening and defensible space tours to demonstrate exemplary HIZ work.	Residents, Community Liaisons	See the Louisville Fire Protection District Section for an example of low-flammability landscaping at Station 2
Utilize Leaf & Branch Drop Off & Collection	The City of Louisville offers Leaf & Branch Drop Off & Collection for the disposal of garden and yard waste and additionally offers free compost and mulch.	Residents	City of Louisville Leaf & Branch Drop Off & Collection
Take classes with CSU Extension Master Gardener program	Learn about Firewise landscaping and xeriscaping to reduce risk in defensible space zones 1-3.	Residents, Community Liaisons	CSU Master Gardener Program
Mid-term			
Expand vegetation mitigation actions into additional high-risk areas	Collaborate with adjacent public land management agencies and private landowners to expand vegetation mitigation actions onto additional high-risk areas identified in the Key Findings Section as appropriate, weighing other benefits and uses of public lands.	City of Louisville Parks, Recreation, and Open Space Department (in coordination with other relevant City of Louisville Departments); City of Boulder Open Space & Mountain Parks; City of Lafayette Open Space Division; Boulder County Parks & Open Space	See the Additional Strategic Management Could Benefit the Community Section for more details (Table 2)
Expand individual home assessment capacity	Individual home assessments from Wildfire Partners are not currently available for areas with high-density communities in Eastern Boulder County. Making this program available to homeowners would expand access to site-specific mitigation guidance, improve consistency in home-hardening practices, and support more effective risk reduction across densely developed neighborhoods.	LFPD, Wildfire Partners	Wildfire Partners Individual Home Assessments
Complete annual measures to protect your home	HIZ mitigation is not a one-time activity. For example, vegetation grows and fencing and decking degrade over time, making it important to evaluate your property every year and commit to upkeep.	Residents	CSFS Live Wildfire Ready Checklist

Take advantage of community chipping	Organize a group in your neighborhood or HOA to apply to Wildfire Partners for a community chipping event to help remove woody material from your property.	Residents	Wildfire Partners Community Chipping
Conduct public outreach and education on alternative landscape recommendations	Encourage and educate residents on fire-resistant plants and landscaping to reduce wildfire hazards in the HIZ.	LFPD, City of Louisville City Manager's Office (Recovery & Resilience Division), HOAs, Community Liaisons	CSU Extension Firewise Plant Materials , Low Flammability Landscape Plants Guide
Apply for grants for multi-homeowner projects	Apply for grants that support fuels mitigation for multi-homeowner projects.	HOAs, Community Liaisons, Residents	Strategic Fuels Mitigation Grant Program
Long-term			
Increase staff capacity dedicated to wildfire mitigation inspections and enforcement	Establish a dedicated wildfire mitigation staff position to support inspections, enforcement, and homeowner assistance, ensuring City regulations and programs can be implemented consistently and at the scale needed to reduce community risk.	City of Louisville, LFPD	
Add or designate staff resources to develop targeted mitigation assistance program	Identify staff capacity to design and administer programs that support residents who face financial, physical, or logistical barriers to completing wildfire risk-reduction work on their properties.	LFPD	
Develop a dedicated wildfire mitigation funding mechanism	Explore a funding mechanism, potentially supported through a voter-approved tax, mill levy, or similar revenue source, to provide financial assistance to homeowners for defensible space, home hardening, and other risk-reduction measures.	City of Louisville, LFPD	Reference City of Boulder Climate Tax as an example
Explore options for the judicious use of broadcast burning on open space	Broadcast prescribed burning is an important management strategy to restore short-grass prairie and other fire-adapted ecosystems, and when safely and strategically applied, it can reduce wildfire risk to adjacent communities. The City of Louisville City of Louisville Parks, Recreation, and Open Space Department should continue exploring options to conduct prescribed burns in coordination with partner organizations, such as the Boulder County Sheriff's Office Wildland Fire Management Program and Boulder County Parks & Open Space.	City of Louisville City of Louisville Parks, Recreation, and Open Space Department; Boulder County Wildland Fire Management Program; Boulder County Parks & Open Space; LFPD and other fire districts; DFPC	Reference Boulder County Wildland Fire Management Program's webpage on Prescribed Burn Projects

Mitigate the Home Ignition Zone (HIZ)

During destructive wildfire events, the majority of structure loss occurs due to vulnerabilities within the HIZ. Research shows that homes with adequate defensible space, reduced structural ignitability, and supportive firefighter access are far more likely to survive major wildfire incidents (IIBHS, 2019; Knapp et al., 2021; Maranghides et al., 2022; Syphard et al., 2014; Troy et al., 2022).

Despite increasing public awareness following the 2021 Marshall Fire, studies show that residents across the WUI frequently underestimate their level of wildfire risk and overestimate the mitigation work completed on their property. A 2021 University of Colorado–Boulder study found that homeowners in the WUI near Bailey, CO perceived themselves as more prepared than objective measurements indicated (Simpkins, 2021). This gap between perceived and actual risk highlights the importance of staying informed about evidence-based best practices and engaging in honest, community-wide conversations about vulnerability and collective responsibility.

Together, defensible space and home hardening form the core of HIZ mitigation (**Figure 21**). When implemented collectively across neighborhoods—rather than in isolated pockets—these practices significantly increase the likelihood that homes will survive an urban conflagration and contribute to a more fire-adapted Louisville.

Home hardening: the process of reducing the home’s structural vulnerability to embers, radiant heat, and direct flame contact. Embers can travel long distances ahead of a wildfire’s flame front and are responsible for the majority of home ignitions in WUI events; studies indicate that 50–90% of home losses are caused by embers rather than direct flame contact (Gropp, 2019; Holstrom et al., 2023; Johnston, 2018). Upgrading building materials, improving installation practices, and addressing vulnerabilities such as vents, roofing, fencing, and attachments can substantially reduce ignition potential (Hakes et al., 2017; Syphard and Keeley, 2019).

Defensible space: the area where vegetation, debris, and other combustible materials are managed to reduce flame length, slow fire spread, and lower radiant heat exposure. Establishing defensible space allows homes to withstand exposure to fire without relying exclusively on firefighter intervention, a critical consideration given resource limitations during large-scale events.

Wildfire Risk Reduction Codes and Laws

In March 2025, the City of Louisville established a [Fire Hardening Code](#) that sets fire-resistant construction standards for residential and commercial structures. New construction, accessory structures, and repairs or replacements must comply with these standards for decks, roof coverings, vents, gutters, siding, and eave materials.

Several Colorado Laws that empower residents to undertake HIZ mitigation and prohibit HOAs from preventing some actions to reduce wildfire risk. Specifically, [SB12-178](#) passed in 2019 says that HOAs must allow residents to use xeric landscaping (which is often more fire resistant). [HB24-1091](#) passed in 2024 generally prohibits covenants and other restrictions that disallow the installation, use, or maintenance of fire-hardened building materials, including fencing. The law does permit HOAs from adopting and enforcing reasonable standards regarding design, dimensions, placement, and external appearance of a fire-hardened building material.

Overview of Home Ignition Zone Mitigation

In Louisville, where homes are often closely spaced and connected by shared features such as fencing, landscaping, and accessory structures, reducing fuels within the HIZ is a critical strategy for reducing the risk of urban conflagration. While traditional wildland fire behavior remains relevant, the Marshall Fire demonstrated that in dense suburban neighborhoods, structure-to-structure ignition, radiant heat transfer, and ember accumulation can drive rapid fire spread.

Creating and maintaining a buffer around the home—including removing combustible materials immediately adjacent to structures—helps interrupt these pathways by reducing flame contact, limiting radiant heat exposure, and minimizing ignition points for wind-driven embers (Hakes et al., 2017). Substantially reducing vegetation within the HIZ, especially vegetation that touches or overhangs roofs, decks, or siding, is one of the most effective ways to lower ignition potential. Research shows that treating vegetation and other fuels within the immediate zone significantly reduces structure loss, including in areas with sloped terrain (Syphard et al., 2014).

The CSFS defines the HIZ as the structure AND the space surrounding it, or structural ignitability and defensible space. Home hardening addresses structural ignitability while targeted mitigation practices address defensible space and fall into three zones (**Figure 21**):

- **Zone 1 (0–5 feet):** The immediate or “ember-resistant” zone, where eliminating combustible materials is essential to reduce the potential for ignition.
- **Zone 2 (5–30 feet):** The intermediate or “lean, clean, and green” zone, where vegetation should be strategically spaced, limbed, and maintained.
- **Zone 3 (30–100 feet):** The extended “fuel reduction” zone, aimed at modifying vegetation to reduce fire intensity before it reaches the home.

Property owners should apply HIZ practices to every structure and surrounding space on their property—not just the primary residence. Campers/RVs, sheds, detached garages, workshops, storage units, and other outbuildings are all potential ignition sources and should be maintained accordingly. Where possible, outbuildings should be placed at least 50 feet from the home to reduce the risk of structure-to-structure fire spread (Maranghides et al., 2022). HIZ mitigation not only reduces wildfire risk, but also delivers everyday co-benefits such as lower water use, reduced maintenance and replacement costs, improved energy efficiency, increased durability of homes and landscapes, and enhanced safety and comfort for residents (**Figure 22**).

To support residents in taking effective action, the Colorado State Forest Service provides accessible guidance in [The Home Ignition Zone](#) publication and related resources. Following these recommendations—and working collaboratively with neighbors, HOAs, and community partners—helps ensure that mitigation efforts form a connected and continuous barrier that reduces the potential for urban conflagration and strengthens resilience across Louisville’s neighborhoods.

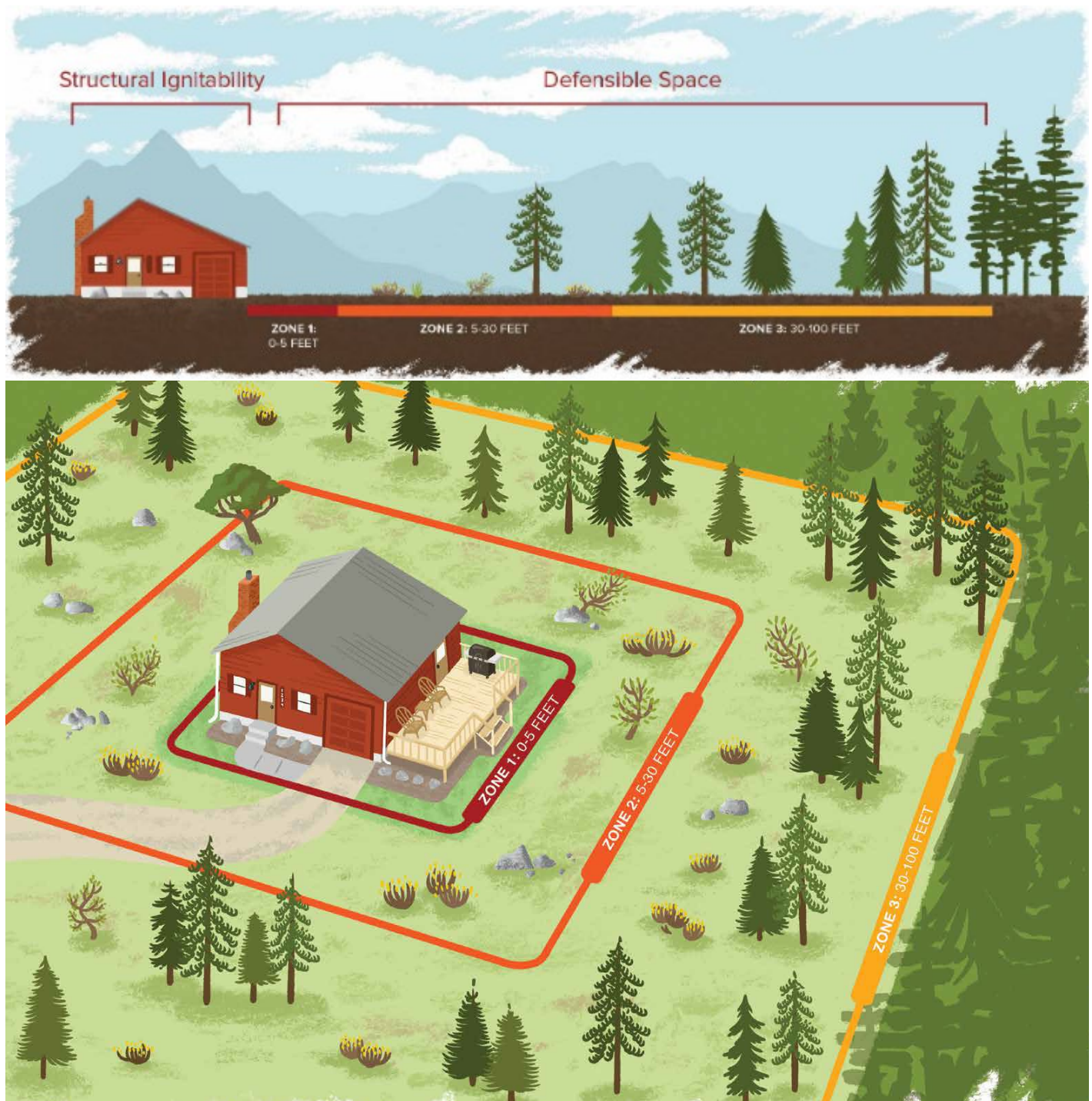


Figure 21. Home ignition zones recommended by the Colorado State Forest Service. Using ignition-resistant building materials and removing burnable fuel around primary structures, outbuildings is crucial for increasing your home's chance of standing strong during a wildfire. Source: Colorado State Forest Service 2021, [The Home Ignition Zone](#).

Co-benefits of HIZ Mitigation



Figure 22. HIZ mitigation actions often have additional co-benefits. Source: (Carter et al., 2023; Quarles and Pohl, 2018).

Considerations for HIZ Mitigation in Suburban Areas

Most guidance for HIZ mitigation was developed for traditional WUI environments where structures are farther apart and interspersed with forest vegetation. Conditions in the City of Louisville are much different due to the high structure density, close spacing between homes, and abundance of urban landscaping. This requires some different considerations for HIZ mitigation in the City of Louisville:

- Many homes only have defensible space in zones 1 and 2, and zone 2 often overlaps with that of neighboring structures. The importance of neighborhood-wide participation in HIZ mitigation is critical in high-density WUI to reduce the potential for structure-to-structure ignition (Maranghides et al., 2022). See the **Linked Defensible Space Section** for more information on linked defensible space.
- Guidance on tree spacing in defensible space zones 2 and 3 might be less relevant for many structures in the City of Louisville (see explanation below). **Limbing trees, particularly conifer trees, and preventing trees from overhanging gutters and roofs are still very important.** Removing shrubs and other vegetation that could spread fire into treetops is also recommended, as are removing dry, dead, and dying trees in defensible space zones 2 and 3 across the City of Louisville.
- Guidance for defensible space zone 1 is critical and the same for structures in more traditional WUI and more suburban environments.

Removing trees from urban landscaping in defensible space zone 2 and 3 is potentially less important in suburban areas in the City of Louisville than in more traditional WUI areas. There is not much research on tree torching and crown fire in urban trees, but anecdotally, very few trees in urban areas ignited during the 2021 Marshall Fire according to observations from local firefighters. Some trees were scorched by fire, but fire rarely carried into treetops. Research demonstrates that fire intensity often decreases in areas with deciduous trees compared to coniferous trees (Harris et al., 2025; Vermina Plathner et al., 2023). Urban trees are often irrigated and well-maintained, making them less likely to ignite than trees occurring in forests.

There are also several downsides to removing trees from urban environments that need to be considered and weighed against potential benefits of HIZ mitigation. Trees help cool urban surface temperatures, reduce wind speeds, improve physical and mental health, provide urban habitat for wildlife, increase property values, and can make people feel safer (Mouratidis, 2019; Tyrväinen et al., 2005; Ulmer et al., 2016). Contact LFPD or Wildfire Partners for specific guidance on creating defensible space zone 2 and 3 around your home.



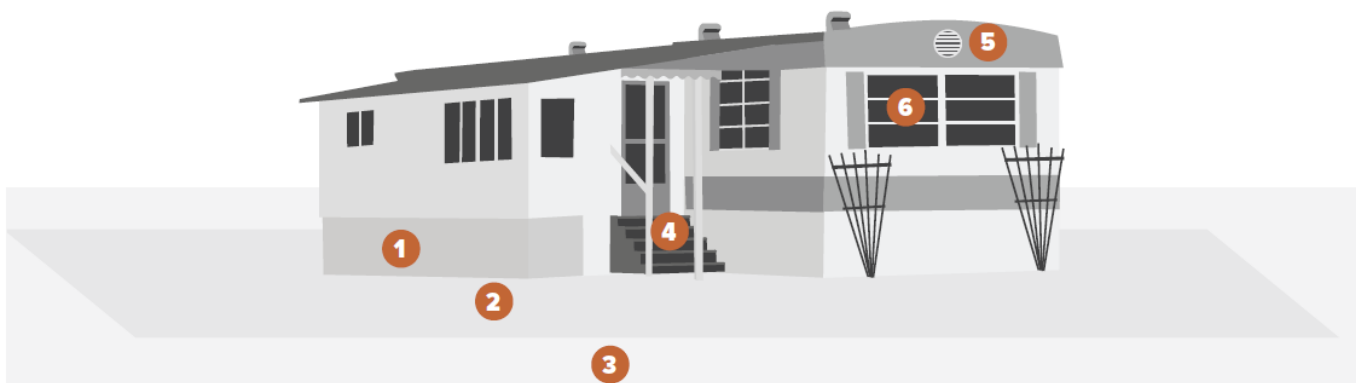
Illustration of a well-mitigated defensible space zone 1 and 2 in a suburban neighborhood. Source IIBHS [Fire Resistant Landscaping for your Home](#).

Considerations for Manufactured Home Neighborhoods

According to [Fire Safe Marin](#), “embers are the most common cause of ignition for both site built and manufactured homes”. Manufactured homes and neighborhoods may have important structural or organizational considerations that affect wildfire and evacuation safety and preparedness. According to an analysis of home loss from the 2018 Camp Fire in California, researchers found that manufactured homes were far more likely to be destroyed (Troy et al., 2022). The AGNI-NAR model does not include a variable for manufactured homes, so risk is likely underestimated for manufactured home neighborhoods in the City of Louisville. Specific steps for hardening manufactured homes and the areas around them can be found in **Figure 23**. Ensuring skirting around the base of manufactured homes is fire-resistant and properly installed is particularly important for reducing the chance that flames and embers ignite a manufactured home from below.



Strategies for Mobile & Manufactured Home Wildfire Resilience



Priority strategies for mobile and manufactured homes

- 1 Skirting:** Use skirting made of metal or fine mesh (1/8" or smaller), including under porches, exterior stairs, and anywhere the underside of the home is exposed to keep embers out.
- 2 Noncombustible zone:** Create and maintain a noncombustible zone underneath and 5 feet out from the home. Clear all combustible material. Use rock and other non-combustible landscape material and remove all dead plants.
- 3 Defensible space:** Create and maintain defensible space of 30 feet around the home and other accessory building. Remove dead plants. Mow grass. Create separation between trees, shrubs and other items that could catch fire, such as patio furniture, wood piles and other combustible materials.
- 4 Fire-resistant attachments:** Make sure any attachments like steps, porches, and carports are built with noncombustible, ignition-resistant materials. Remove combustible items from attachments during times of high wildfire risk.
- 5 Vents:** Cover vents, including those on the roof and walls with 1/16" mesh screen.
- 6 Windows:** Install window reinforcements, such as noncombustible screens or shutters.

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Figure 23. Recommendations for HIZ mitigation for manufactured homeowners. Source: [Headwaters Economics / Community Planning Assistance for Wildfire](#).

Effectiveness and Cost of HIZ Mitigation

HIZ mitigation is critical to reduce the risk of structures to wildfire, and there are co-benefits of many HIZ mitigation strategies, including lower maintenance costs for wildfire-resistant roofing, siding, and decking (**Figure 22**). Risk from wildfire cannot be eliminated, but actions by residents, business owners, land managers, and other partners can reduce risk and increase the chance that homes stand strong to wildfire. Homeowners are encouraged to contact LFPD or Wildfire Partners to discuss specific ways they can reduce risk on their property.

Following WUI code for new buildings is required in the City of Louisville, and wildfire-resistant construction materials can actually be lower than typical construction, assuming typical, non-wildfire-resistant construction uses expensive siding (**Figure 24**) (Quarles and Pohl, 2018). If vinyl siding is used for typical construction instead of expensive flammable siding, then cost of new construction that follows WUI code is higher by about \$6.00 per square foot, according to an analysis in 2021 in Canada (Porter et al., 2021).

Replacing existing structure features with wildfire-resistant material can be expensive, and many HIZ mitigation strategies require annual maintenance, such as removing material from gutters and pruning vegetation. According to an analysis in Canada, the cost of replacing certain features on an existing structure to comply with WUI code is about \$16.00 per square foot (Porter et al., 2021). Costs of replacing structure features can be reduced to about \$7.00 per square foot if flammable material in defensible space zone 1 is eliminated and vegetation in zone 2 is managed because this can reduce the need to replace flammable siding (Porter et al., 2021).

*A study in 2018 by Headwater Economics found that construction costs for a new home were 2% **lower** with wildfire-resistant material than typical materials, primarily because of the lower cost of many fire-resistant siding materials compared to expensive and flammable cedar plank siding (Quarles and Pohl, 2018).*

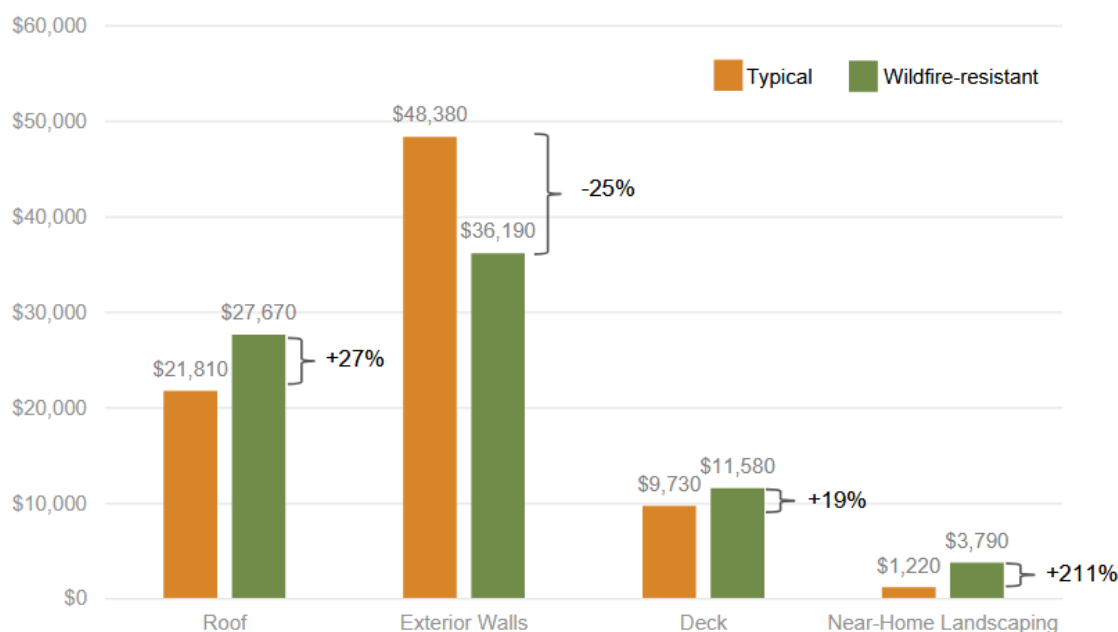


Figure 24. An analysis by Headwater Economics in 2018 compared the cost of constructing a three-bedroom, 2,500-square-foot, single-story, single-family home using typical construction materials (orange bars) versus using wildfire-resistant materials (green bars). Cost estimates come from a national database (RSMMeans) that averaged material and labor pricing from hundreds of U.S. cities and includes materials, labor, and contractor overhead and profit. Costs do NOT include savings that might occur over time due to reduced maintenance costs and longer lifespans of some fire-resistant construction material.

Communities can realize significant avoided costs if structures are built with fire-resistant material and well-maintained defensible space and these behaviors reduce the risk of structure-loss in high fire-risk areas. According to an analysis in Canada, which utilized data on structure loss during the 2018 Camp Fire in California, the benefit-cost ratio of complying with WUI code is \$14 saved for every \$1 spent in communities with high wildfire hazard communities and \$2 saved for every \$1 spent in communities with moderate wildfire risk. The benefit-cost ratio to individual homeowners could be \$34 saved for every \$1 spent on new construction and \$14 saved for every \$1 spent on replacing features on existing homes in high-risk areas. In moderate-risk areas, these values are \$5 saved for every \$1 spent on new construction and \$2 saved for every \$1 spent on replacing features on existing homes (Porter et al., 2021).

Homeowners and businessowners often wonder what HIZ mitigation they should prioritize. Multiple interacting factors influence risk, and there is not a one-size-fits-all optimal approach to risk reduction. Research on structure loss during wildfire and construction costs can provide general guidelines regarding high-priority actions for new construction or replacing existing structure features (**Table 4**). The following generalizations emerge from research on HIZ mitigation (Dossi et al., 2022; Porter et al., 2021; Quarles and Pohl, 2018; Syphard and Keeley, 2019; Troy et al., 2022):

- Fire-resistant roofing is one of the most important characteristics of homes that survive wildfire. Fortunately, most homes in the City of Louisville have fire-resistant class A roofs.
- Double-paned, tempered-glass windows with fire-resistant frames are very important to reduce the risk of internal structure ignition from radiant heat and/or embers, especially when homes are spaced less than 30 feet apart.
- Non-flammable siding is particularly important when homes are spaced less than 30 feet apart and when vegetation in defensible space zones 1 and 2 are not mitigated. Removing vegetation can reduce the chance of flames and radiant heat igniting siding.
- Having no deck or non-flammable decking can increase the chance of homes surviving wildfire.
- The most cost-effective actions (i.e., beneficial but less expensive) are removing fencing or replacing fencing with fire-resistant material, installing fine wire mesh over vents, and mitigating vegetation in defensible space zones 1 and 2. However, the impact of these actions individually is lower in magnitude than some of the more expensive actions, such as non-flammable roofing and double-paned windows.
- No individual action can guarantee your home will stand strong during a wildfire, so it is important to reassess your structure and your ability to pay for mitigation work and make continuous improvements.
- HIZ mitigation requires a regular commitment to maintenance—debris fills gutters, cracks form in siding, and vegetation regrows. Take time every year to walk around your home and identify steps you can take to continue reducing your risk—this can help make your home, your family, your neighborhood, and firefighters safer in the case of an emergency.

Table 3. Relative importance of HIZ mitigation actions based on research by Headwater Economics in 2018 and a study in Canada that utilized findings of structure loss and HIZ characteristics during the 2018 Camp Fire in California (Porter et al., 2021; Quarles and Pohl, 2018). Relative costs for replacing structure features are classified as low (<\$1,00), moderate (\$1,000-5,000), high (>\$5,000-10,000), and very high (>\$10,000) based on cost estimates provided in Porter et al. (2021) and Quarles and Pohl (2018).

HIZ mitigation action	Relative importance for risk reduction	Relative cost for replacement
Replacing roof with fire-resistant material	Very high	Very high
Covering vents to reduce ember penetration	Moderate to high	Low
Replacing vinyl gutters with metal gutters and installing gutter cover devices and metal drip edge	High	Moderate
Enclosing soffits with fire-resistant material	Moderate to high	Moderate to high
Replacing flammable siding with fire-resistant exterior siding, sheathing, and vapor barriers	High, especially when home spacing is <30 feet and vegetation is not mitigated in defensible space zone 1 and 2	Very high
Replacing single-pane windows with vinyl frames with double-paned, tempered-glass windows with fire-resistant frames	Very high, especially when home spacing is <30 feet	Very high
Replacing flammable doors with fire-resistant doors and weather stripping	Moderate	Moderate to high
Replacing flammable decking with fire-resistant decking surface, frame, and fascia	High	Very high
Removing fences or replacing flammable fences with fire-resistant material	High	Low (removing fence) to high (replacing fence)
Removing all flammable material and creating non-combustible barrier in defensible space zone 1	Very high	Moderate
Reducing vegetation in defensible space zone 2	Very high	Moderate

Linked Defensible Space

In an urban fire context like Louisville's, HIZ mitigation efforts must happen collectively, because one property's untreated vegetation, fences, or attachments can increase the vulnerability of adjacent homes. Mitigation across the HIZ is most effective when neighbors coordinate to address shared exposures, linked defensible space, and structural linkages that can transmit fire between properties. Results from this study emphasize the potential of widespread mitigation to substantially reduce community-wide vulnerability to wildfire (**Figure 13; Figure 14**).

In Louisville's dense urban neighborhoods, the HIZ of one property almost always overlaps with that of several neighbors (**Figure 25**). As a result, wildfire hazards on a single parcel—vegetation, fencing, attachments, outbuildings, combustible debris, or architectural vulnerabilities—can increase the risk of igniting surrounding homes. This interconnectedness means that mitigating isolated properties does not fully address the pathways

through which fire can spread in an urban conflagration environment. Instead, neighborhoods must adopt a mindset of linked defensible space, where collective action across property lines creates a continuous, mutually reinforcing buffer against ignition.

The cumulative effect of linked defensible space across multiple homes can significantly improve the likelihood of home survival during a wildfire and enhance firefighter safety (Jolley, 2018; Knapp et al., 2021). During the 2021 Marshall Fire, closely spaced structures, continuous fencing, and shared landscaping created conditions where fire could move rapidly from home to home, outpacing traditional suppression capabilities (Holstrom et al., 2023). Similar patterns have been documented in other urban-fire disasters across the West, underscoring the need for community-scale, not just parcel-scale, mitigation (Maranghides et al., 2022).

In Louisville, nearly all homes share part of their HIZ with at least one adjacent structure, and many share it with multiple structures. This overlapping HIZ environment creates a greater potential for structure-to-structure ignition, particularly when homes lack mitigation or hardening measures (Syphard et al., 2012). When one structure ignites, it becomes a high-intensity heat source capable of transmitting fire across property lines through radiant heat, flame contact, or ember generation. Reducing these risks requires coordinated mitigation across all structures within overlapping HIZs.

Linked defensible space also includes all secondary structures—garages, sheds, workshops, detached studios, campers, and storage units. These buildings can ignite easily and produce embers and radiant heat similar to a primary residence. Mitigating HIZ conditions around secondary structures, and spacing them appropriately from homes when possible, reduces the potential for fire to cascade from one structure to another. Without consistent mitigation across these ancillary buildings, wildfires can quickly escalate into urban conflagrations that exceed the capacity of wildland and structural firefighters to intervene (Cohen, 2008).

Ultimately, forming linked defensible space is both a technical practice and a community ethic. By working together to create defensible space that extends seamlessly across property lines, Louisville residents can help reduce the risk of structure-to-structure fire spread and reinforce the broader goal of becoming a fire adapted community.



Figure 25. Most homes in Louisville have overlapping HIZ, requiring neighbors to work together to create linked defensible space in order to reduce shared risk. Source: [Fire Safe Marin](#) with modifications by The Ember Alliance.

Resources for Shared Responsibility

Collaboration

Wildfire and conflagration resilience is fundamentally a shared responsibility. It depends on residents working together, neighborhoods coordinating their mitigation priorities, municipal agencies and fire protection districts providing guidance and support, and partner organizations offering technical expertise and facilitation. This collaboration must occur across scales—home, neighborhood, HOA, city, and county—because wildfire risk itself is interconnected across these levels (**Figure 20**).

Addressing interconnected hazards requires coordinated mitigation and not isolated or uneven efforts. Residents working independently may reduce their own vulnerability, but without alignment across homes, gaps in treatment can allow conflagration to bypass mitigation on individual properties. Vegetation management on public land can reduce wildfire risk, but if adjacent private land is unmitigated, wildfires might still be able to travel into the community and become conflagrations.

Wildfire resilience is not only technical—it is social. Communities that work together before a wildfire event are better prepared to communicate, make decisions, and support one another during an emergency. Collaboration builds:

- Shared understanding of local hazards and priority mitigation needs.
- Clear expectations for maintenance of landscaping, fencing, and defensible space across properties.
- Stronger communication pathways among residents, HOAs, and response agencies.
- Capacity for coordinated action, whether implementing mitigation projects or responding to evacuation needs.

Louisville residents have access to robust mitigation support through Wildfire Partners, LFPD, and national frameworks such as Firewise USA®. Wildfire Partners provides the technical foundation for mitigation through expert advising, hazard assessments, and community mitigation planning. Firewise USA® can provide the long-term accountability and recognition framework that keeps communities engaged year after year. HOA and neighborhood collaboration provides the social and organizational structure for carrying out shared mitigation projects.

These social networks and governance structures—HOAs, neighborhood committees, Firewise boards, and Wildfire Partners community liaisons—dramatically improve a neighborhood’s ability to sustain mitigation over time, respond cohesively to emergencies, and recover more rapidly after an event. By working across homes, neighborhoods, HOAs, and community organizations, Louisville can reduce the likelihood of structure ignition, limit the spread of wildfire in urban settings, and strengthen the community’s long-term resilience.

Louisville Fire Protection District

LFPD is an essential partner in advancing wildfire resilience within the City of Louisville. The district brings deep operational knowledge of local fire behavior, structural vulnerabilities, response capabilities, and community needs. LFPD plays a central role in supporting both individual and community-scale mitigation. Through education and public engagement, the district ensures that residents understand their shared risk and the steps necessary to reduce it. Through planning and coordination with the City of Louisville, LFPD helps align mitigation priorities across Louisville’s built environment in several ways:

- **Fire behavior insight in an urban/suburban context**—LFPD brings expertise on how embers move through neighborhoods, where radiant heat transfer is most likely, and which neighborhood characteristics influence fire spread. This local fire behavior understanding ensures that mitigation actions align with the actual drivers of risk.

- **Guidance on home hardening and community-level priorities**—The district provides residents, HOAs, and community leaders with evidence-based recommendations on roofs, fencing, attachments, vegetation, and common-area mitigation. Their guidance supports consistent standards across properties—critical in Louisville’s dense housing patterns.
- **Risk communication and public outreach**—LFPD regularly engages with Louisville residents through community events. These efforts help elevate awareness, encourage participation, and establish shared expectations for mitigation.
- **Alignment with emergency response needs**—As the agency responsible for fire suppression and emergency operations during wildfire and conflagration events, LFPD ensures that community mitigation supports response needs—clear access, safe zones, reduced fuel continuity, and well-maintained infrastructure.



LFPD Station 2 on Via Appia Way is designed with wildfire-wise and water-wise landscaping. Use this as a starting place for ideas for your yard or a conversation starter with your neighbors about HIZ mitigation. Photo credits: Jennifer Henderson, LFPD.

Homeowners Associations

HOAs and similar neighborhood governing bodies play a critical role in shaping how wildfire mitigation happens across residential areas. HOAs often manage common open spaces, control landscaping standards, and maintain shared infrastructure that can significantly affect ignition likelihood and fire spread. They are also uniquely positioned to convene and mobilize residents around shared priorities, such as replacing continuous combustible fencing with ignition-resistant alternatives, maintaining vegetation along property lines, or adopting neighborhood-wide ember-resistant landscaping guidelines.

For Louisville, HOA-led or HOA-supported mitigation also improves financial efficiency and long-term sustainability. Many of the highest-impact mitigation projects, such as coordinated vegetation management or replacing perimeter or shared fences, are far more cost-effective when implemented at scale. HOAs can apply for grants, leverage cost-sharing models, and negotiate group rates with contractors.

Equally important is the social dimension of wildfire resilience. HOAs provide a platform for developing shared expectations, improving communication, and encouraging collective preparedness. When HOAs actively engage residents in wildfire mitigation planning—whether through community meetings, annual maintenance reminders, or neighborhood-scale projects—they strengthen the social cohesion that becomes critical during fast-moving events.

Residents who live in HOAs can become involved in several ways to stay informed and encourage their HOA to embrace the concept of fire adapted communities. For example:

- Sign up for newsletters and email announcements from your HOA to stay abreast of fire-related events and relevant regulations.
- Encourage your HOA to adopt architectural and landscaping standards that align with best practices for HIZ mitigation.
- Help your HOA become a Firewise USA® community to access resources to support community events and education (see the **Firewise USA® Section** for more information).
- Become a community liaison with Wildfire Partners to connect your HOA with community advising offered by Wildfire Partners.
- Work with your HOA to organize a HIZ mitigation walking tour to visit properties with admirable defensible space and home hardening.
- Work with your HOA to organize an HIZ mitigation workday so neighbors can help each other with low-cost, low-effort actions like removing debris from gutters and installing mesh over vents.
- Help your HOA coordinate with the City of Louisville Department of Parks, Recreation, and Open Space to mitigate risk on adjacent public land. The City Manager's Office (Recovery & Resilience Division) can help liaise with appropriate departments for collaborative work. See the **Parks and Open Space Section** for more ideas about engaging with the City of Louisville Department of Parks, Recreation, and Open Space.

Wildfire Partners

Louisville residents have access to Boulder County's nationally recognized Wildfire Partners program, which supports both household-level mitigation and coordinated neighborhood or HOA-scale efforts. Through Wildfire Partners, residents can engage in two primary pathways: community advising and community mitigation planning.

Community Advising

Community Advising provides Louisville residents, HOAs, and neighborhood leaders with expert, site-specific guidance on how to reduce wildfire and conflagration risk. Wildfire Partners subject matter experts work

directly with community liaisons to develop actionable recommendations tailored to local conditions, property characteristics, and the broader neighborhood context.

Community Advising can help residents identify priority actions such as vegetation management, removal of combustible materials, hardening of building materials, and improving the ignition resistance of fencing or landscaping. This level of support is especially valuable in Louisville's denser residential areas, where the vulnerability of one home is closely tied to that of its neighbors, such as the downtown area of Louisville.

Community Advising also plays a crucial role for HOAs and resident groups. Advising helps HOA boards or neighborhood committees understand regulatory considerations, prioritize collective actions, and communicate effectively with residents about shared responsibilities.

Community Mitigation Planning

Where neighborhoods share boundaries, vegetation patterns, or structural arrangements that create a more collective fire environment, Wildfire Partners supports a more formal, neighborhood-wide approach through Community Mitigation Planning. This process is designed for groups of residents—ranging from small clusters of homes to full HOAs—who want to understand wildfire risk at the community scale and organize mitigation in a coordinated, strategic manner.

The process typically includes:

1. **Boundary identification**—Defining a reasonable neighborhood footprint based on built form, vegetation characteristics, parcel layout, and shared exposures.
2. **Community liaison designation**—Selecting a resident or HOA representative who serves as the point of contact and helps facilitate communication among neighbors.
3. **Joint site visit and assessment**—Wildfire Partners staff visit the community to assess structural vulnerabilities, vegetative conditions, common-area hazards, and features that may influence ignition or fire spread (e.g., continuous wooden fencing, shared open-space edges, drainage corridors).
4. **Customized mitigation report**—The community receives a detailed summary of findings and recommendations, identifying the most impactful mitigation actions at both the structural and neighborhood levels. These may include vegetation/fuel reduction projects, infrastructure improvements, defensible-space guidelines, replacement of combustible fencing, or long-term maintenance planning.
5. **Community education and engagement**—Wildfire Partners often helps organize outreach events where residents can learn about hazards, understand recommended actions, and commit to shared mitigation practices.

For Louisville residents, working with Wildfire Partners amplifies the effectiveness of wildfire mitigation at both the household and neighborhood scales. Community Advising equips residents with the technical knowledge needed to address home-level vulnerabilities, while Community Mitigation Planning provides the structure for neighborhoods to reduce shared risks that cannot be solved by individual homeowners alone.

Firewise USA®

As Louisville continues to adapt to post-Marshall Fire realities, residents and neighborhoods are seeking ways to formalize wildfire and conflagration risk reduction, build shared responsibility, and create long-term structures for maintaining mitigation. One of the most effective pathways available is participation in the Firewise USA® program, a national recognition initiative administered by the National Fire Protection Association (NFPA) in collaboration with state forestry agencies. Firewise USA encourages neighborhoods to organize around wildfire preparedness, assess local hazards, complete measurable mitigation projects, and maintain annual commitments to reducing structural ignition potential. The Cornerstone neighborhood in the

City of Louisville received Firewise USA® designation in 2025, paving the way for additional neighborhoods to follow their example.

The Firewise framework aligns well with the city's need for neighborhood-scale action. Firewise provides a widely trusted, structured, and repeatable process that supports long-term community resilience and fosters a culture in which wildfire preparedness is routine rather than exceptional.

To achieve Firewise USA® recognition, a neighborhood must complete several core steps, including:

1. **Organizing a local Firewise committee or board**—Typically composed of residents, HOA representatives, or neighborhood leaders.
2. **Completing a community hazard assessment**—This identifies ignition vulnerabilities, structure and vegetation hazards, and site-specific factors that influence fire behavior. In Louisville, these assessments highlight community-wide exposures such as continuous wooden fencing, shared landscaping, dense home spacing, and proximity to open spaces.
3. **Developing a three-year action plan**—This plan outlines achievable mitigation projects and maintenance strategies that the community commits to undertaking.
4. **Completing annual mitigation work**—Firewise communities must document investments in vegetation management, home hardening, and other risk-reduction practices.
5. **Annual renewal and reporting**—Firewise status is maintained through regular updates, reporting of work completed, and demonstration of continued community engagement.



The Cornerstone neighborhood in Louisville celebrated Firewise USA® recognition in 2025 with a ribbon-cutting ceremony. From left: Wildfire Partner's Abby Silver, Councilmember Josh Cooperman, resident Ann Brennan, resident Lisa Hughes, Councilmember Judi Kern, retired Chief John Willson. Photo credit: City of Louisville.

Wildfire Partners' Community Mitigation Planning provides a strong technical foundation and organizational structure for neighborhoods that may ultimately seek Firewise USA® recognition. Because many aspects of the Wildfire Partners process parallel Firewise requirements, neighborhoods that complete mitigation planning are already well positioned to transition into Firewise.

When neighborhoods transition from Wildfire Partners Community Mitigation Planning into Firewise USA recognition, they gain several long-term advantages:

- Formal structure for ongoing mitigation rather than short-term, one-off projects.
- Improved communication and coordination among residents, HOAs, and municipal partners.
- Annual accountability and momentum through reporting requirements and a living action plan.
- Increased access to grant opportunities—many funding programs prioritize or require Firewise participation.
- Recognition and identity as a fire-adapted neighborhood, which can enhance social cohesion and motivate continued engagement.
- Potential insurance benefits, depending on carrier practices and program evolution.

City of Louisville Parks and Open Space

The City of Louisville owns and manages roughly 2,600 acres of open space, parks, trails, and publicly accessible lands under its Parks, Recreation, and Open Space Department. Public land co-managed or managed by the City of Boulder, City of Lafayette, and Boulder County surround the City of Louisville. Public lands, trails, and open-space and park corridors intersect with residential neighborhoods, making coordination between residents, private-property owners, and City of Louisville Department of Parks, Recreation, and Open Space (in coordination with other relevant City Departments), critical. Working collaboratively ensures that mitigation strategies on public lands—especially fuel management and vegetation projects—complement defensible space, home-hardening, and landscape mitigation on private properties.

The City of Louisville Department of Parks, Recreation, and Open Space are already undertaking extensive wildfire mitigation on their properties. The [2023 Wildfire Hazard and Risk Assessment of Louisville Public Lands](#) provides a data-driven foundation to guide mitigation on public lands; integrating that with resident-led mitigation efforts amplifies resilience across the built and natural environment. Information on ongoing wildfire mitigation treatments on City of Louisville open space lands is available through the [Open Space Wildfire Mitigation Story Map](#). This analysis suggests several additional locations where strategic land management could make the city more resilient to wildfire (**Table 2**).

The City of Louisville collaborates closely with the City of Boulder, City of Lafayette, and Boulder County to be aware of management of adjacent public land. Some of the public land around the city is even jointly owned and managed by these entities. The City of Louisville also coordinates with the [Boulder County Ditch Wildfire Mitigation Program](#), which is run by Boulder County Parks & Open Space and funded by the 2022 1A Wildfire Mitigation Sales Tax. Vegetation along Goodhue Ditch and Davidson Highline Lateral were treated in 2025 through this coordination to reduce wildfire risk from vegetation in ditches.

Land managers need to balance multiple uses of public land when undertaking wildfire mitigation. There are benefits and tradeoffs to different actions to mitigate wildfire risk, and there are no management strategies that can optimize all values for public land and minimize wildfire risk at the same time. Social values, ecological impacts, feasibility, cost, and likelihood of success must be considered when deciding where to conduct different management options.



A recent project by City of Louisville Department of Parks, Recreation, and Open Space involved removing flammable creeping juniper along fence lines around Harper Lake. Photo credits: City of Louisville.

Residents and neighborhood associations can collaborate with the City of Louisville in the following ways:

- **Coordinate private and public mitigation efforts**—When public land areas buffer neighborhoods, coordinated action is necessary to manage fuel loads, maintain defensible boundaries, and reduce conflagration potential. Residents can work with City staff from the City Manager’s Office (Recovery & Resilience Division) to align timing and scope of vegetation management, tree removal, controlled grazing/mowing, or fuel-reduction efforts so that mitigation on public lands supports safety for adjacent private properties.

- **Participate in volunteer programs**—The City of Louisville Department of Parks, Recreation, and Open Space offers [volunteer opportunities and events](#) related to land management, trail maintenance, and ecological stewardship. Engaging as volunteers provides residents with a role in fueling resilience, while fostering community ownership of mitigation.
- **Monitor and report post-mitigation maintenance needs**—After fuel reduction or vegetation management is implemented on public lands, ongoing maintenance is essential. Residents have a role in reporting regrowth, dead trees, downed branches, or other hazards — particularly where open space abuts residential subdivisions — to help maintain the effectiveness of mitigation over time.
- **Support educational outreach and neighborhood awareness**—Residents can collaborate with Open Space and other community partners to share information about wildfire risk, mitigation benefits, and WRA and WCRA findings. This helps build broader neighborhood awareness and encourages adoption of defensible-space practices both on public and private lands.

Tradeoffs and Additional Considerations

Recommendations provided in this report are based on advanced conflagration modeling for the City of Louisville, best practices for creating fire adapted communities, and discussions with LFPD and the City of Louisville. Implementing the actions in this report will require an investment of time and money by individual homeowners and business owners, LFPD, the City of Louisville, and other partners. The following tradeoffs and challenges are important for the community to evaluate when deciding which actions to prioritize. Analyses and scientific research can inform decision making, but social values and economic considerations also factor into feasibility and likelihood of success.

- Widespread HIZ mitigation in the City of Louisville will require regulations, compliance, and enforcement that cover not only new construction but existing buildings as well (e.g., replacing structure features).
- Enforcing WUI code will require additional staffing to ensure consistent and fair evaluation of compliance. Regular inspections are important because conditions in the HIZ change over time, particularly vegetation in defensible space zones 1 and 2.
- Financial and other resources might need to be available for members of the community who cannot financially or physically conduct HIZ mitigation.
- HIZ mitigation requires a regular commitment to maintenance, particularly mitigating vegetation in defensible space zones 1 and 2 as vegetation regrows.
- Some HIZ mitigation might negatively impact other community values and therefore might not be desirable. For example, historic buildings often have more flammable construction material, but some of these building materials are important to retain historic character and historical designation. Removing some trees might reduce fire risk in certain areas, but urban trees also help cool urban surface temperatures, reduce wind speeds, improve physical and mental health, provide urban habitat for wildlife, increase property values, and can make people feel safer (Mouratidis, 2019; Tyrväinen et al., 2005; Ulmer et al., 2016).
- Managing public land to reduce wildfire risk is not always consistent with other, Home Rule Charter adopted, multi-use values for public land. For example, mowing vegetation in open space can reduce habitat for some plants and animals, and it can create social trails that cause privacy concerns for residents living adjacent to public land.
- Becoming a fire adapted community requires reframing the role of fire on the landscape, and accepting activities that were previously uncomfortable might grow in importance, such as embracing the judicious use of broadcast prescribed burning to restore grassland ecosystems and reduce wildfire risk.



The City of Louisville is a beautiful and resilient community that survived the 2021 Marshall Fire—a devastating urban conflagration—and continues to come together and grow towards fire adaptation. Important steps have already been taken by residents, business owners, developers, city and county agencies, and other partners to reduce wildfire risk. This report supplements and leverages the existing commitment across the community to reduce risk and increase emergency preparedness, and it is a call to action to continue playing an active role in making the community safer.

Photo credit: Sunset taken from Harper Lake in the City of Louisville. Image by Mike Smith as posted on City of Louisville social media.

Glossary

20-foot wind speed: The rate of sustained wind over a 10-minute period at 20 feet above the dominant vegetation. The wind adjustment factor to convert surface winds to 20-foot wind speeds depends on the type and density of surface fuels slowing down windspeeds closer to the ground (NWCG, 2021).

Broadcast prescribed burning (aka, prescribed burn, controlled burn): A wildland fire originating from a planned ignition in accordance with applicable laws, policies, and regulations to meet specific objectives (NWCG, 2018).

Building factor: An input required for the AGNI-NAR model that is calculated for each structure to indicate its relative potential of ignition based on its home ignition zone conditions. Building factors range from 0 to 1, and higher building factors are associated with a higher likelihood of ignition if a fire encounters that structure (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018).

Canopy fuels: The stratum of fuels containing the crowns of the tallest vegetation (living or dead), usually above 20 feet (NWCG, 2018).

Chain: Chains are commonly used in forestry and fire management as a measure of distance. 1 chain is equivalent to 66 feet. Chains were used for measurements in the initial public land survey of the U.S. in the mid-1800s.

Community Wildfire Protection Plan (CWPP): A plan developed in the collaborative framework established by the Wildland Fire Leadership Council and agreed to by state, Tribal, and local governments, local fire departments, other partners, and federal land management agencies in the vicinity of the planning area. CWPPs identify and prioritize areas for hazardous fuel reduction treatments, recommend the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure, and recommend measures to reduce structural ignitability throughout the at-risk community. A CWPP may address issues such as wildfire response, hazard mitigation, community preparedness, and structure protection (NWCG, 2018).

Conflagration: See definition for urban conflagration.

Controlled burn: See definition for broadcast prescribed burning.

Convection: A type of heat transfer that occurs when a fluid, such as air or a liquid, is heated and travels away from the source, carrying heat along with it. Air around and above a wildfire expands as it is heated, causing it to become less dense and rise into a hot convection column. Cooler air flows in to replace the rising gases, and in some cases, this inflow of air creates local winds that further fan the flames. Hot convective gases move up slope and dry out fuels ahead of the flaming front, lowering their ignition temperature and increasing their susceptibility to ignition and fire spread. Homes located at the top of a slope can become preheated by convective heat transfer. Convection columns from wildfires carry sparks and embers aloft.

Cumulative fire zone: The combined area encompassing all simulated fire perimeters from the AGNI-NAR model indicating the zone where conflagrations might occur based on the potential for vegetation-to-structure, structure-to-structure, and structure-to-vegetation fire spread. The cumulative fire zone does not indicate the extent of an individual fire perimeter.

Defensible space: The area around a building where vegetation, debris, and other types of combustible fuels have been treated, cleared, or reduced to slow the spread of fire and reduce exposure to radiant heat and direct flame. It is encouraged that residents develop defensible space so that during a wildfire their home can stand alone without relying upon limited firefighter resources due to the great reduction in hazards they have undertaken. The Colorado State Forest Service defines three zones of defensible space: zone 1 as 0 to 5 feet from the home, zone 2 as 5 to 30 feet from the home, and zone 3 as 30 to about 100 feet from the home (CSFS, 2021).

Ember: Small, hot, and carbonaceous particles. The term “firebrand” is also used to connote a small, hot, and carbonaceous particle that is airborne and carried for some distance in an airstream (Johnston, 2018).

Ember cast: The process of embers/firebrands/flaming sparks being transported downwind beyond the main fire and starting new spot fires and/or igniting structures. Short-range ember cast is when embers are carried by surface winds and long-range ember cast is when embers are carried high into the convection column and fall out downwind beyond the main fire. The number of embers reaching an area decreases exponentially with distance traveled, and the likelihood of structure ignition increases with the number of embers landing on receptive fuels (Caton et al., 2016). The distance used to differentiate short-range and long-range ember cast varies among sources. NWCG (2018b) classifies short-range ember cast as embers that travel less than 0.25 miles and long-range ember cast as embers that travel more than 0.25 miles, whereas Beverly et al. (2010) use a threshold of 0.06 miles. We use the Beverly et al. (2010) definition in this CWPP.

Fire adapted community (FAC): A human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire (NWCG, 2018). There is not a checklist or one silver bullet to become a FAC; there are many strategic actions and tools that should be used together to reduce shared risk. Risk mitigation is the responsibility of everyone who lives and works in the community—residents, community groups, fire protection districts, agency partners, non-governmental organizations, etc. Fire adaptation is an ongoing process of collaborative action to identify risk, mitigate it, and maintain the work overtime.

Fire behavior: The manner in which a fire reacts to the influences of fuel, weather, and topography. Characteristics of fire behavior include rate of spread, fire intensity, fire severity, and fire behavior category (NWCG, 2018).

Fire intensity (aka, fireline intensity): (1) The product of the available heat of combustion per unit of ground and the rate of spread of the fire, interpreted as the heat released per unit of time for each unit length of fire edge, or (2) the rate of heat release per unit time per unit length of fire front (NWCG, 2018).

Fire perimeter: The entire outer edge or boundary of a fire (NWCG, 2021). For the AGNI-NAR model, a fire perimeter is the area bounded by most probable paths (MPP) for a single ignition scenario that has a MPP probability greater than a specific threshold (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018).

Fire regime: Description of the patterns of fire occurrences, frequency, size, and severity in a specific geographic area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured, such as fire return interval (NWCG, 2018).

Fire severity. Degree to which a site has been altered or disrupted by fire; loosely, a product of fire intensity and residence time (NWCG, 2018). Fire severity is determined by visually inspecting or measuring the effects that wildfire has on soil, plants, fuel, and watersheds. Fire severity is often classified as low-severity (less than 20% of overstory trees killed) and high severity (more than 70% of overstory trees kills). Moderate-severity or intermediate fire severity falls between these two extremes (Agee, 1996). Specific cutoffs for fire severity classifications differ among researchers. For example, Sheriff et al. (2014) define high-severity fires as those

Flame length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface). Flame length is measured on an angle when the flames are tilted due to effects of wind and slope. Flame length is an indicator of fire intensity (NWCG, 2018).

FlamMap: A fire analysis desktop application that can simulate potential fire behavior and spread under constant environmental conditions (weather and fuel moisture) (Finney, 2006). FlamMap is one of the most common models used by land managers to assist with fuel treatment prioritization, and it is often used by fire behavior analysts during wildfire incidents.

Fuel model: A stylized set of fuel bed characteristics used as input for a variety of wildfire modeling applications to predict fire behavior (Scott and Burgan, 2005).

Fuel reduction: Manipulation, combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage from wildfires and resistance to control (NWCG, 2018).

Fuelbreak: A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled. Fuelbreaks differ from firebreaks due to the continued presence of vegetation and organic soil. Trees in shaded fuelbreaks are thinned and pruned to reduce the fire potential but enough trees are retained to make a less favorable microclimate for surface fires (NWCG, 2018).

Fuel mitigation / management: The act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire, in support of land management objectives (NWCG, 2018).

Fuel: Any combustible material, most notably vegetation in the context of wildfires, but also including petroleum-based products, homes, and other man-made materials that might combust during a wildfire in the wildland-urban interface. Wildland fuels are described as 1-, 10-, 100-, and 1000-hour fuels. One-hour fuels are dead vegetation less than 0.25 inch in diameter (e.g., dead grass), ten-hour fuels are dead vegetation 0.25 inch to 1 inch in diameter (e.g., leaf litter and pine needles), one hundred-hour fuels are dead vegetation 1 inch to 3 inches in diameter (e.g., fine branches), and one thousand-hour fuels are dead vegetation 3 inches to 8 inches in diameter (e.g., large branches). Fuels with larger diameters have a smaller surface area to volume ratio and take more time to dry out or become wetter as relative humidity in the air changes (NWCG, 2018).

Fuel treatments: The act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire, in support of land management objectives (NWCG, 2018).

Graph theory: A branch of mathematics that studies the connections and relationships between objects, conceptualizing complex problems in terms of nodes (objects) and edges (connections), with various factors influencing the strength of connections between nodes.

Hazard: Any real or potential condition that can cause injury, illness, or death of personnel, or damage to, or loss of equipment or property (NWCG, 2018).

Home hardening: Steps taken to improve the chance of a home and other structures withstanding ignition by radiant and convective heat and direct contact with flames or embers. Home hardening involves reducing structure ignitability by changing building materials, installation techniques, and structural characteristics of a home (California Fire Safe Council, 2020). A home can never be made fireproof, but home hardening practices in conjunction with creating defensible space increases the chance that a home will stand strong during a wildfire.

Home ignition zone (HIZ): The characteristics of a home and its immediate surroundings within 100 feet of structures. Conditions in the HIZ principally determine home ignition potential from radiant heat, convective heat, and ember cast (CSFS, 2021; NWCG, 2018).

Linear fuel treatment: Fuel treatments that follow linear features such as roads, ridgetops, and rivers and are strategically located to increase the safety of residents firefighters, and other first responders during wildfires and to aid in suppression and proactive wildfire management such as broadcast prescribed burning.

Mitigation actions: Actions that are implemented to reduce or eliminate (mitigate) risks to persons, property, or natural resources. These actions can be undertaken before and during a wildfire. Actions before a fire include fuel treatments, vegetation modification in the home ignition zone, and structural changes to increase the chance a structure will stand strong during a wildfire (aka, home hardening). Mitigation actions during a wildfire include mechanical and physical tasks, specific fire applications, and limited suppression actions, such

as constructing firelines and creating "black lines" through the use of controlled burnouts to limit fire spread and behavior (NWCG, 2018).

Mosaic landscape: A heterogeneous area composed of different communities or a cluster of different ecosystems that are similar in function and origin in the landscape. It consists of 'patches' arranged in a 'matrix', where the patches are the different ecosystems and the matrix is how they are arranged over the land (Hansson et al., 1995).

Most probable path (MPP): A key analysis conducted by the AGNI-NAR model to determine potential fire spread by determining the pathways with the highest probability for fire propagation from an ignited node to a non-ignited one while considering the characteristics of each node (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018). A probability value at a given node in MPP maps indicates the probability of that node being in the path of the fire ranging from 0.0 (indicating a very low likelihood of fire reaching that location) to 1.0 (indicating a high likelihood of fire reaching that location).

National Wildfire Coordinating Group (NWCG): An operational group established in 1976 through a Memorandum of Understanding between the U.S. Department of Agriculture and Department of the Interior to coordinate programs of the participating agencies to avoid wasteful duplication and to provide a means of constructively working together. NWCG provides a formalized system and agreed upon standards of training, equipment, aircraft, suppression priorities, and other operational areas. More information about NWCG is available online at <https://www.nwcg.gov/>.

Node importance rank: Output from the AGNI-NAR model that indicates the rank of each building node from lowest important to highest in terms of how many other buildings could be exposed to fire due to ignition of that building node (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018).

Odds ratio: A measurement of the strength of the association between an exposure (i.e., HIZ characteristic) and an outcome (i.e., building ignites from wildfire).

Prescribed burn: See definition for broadcast prescribed burning.

Radiation: A method of heat transfer by short-wavelength energy through air (aka, infrared radiation). Surfaces that absorb radiant heat warm up and radiate additional short-wavelength energy themselves. Radiant heat is what you feel when sitting in front of a fireplace. Radiant heat preheats and dries fuels adjacent to the fire, which initiates combustion by lowering the fuel's ignition temperature. The amount of radiant heat received by fuels increases as the fire front approaches. Radiant heat is a major concern for the safety of wildland firefighters and can ignite homes without direct flame contact.

Rate of spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Rate of spread is usually expressed in chains or acres per hour for a specific period in the fire's history (NWCG, 2018).

Relative vulnerability: Output from the AGNI-NAR model that ranges from 0 to 1 and corresponds to the vulnerability of a node (i.e., structure) in terms of the likelihood of being damaged relative to other nodes/structures in the community (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018).

Risk: (1) The chance of fires starting as determined by the presence and activity of causative agents (e.g., lightning), (2) a chance of suffering harm or loss, or (3) a causative agent (NWCG, 2018).

Spot fire: Fire ignited outside the perimeter of the main fire by an ember (NWCG, 2018). Spot fires are particularly concerning because they can form a new flaming front, move in unanticipated directions, trap firefighters between two fires, and require additional firefighting resources to control.

Spotting: Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire (NWCG, 2018).

Suppression: The work and activity used to extinguish or limit wildland fire spread (NWCG, 2018).

Surface fuels: Fuels lying on or near the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants (NWCG, 2018).

Transmission capacity: Output from the AGNI-NAR model that ranges from 0 to 1 and indicates the potential for a node to spread fire to its immediately neighboring nodes via convection, radiation, or ember spotting once that node is ignited (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018).

Urban conflagrations: Wildland fires that transition into the built environment and escalate into destructive, self-sustaining structure-to-structure fire events (Calkin et al., 2023; Giammanco et al., 2023).

Wildfire-resistant building materials: A general term used to describe a material and design feature that can reduce the vulnerability of a building to ignition from wind-blown embers or other wildfire exposures (Quarles, 2019; Quarles and Pohl, 2018).

Wildland-urban interface (WUI): Any area where the built environment meets wildfire-prone areas—places where wildland fire can move between natural vegetation and the built environment and result in negative impacts on the community (Mowry and Johnston, 2018).

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Appendix A. Methodology for Urban Conflagration Modeling

General description of the AGNI-NAR model

In this study, fire spread in and around the City of Louisville was modeled using the AGNI-NAR mode (Asynchronous Graph Nexus Infrastructure for Network Assessment of Wildland-Urban Interface Risk) (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018). The model utilizes graph theory to assess fire propagation through intermixed fuel of structures and vegetation and simulates fire propagation from vegetation to vegetation, structure to vegetation, vegetation to structure, and structure to structure via convection, radiation, and ember spotting (**Figure 6**) (Mahmoud, 2024a). Graph theory is a branch of mathematics that studies the connections and relationships between objects, conceptualizing complex problems in terms of nodes (objects) and edges (connections), with various factors influencing the strength of connections between nodes.

AGNI-NAR requires a directed graph comprising nodes and links for the community being analyzed. The nodes in the graph represent the fuel (each individual structure or 30-meter x 30-meter patch of vegetation) and the links (lines) represent the connectivity and fire interaction between the different fuel, including connections between non-adjacent fuel, by incorporating different fire propagation modes: 1) convection, 2) radiation, and 3) ember spotting (embers generated by burning vegetation and homes). A detailed description of the AGNI-NAR model can be found in (Chulahwat et al., 2022; Mahmoud and Chulahwat, 2018).

Validation of the AGNI-NAR Fire Spread Model

Both the fire perimeter from the most probable path analyses and the expected damage (i.e., relative vulnerability) have been validated against impacts from recent wildland urban interface fires. The AGNI-NAR model was tested for the 2018 Camp Fire, 2020 Glass Fire, 2021 Marshall, and 2023 Lahaina Fire. The analyses of the four fires resulted in an accuracy of predicted structure damage of approximately 85%, 64%, 72%, and 74%, respectively (Chulahwat et al., 2022; Chulahwat and Mahmoud, 2024; Mahmoud, 2024b). Predicted fire perimeters and building damage for the 2021 Marshall Fire are shown in **Figure 26**. The model has been recently validated against the 2025 Palisades fire (publication by Mahmoud et al. under review).

Types of Analyses and Output

Two types of analysis are conducted by AGNI-NAR to determine the potential fire perimeter (most probable path analysis) and the relative vulnerability of structures to wildfire. These analyses also predict the transmission capacity of vegetation and the node importance rank of buildings. Analyses and outputs are as follows:

- *The most probable path (MPP)* are the paths with the highest probability for fire propagation from an ignited node to a non-ignited one while considering the characteristics of each node. A probability value at a given node in MPP maps indicates the probability of that node being in the path of the fire ranging from 0.0 (indicating a very low likelihood of fire reaching that location) to 1.0 (indicating a high likelihood of fire reaching that location). Areas with an MPP probability <0.1 are excluded from fire perimeters.
- *Relative vulnerability* ranges from 0 to 1 and corresponds to the vulnerability of a node (i.e., structure) in terms of the likelihood of being damaged relative to other nodes/structures in the community. Relative vulnerability is calculated only for structures within the fire perimeter resulting from the MPP analysis. Relative vulnerability can be converted into an approximation of home survival were it to be burned in a fire under conditions modeled for the MPPs analysis. Experience by AGNI-NAR model developers with modeling various historical events indicates that buildings with relative vulnerability less than 0.7 have a low likelihood of burning.

- *Transmission capacity* ranges from 0 to 1 and indicates the potential for a node with burnable vegetation to spread fire to immediately neighboring nodes with burnable vegetation via convection, radiation, or ember spotting once that node is ignited. Transmission capacity shows only slight variation under different wind direction scenarios because transmission capacity is based on fire spread between immediately adjacent cells. Transmission capacity was utilized to guide the development of fuel mitigation scenarios.
- *Node importance rank* indicates the rank of each building node from lowest important to highest in terms of how many other buildings could be exposed to fire due to ignition of that building node. Node importance rank was utilized to guide the development of HIZ mitigation scenarios.

Individual Fire Perimeters vs. Cumulative Fire Zone

To determine cumulative fire zones, fire perimeters were produced from MPP analyses for each of 1,000 scenarios with random ignitions, and areas with MPP probability ≤ 0.05 were excluded. Then the edges of all fire perimeters were connected to produce a cumulative fire zone, which represents all possible fire perimeters combined. The same random ignition points were used for every scenario in this project to produce cumulative fire zones that could be compared among scenarios. **Figure 7** illustrates the difference between the fire perimeter produced by AGNI-NAR for an individual ignition scenario compared to the cumulative fire zone utilized in this report.

For this analysis, ignition points were sampled in areas where a fire is most likely to grow in and around the City of Louisville if an ignition starts (i.e., nodes with a higher transmission capacity) using Monte Carlo simulation. Nodes with a high transmission capacity have a greater potential to spread fire to neighboring nodes once ignited. Historical ignition points for fires larger than 10 acres from 1992-2020 from the U.S. Forest Service Fire Program Analysis fire-occurrence database were limited in the City of Louisville (Short, 2022). Accordingly, sampling ignition points based on historical events was not feasible.

The use of cumulative fire zones requires careful interpretation of maps and results presented in this document as follows:

- Maps of the cumulative fire zone show the probability of nodes being in the path of any of the simulated fires with the cumulative fire zone encircling areas with a probability greater than 0. These maps **do not** represent the predicted fire perimeter for a single fire event or the probability that a node will ignite in a single fire event. Cumulative fire zones cover large portions of the city, but this **does not** suggest that a single fire event would spread across all these areas. Instead, it suggests that many parts of the city could experience a fire depending on the ignition location.
- Maps of relative vulnerability indicate potential impact to structures from urban conflagration were a fire to reach that structure during any of the thousands of ignition scenarios. These maps **do not** represent potential vulnerability during a single fire event, and they do not represent which homes could be exposed to fire during a single fire event.
- Estimates of the percentage of structures with a lower chance of ignition (relative vulnerability < 0.7) indicate the percentage of structures that could survive if a fire were to reach that structure. These estimates **do not** represent the percentage of homes that could survive during a single fire event; not all structures included in the cumulative fire zone are likely to experience fire from the same fire event.
- Maps of transmission capacity represent how likely an area is to transmit fire to adjacent areas. These maps **do not** indicate the pathway that a fire would spread during an individual event.

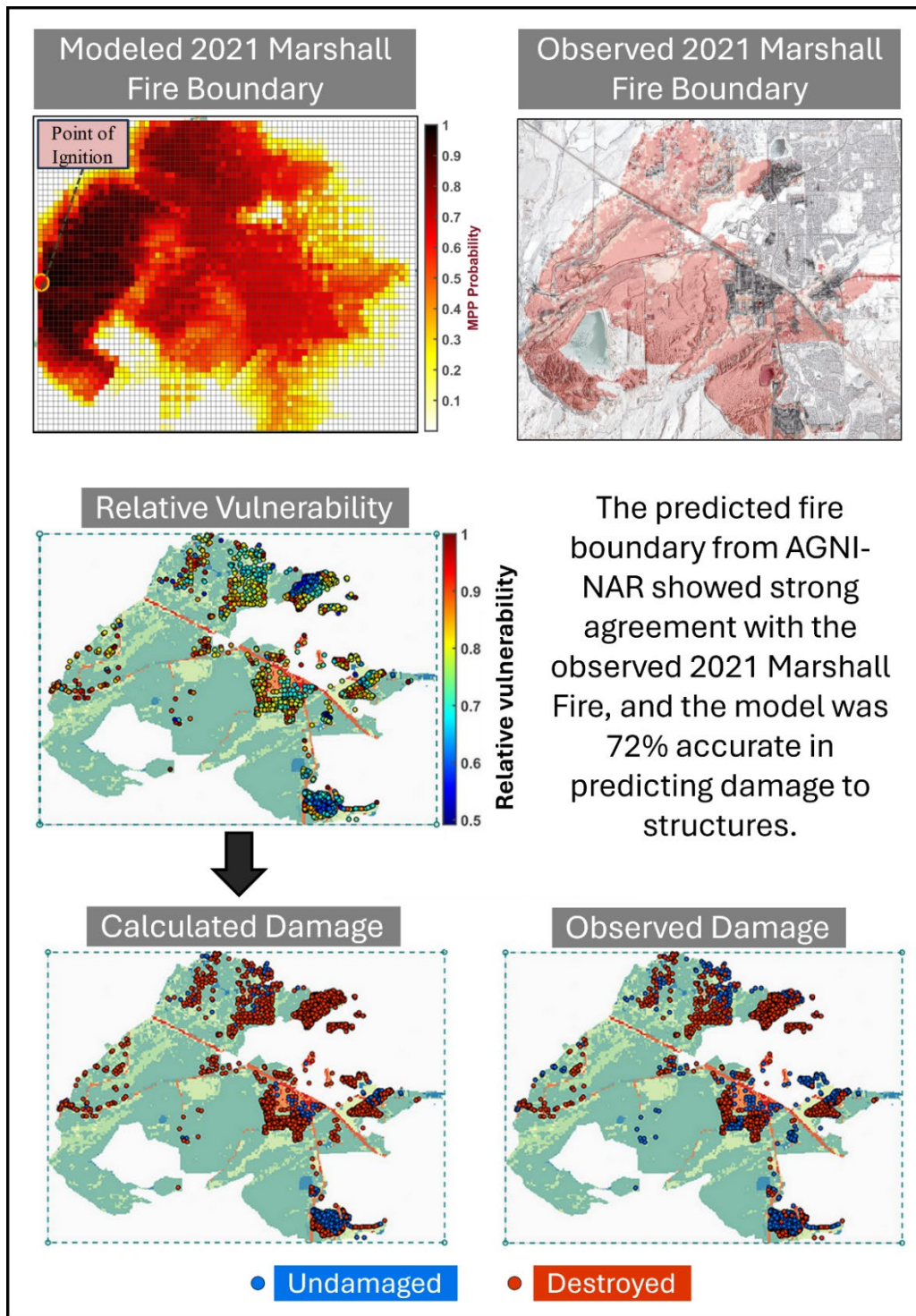


Figure 26. Comparison of the actual fire perimeter for the 2021 Marshall Fire (upper left) and the fire perimeter simulated using the most probable path (MPP) analysis with AGNI-NAR (upper right). Dark red cells (MPP probability of 1) represent areas more likely to be in the path of a fire and white cells (MPP probability of 0) represent areas where the fire extinguished and did not burn. Relative vulnerability estimates from AGNI-NAR (center) were converted into predictions of structure damage assuming structures with relative vulnerability >0.72 were destroyed (lower left). Predicted damage aligned well with observed damage (lower right). Blue dots represent undamaged/minimally damaged structures and red dots represent significantly damaged/destroyed structures. Sources: (Chulahwat et al., 2022; Mahmoud, 2024c).

Model Input for the City of Louisville

The AGNI-NAR model requires information on topography, vegetation, and weather conditions—inputs also required by fire behavior models such as FSIM and FlamMap. The model also requires information on structure locations, building material, and fuels in the home ignition zone.

Vegetation Data

The only vegetation data required for this analysis was surface fuel model for each 30-meter x 30-meter pixel (98-feet x 98-feet) in the study area. Information on canopy fuels was not required for this analysis because ember production was not modeled for overstory vegetation to produce more realistic fire behavior predictions (see explanation below).

Fuel models are a stylized set of fuel bed characteristics used as input for a variety of wildfire modeling applications to predict fire behavior. AGNI-NAR utilizes predictions of flame length and rate of spread by wind speed and fuel moisture for the same set of fuel models used in FSIM and FlamMap (Scott and Burgan, 2005). The Ember Alliance conducted a rigorous quality control of fuel model data for the City of Louisville and surrounding area after deeming that the fuel model data from the 2022 CO-WRA by CSFS and 2022 Colorado All-Lands (COAL) assessment by the USFS were insufficient (**Figure 27**). CO-WRA classified much of the City of Louisville as unburnable fuel models, even areas such as greenbelts, ditches, public land, and other shared spaces that have grasses, shrubs, and tree litter that could burn during a wildfire. CO-WRA did a more adequate job classifying agricultural areas than COAL. COAL incorrectly classified some areas as being vegetated when they were developed and classified some burnable areas as unburnable fuel models.

The Ember Alliance used CO-WRA and COAL data as a starting place to develop an improved map of fuel models in and around the City of Louisville by referencing aerial imagery and developing rules to consistently assign fuel models to different types of vegetation (**Table 4; Figure 28**). Agricultural grasslands, including open space that is actively grazed by livestock, were modeled assuming dry and unharvested conditions, meaning they have the potential to burn and transmit fire. During the growing season and after harvest, fire risk from agricultural land is much lower than that modeled here.

The baseline surface fuel conditions in **Figure 28** represent conditions without ongoing vegetation mitigation by City of Louisville Department of Parks, Recreation, and Open Space. Ongoing vegetation mitigation was considered separately for scenarios exploring different degrees of vegetation management (described below in the **Modeling Scenarios Section**). An analysis was also conducted for potential future conditions incorporating changes to fuels that will result from the [Redtail Ridge development](#) in the southern part of the city. Grass fuel types were converted to unburnable parking lots around buildings and to timber litter to simulate irrigated and mowed lawns with intermittent trees.

A key limitation of existing fire behavior models is the lack of fuel models appropriate for urban vegetation. At the time of modeling for this project, there were no calibrated fuel models for urban vegetation, so timber litter fuel models were assigned to areas with irrigated grass with trees and irrigated grass without trees.² The fuels

² In October 2025, a peer-reviewed publication presented several new options for modeling urban fuels (Moran et al., 2025). However, modeling was already underway for this project before this publication was released. Feedback from the core team helped refine model output and found predictions using timber litter fuel models were appropriate for characterizing potential fire spread in urban fuels in the City of Louisville. Of existing fuel models, Moran et al. (2025) suggest that the original Anderson fuel model 9 (aka, hardwood litter) is the most appropriate of the original set of 13 fuel models for modeling fire spread in urban areas, but they do not provide guidance for the updated set of 40 fuel models from Scott and Burgan (2005). Scott and Burgan (2005) suggest that several of their timber litter fuel models (TL2, TL6, TL8, and TL9) are the best crosswalk for the Anderson fuel model 9, and this analysis uses TL2 for much of the urban vegetation.

in these areas are clearly not characterized by continuous pine litter or deciduous tree litter, but the timber litter fuel models provide the best approximation for the lower rates of spread and flame lengths that could be expected (and are observed) when fire burns through irrigated and mowed grass. Ember production was suppressed for timber litter and timber understory vegetation types for this project based on observations of lower ember production from mowed parks and golf courses during the 2021 Marshall Fire.

Ember production from surface fuels and buildings was accounted for in the model, which is important given that 70% of structures damaged during the 2021 Marshall Fire were damaged from indirect exposure (i.e., embers) (Holstrom et al., 2023). However, ember spotting from canopy fuels was not factored into this analysis after the core team reviewed initial model results. Predicted transmission values were unrealistically higher for urban and riparian areas with trees compared to grasslands and shrublands due to greater ember production assumed to occur from trees. Very few trees in urban areas ignited during the 2021 Marshall Fire according to observations from local firefighters. Some trees were scorched by fire, but fire rarely carried into treetops. Fire intensity often decreases in areas with deciduous trees compared to coniferous trees (Harris et al., 2025; Vermina Plathner et al., 2023). Many trees in Louisville Open Space are deciduous trees in riparian areas which have a lower likelihood of igniting due to higher leaf moisture, plus, deciduous trees lose their leaves during times of the year when 2021 Marshall Fire-like weather is more likely to occur, meaning they have very little fuel in their canopies. Urban trees are often irrigated and well-maintained, making them less likely to ignite than trees occurring in forests. Model output that excluded ember production from canopy fuels aligned better with observed fire behavior and transmission from the 2021 Marshall Fire and with observations from firefighters about fire spread in similar areas.



During the 2021 Marshall Fire, flames spread through litter underneath trees and began scorching tree stems, but most trees were not consumed during the fire. Photo credit: The Ember Alliance. Photo taken in the City of Louisville Arboretum.

Table 4. Fuel models assigned to different types of vegetation for fire behavior modeling with AGNI-NAR. Timber litter (TL) and timber understory (TU) fuel models were used for urban vegetation in the absence of more suitable fuel models. Lower rates of spread and flame lengths predicted for TL and TU fuel models compared to other fuel models made them the most appropriate options. See (Scott and Burgan, 2005) for a description of fuel models.

FBFM code (number) – description	Rate of spread (chains/hour) ¹	Flame length (feet) ¹	Relative ember production ²	Used for...
NB1 (91) – Urban/developed	N/A	N/A	N/A	Roads, parking lots, and housing developments
NB3 (93) – Non-burnable agriculture	N/A	N/A	N/A	Vegetable patches
NB8 (98) – Open water	N/A	N/A	N/A	Open water
NB9 (99) – Barren	N/A	N/A	N/A	Barren land
GR1 (101) – Short, sparse dry climate grass	Moderate (~20 ch/hr)	Low (~2.5 ft)	Very low	Grasslands or burnable agriculture (<i>i.e.</i> , wheat fields during dry spells and before harvest) with lower vegetation cover Prairie dog colonies
GR2 (102) – Low load, dry climate grass	Extreme (~175 ch/hr)	High (>10 ft)	Low	Grasslands or burnable agriculture (<i>i.e.</i> , wheat fields during dry spells and before harvest) with higher vegetation cover
GS1 (121) – Low load, dry climate grass-shrub	Very high (80-90 ch/hr)	Moderate (8 ft)	Low	Grasslands / shrublands with scattered shrubs Ditches or public spaces with scattered conifer shrubs
GS2 (122) – Moderate load, dry climate grass-shrub	Very high (>100 ch/hr)	High (>10 ft)	Moderate	Grasslands / shrublands with higher shrub cover Ditches or public spaces with higher cover of shrubs Rows / clumps of short conifer trees
SH1 (141) – Low load dry climate shrub	Low (2-3 ch/hr)	Very low (<1 ft)	Moderate	Grasslands / shrublands following fuel mitigation (see Table 8)
SH2 (142) – Moderate load dry climate shrub	High (50 ch/hr)	High (>10 ft)	High	Shrublands Clumps of tall sedges/reeds
TU1 (161) – Low load dry climate timber-grass-shrub	Moderate (~20 ch/hr)	Moderate (4-5 ft)	Very low ²	Riparian areas and cottonwood stands
TL1 (181) – Low load compact conifer litter	Low (~2.5 ch/hr)	Very low (<1 ft)	Very low ²	Some vegetation types following fuel mitigation (see Table 8)
TL2 (182) – Low load broadleaf litter	Low (~4 ch/hr)	Low (~1.5 ft)	Very low ²	Irrigated / manicured lawns, including parks, greenbelts, baseball fields, soccer fields, and

FBFM code (number) – description	Rate of spread (chains/hour) ¹	Flame length (feet) ¹	Relative ember production ²	Used for...
				putting greens with no to low tree cover
TL3 (183) – Moderate load conifer litter	Low (5-6 ch/hr)	Low (~2 ft)	Very low ²	Irrigated / manicured lawns, including parks, greenbelts, baseball fields, soccer fields, and putting greens with moderate to high tree cover
TL5 (185) – High load conifer litter	High (>25 ch/hr)	Moderate (>5 ft)	Very low ²	Deciduous forests following fuel mitigation (see Table 8)
TL6 (186) – Moderate load broadleaf litter	High (>25 ch/hr)	High (8-9 ft)	Very low ²	Deciduous forests with moderate to high tree cover

¹Rate of spread and flame length adjectives (*e.g.*, very low, low, moderate, high, very high, and extreme) and estimates came from (Scott and Burgan, 2005) for midflame wind speeds of 20 mph, zero slope, and very dry fine dead fuel moisture. Rate of spread is measured in chains/hour, where 1 chain = 66 feet and 1 chain / hour = 1.1 feet / minute. Chains are commonly used in forestry and fire management as a measure of distance.

²Relative ember production as modeled in AGNI-NAR are based on fuel bed depth and packing ratio from (Scott and Burgan, 2005), with the exception of timber litter (TL) and timber understory (TU) fuel models. For TL and TU fuel models, ember production were suppressed because these fuel models were selected for their lower rates of spread and flame lengths to approximate urban vegetation in the absence of better suited fuel models. However, TL and TU have relatively high ember production based on their fuel bed depth and packing ratio. Urban vegetation has a much lower fuel bed depth than deciduous and coniferous forest litter and is not expected to produce abundant embers.

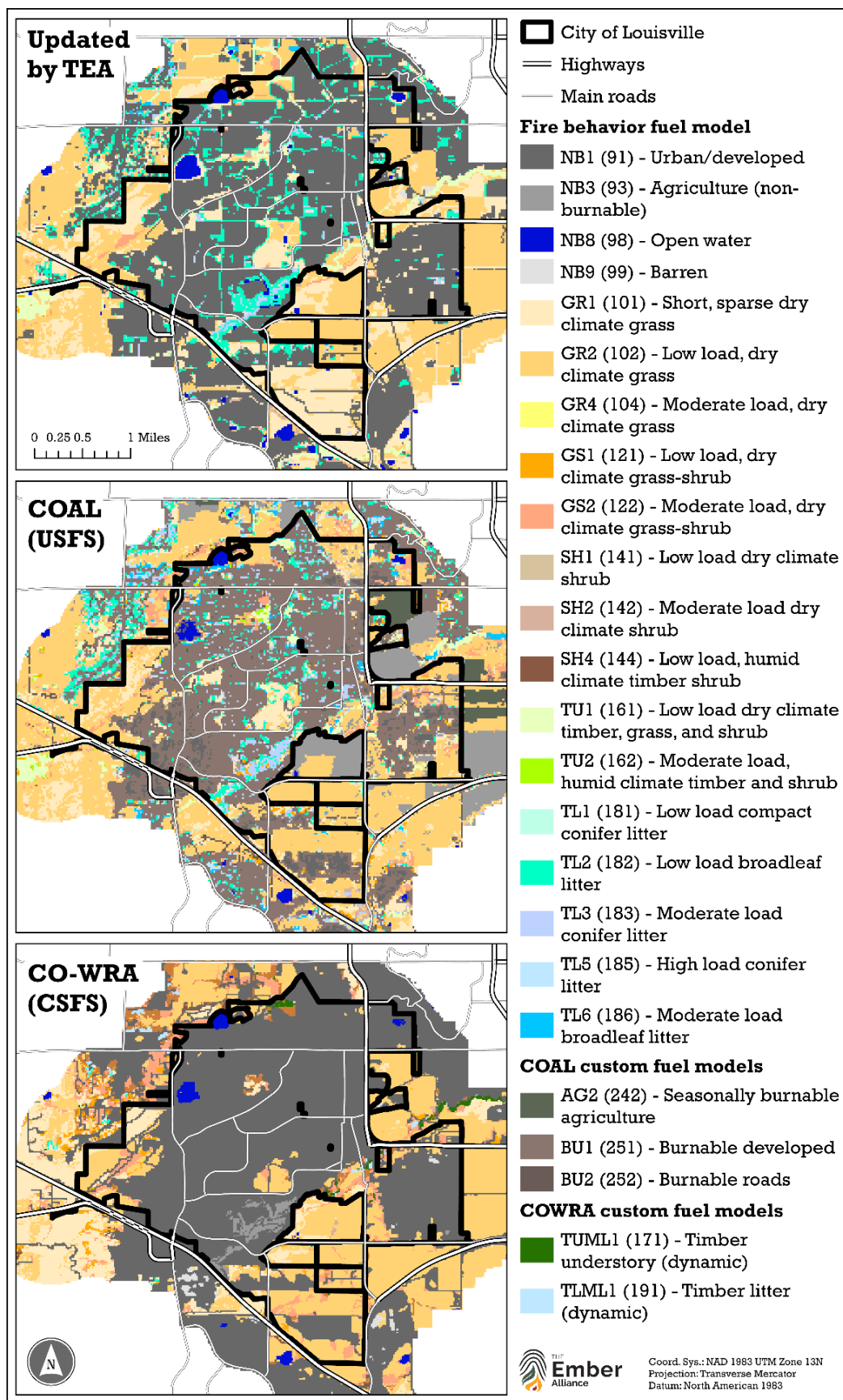


Figure 27. Surface fuel model layer prepared by The Ember Alliance (top) to improve upon the 2022 COAL (center) and 2022 CO-WRA (lower) datasets. See (Scott and Burgan, 2005) for a description of fuel models.

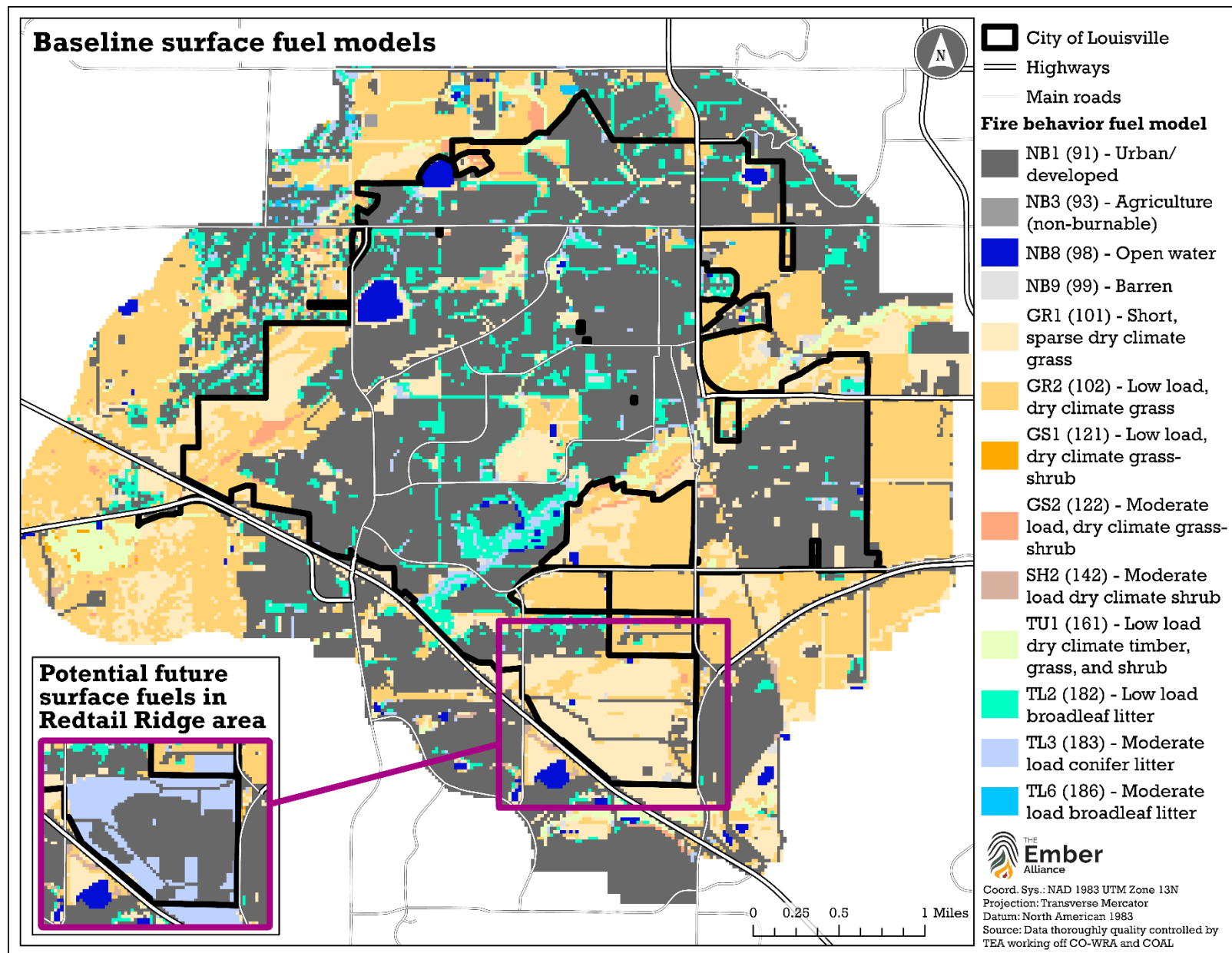


Figure 28. Baseline surface fuel model layer used for modeling with AGNI-NAR as prepared by The Ember Alliance. Conditions were also modeled assuming fuel changes from the future Redtail Ridge development. See (Scott and Burgan, 2005) for a description of fuel models.

Topographic Data

Topographic data required for the AGNI-NAR model is elevation, slope, and aspect (**Figure 29**). The topographic connectivity of a landscape impact fire spread and intensity. Slope impacts fire spread due to convective heat that pre-heats fuels and exacerbates fire spread when a fire moves upslope. Aspect impacts the amount of solar radiation that heats fuel and dries it out during the day. Topographic data came from the 2022 COAL data (Napoli et al., 2022a).

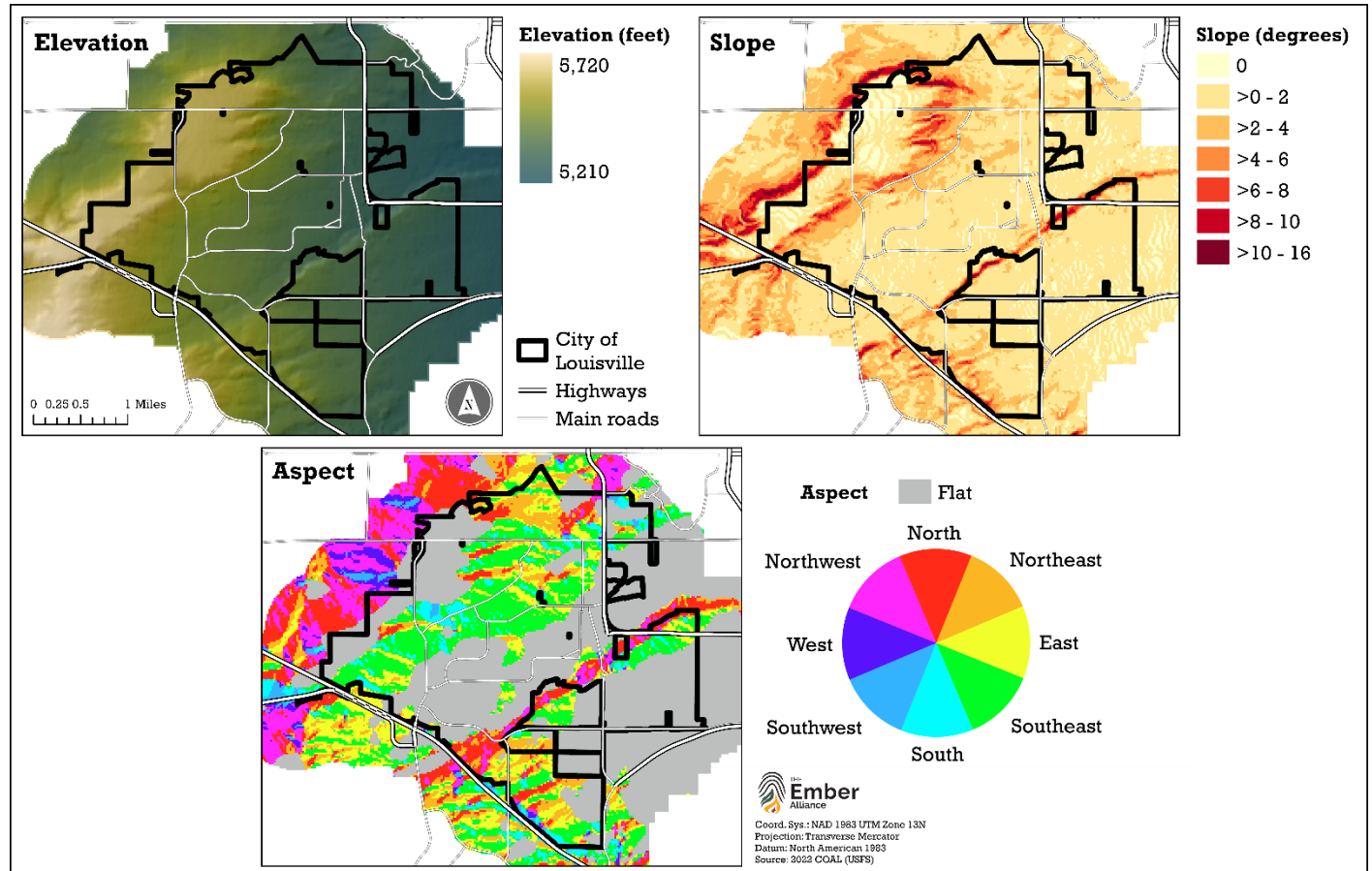


Figure 29. Elevation, slope, and aspect in and around the City of Louisville. Source: 2022 COAL data.

Weather Data

Weather conditions impacting fire behavior include temperature, relative humidity, and precipitation due to their impact on fuel moisture, and wind speed and direction. Wind influences fire behavior by drying out, increasing the amount of oxygen feeding the fuel, preheating vegetation through convective heat, and carrying embers more than a mile ahead of an active fire. Complex topography, such as chutes, saddles, and draws, can funnel winds, increase wind speeds, and result in erratic fire behavior.

All fire modeling for this project assumed very dry fuel conditions (3% 1-hour fuel moisture, 4% 10-hour fuel moisture, and 5% 100-hour fuel moisture). Wind speed scenarios for this project were 45 and 85 miles/hour (20-foot wind speeds) with winds blowing out of the west (270°) and with winds blowing out of the north (0°). Preliminary analyses were done with 10 mph winds, but potential fire growth was so low at that windspeed that effort was put into modeling 45 and 85 mph wind conditions instead. Multiple wind speed and wind direction scenarios were used because previous simulations of the 2021 Marshall Fire with the AGNI-NAR model demonstrate that the impact of wind direction on fire growth and structure vulnerability are greater at higher wind speeds (Chulawat and Mahmoud, 2024).

Selected wind scenarios were based on historic weather data observed along the Colorado Front Range near the City of Louisville area from the National Oceanic and Atmospheric Administration (NOAA) [National Centers for Environmental Information \(NCEI\)](#). The wind speed of 45 miles/hour represents the 99th percentile maximum daily wind from July 1, 2015, to July 1, 2025, observed at Broomfield Jefferson CO Airport. Sustained winds of 50 to 60 mph and gusts of 70 to 100 mph fueled the 2021 Marshall Fire (Holstrom et al., 2023). Historically, the most prominent wind directions are winds blowing out of the west and blowing out of the northwest (**Figure 30**).

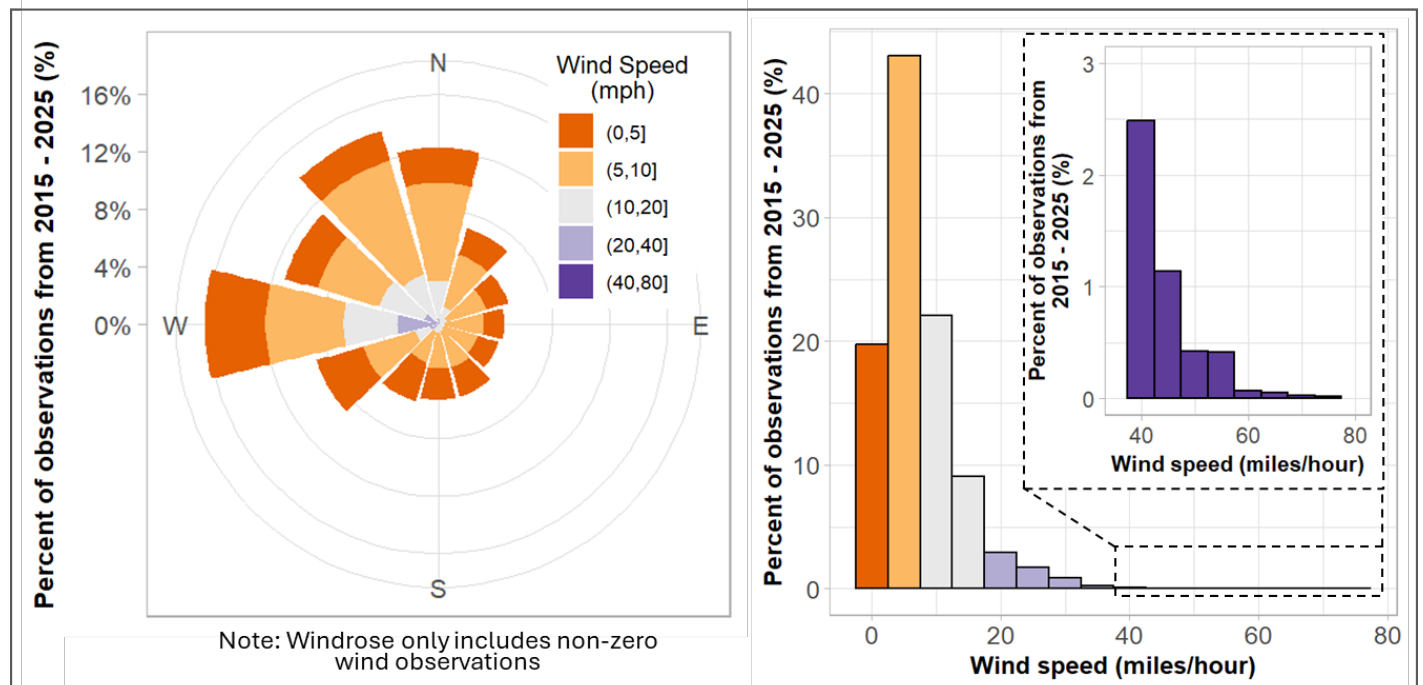


Figure 30. Distribution of observed wind directions and wind speeds observed at Broomfield Jefferson CO Airport from July 1, 2015, to July 1, 2025. Source: [National Centers for Environmental Information \(NCEI\)](#).

Building Data

A total of 7,536 structure nodes were identified in the modeling area based on data acquired in June 2025 from the Boulder County [Assessor's Property Data Download](#), building structure data from Federal Emergency Management Agency ([FEMA](#)) circa 2022, and manual quality assurance by The Ember Alliance using aerial imagery. A scenario was also considered with 21 additional structures planned for the future [Redtail Ridge development](#). Every building was modeled a node at the centroid of its footprint, with the exception of larger multi-family dwellings (e.g., condos or apartments) for which nodes were placed near the ends of the footprint and several in the middle depending on structure size.

The AGNI-NAR model requires data on the home ignition zone, which includes building construction, vegetation in defensible space zone 1 (0-5 feet from structures), and vegetation in defensible space zone 2 (5-30 feet from structures). Each characteristic has several conditions (e.g., low, medium or high fuel load; none, combustible, or ignition-resistant fence) with their own ignitability score based on the concept of odds ratios (Porter et al., 2021) (**Table 5**). Odds ratios were informed using damage inspection data collected by CAL FIRE and an analysis to determine the extent to which specific HIZ characteristics contributed to ignition likelihood during the 2018 Camp Fire (Porter et al., 2021).

Odds ratio measures the strength of the association between an exposure (i.e., HIZ characteristic) and an outcome (i.e., building ignites from wildfire). Odds ratios can be interpreted as follows:

- Odds ratio > 1 indicates that structures with that condition are **more likely** to ignite than a structure for which nothing is known about its condition for that characteristic. For example, wooden roofs have an odds ratio of 6, meaning structures with wooden roofs are 6 times more likely to ignite than a structure for which nothing is known about its roof material based on observations of structure damage from the 2018 Camp Fire.
- Odds ratio < 1 indicates that structures with that condition are **less likely** to ignite than a structure for which nothing is known about its condition for that characteristic. For example, tile roofs have an odds ratio of 0.4, meaning structures with tile roofs are 0.4 times less likely to ignite than a structure for which nothing is known about its roof material.
- Odds ratio = 1 indicates that structures with that condition are **neither more nor less likely** to ignite than a structure for which nothing is known about its condition for that characteristic.

One thing to note is that the odds ratios from (Porter et al., 2021) do not capture the interaction between the different characteristics. For example, the odds ratios do not account for the interactions between the combustibility of fences and siding or between the presence of vent screens and the combustibility of roofing materials.

Data on HIZ characteristics were collected from the Boulder County [Assessor's Property Data Download](#) and an on-the-ground assessments by The Ember Alliance. To facilitate data collection, the City of Louisville was divided into 38 clusters of similar building construction date, development patterns, and land use (**Figure 31**).

Specific information on siding was available from the Boulder County [Assessor's Property Data Download](#) for 84% of structures in the project area, roofing for 50% of structures, and detached garages for 86% of structures. The Ember Alliance summarized the percentage of structures with known types of siding, roofing, and detached garages for each cluster, which was used by the InFoRM, LLC team when calculating building factors (see description below).

Data was not available from the Boulder County Assessor for eaves, fences, decks, windows, patios, vent screens, defensible space zone 1, or defensible space zone 2 so additional data was collected via ground assessments by The Ember Alliance. Examples of different fuel loads in defensible space zone 1 and 2 in the City of Louisville are depicted in **Figure 8**.

The team estimated the percentage of structures in each cluster with different conditions for each characteristic (e.g., percentage of structures with low, medium, or high fuel loads in defensible space zone 1). Then the InFoRM, LLC team used the distribution of cluster-level observations when calculating building factors (see below). If structures were clearly of the same construction material (e.g., condos in the same complex), they were treated as a group, and the same conditions were assigned to all structures in that group.

The presence or absence of screens on vents and condition of windows (single vs double paned) could not be determined during ground assessments. Based on expert, local knowledge from the core team that very few homes have vent screens in the city, the model assumes that no homes have vent screens for this project. An assumption was made that all homes built before 1970 have single-pane windows, 50% built between 1970-1989 have single-pane windows, and 100% built after 1990 have multi-pane windows.

Table 5. Odds ratios for different HIZ characteristics based on data collected by CAL FIRE for the 2018 Camp Fire and analyzed by Porter et al. (2021). Odds ratio measures the strength of the association between an exposure (building or HIZ characteristic) and an outcome (building ignites from wildfire). Values in **orange** have 95% confidence intervals (CIs) above 1, indicating a higher likelihood of home ignition; values in **blue** have 95% CIs above 1, indicating a lower likelihood of home ignitions; and values in **grey** have 95% CIs that include 1, indicating neither a higher nor lower likelihood of ignition. Values in **black** were not evaluated by Porter et al. (2021) to determine odds ratios because they were conditions added for this project.

Characteristic	Condition	Odds ratio	Source of data
Elevated deck or porch	None	0.5	Ground assessment
	Composite	0.5	
	Masonry or concrete	0.3	
	Wood	2.5	
Deck or porch on grade (i.e., slope)	None	2	Ground assessment
	Composite	0.3	
	Masonry or concrete	0.3	
	Wood	2.7	
Defensible space zone 1 (0-5 ft)¹	No fuel	0	Ground assessment
	Low fuel load	0.9	
	Medium fuel load	1.8	
	High fuel load	2.7	
Defensible space zone 2 (5-30 ft)¹	No fuel	0	Ground assessment
	Low fuel load	0.8	
	Medium fuel load	1.5	
	High fuel load	2.3	
Eaves	None	2	Ground assessment
	Enclosed	0.8	
	Unenclosed	1	
Siding (also known as exterior cladding)²	Ignition-resistant	0.6	Boulder County Assessor data
	Combustible	1.5	
Fence	None	0.7	Ground assessment
	Ignition-resistant	1.1	
	Combustible	1.8	
Detached carport cover	None	0.7	Boulder County Assessor data
	Ignition-resistant	1.1	
	Combustible	1.5	
Patio cover (including gazebos and pergolas)	None	0.7	Ground assessment
	Ignition-resistant	1.1	
	Combustible	1.5	
Roof³	Tile	0.4	Boulder County Assessor data
	Asphalt	0.9	
	Concrete	1.2	
	Metal	1.2	
	Rubber membrane	2.5	
	Wood	6	
Vent screen⁴	No vents	1.1	Feedback from local experts

Characteristic	Condition	Odds ratio	Source of data
Windows⁵	No screens	1.5	Estimated based on year built as reported by Boulder County Assessor data
	Mesh $\leq 1/8$ "	0.7	
	Mesh $> 1/8$ "	1.2	
	Multi-pane	0.4	
	Single pane	3	

¹ Porter et al. (2021) assessed defensible space as one characteristic with conditions being “compliant” (odds ratio of 0.2) vs “non-compliant” (odds ratio of 5.0). For this project, we added more nuance to the evaluation of defensible space and split the odds ratio between defensible space zone 1 and zone 2.

² Ignition-resistant siding was considered block on stucco, brick on block, brick veneer, cement board, faux stone, frame asbestos, frame stucco, metal, moss rock/flagstone, or painted block. Combustible siding was considered cedar, frame wood/shake, log, or vinyl. Boulder County Assessor data provided information on primary and secondary siding material for structures, and if either primary or secondary siding were listed as combustible, the structure was considered to have combustible siding.

³ Rubber membrane was not evaluated by Porter et al. (2021), but research reviewed by InFoRM, LLC suggests that rubber membrane roofs perform worse than other class A roofs like asphalt, clay, concrete, and metal.

⁴ Based on expert, local knowledge from the core team that very few homes have vent screens in the city, the model assumes that no homes have vent screens for this project.

⁵ An assumption was made that all homes built before 1970 have single-pane windows, 50% built between 1970-1989 have single-pane windows, and 100% built after 1990 have multi-pane windows.

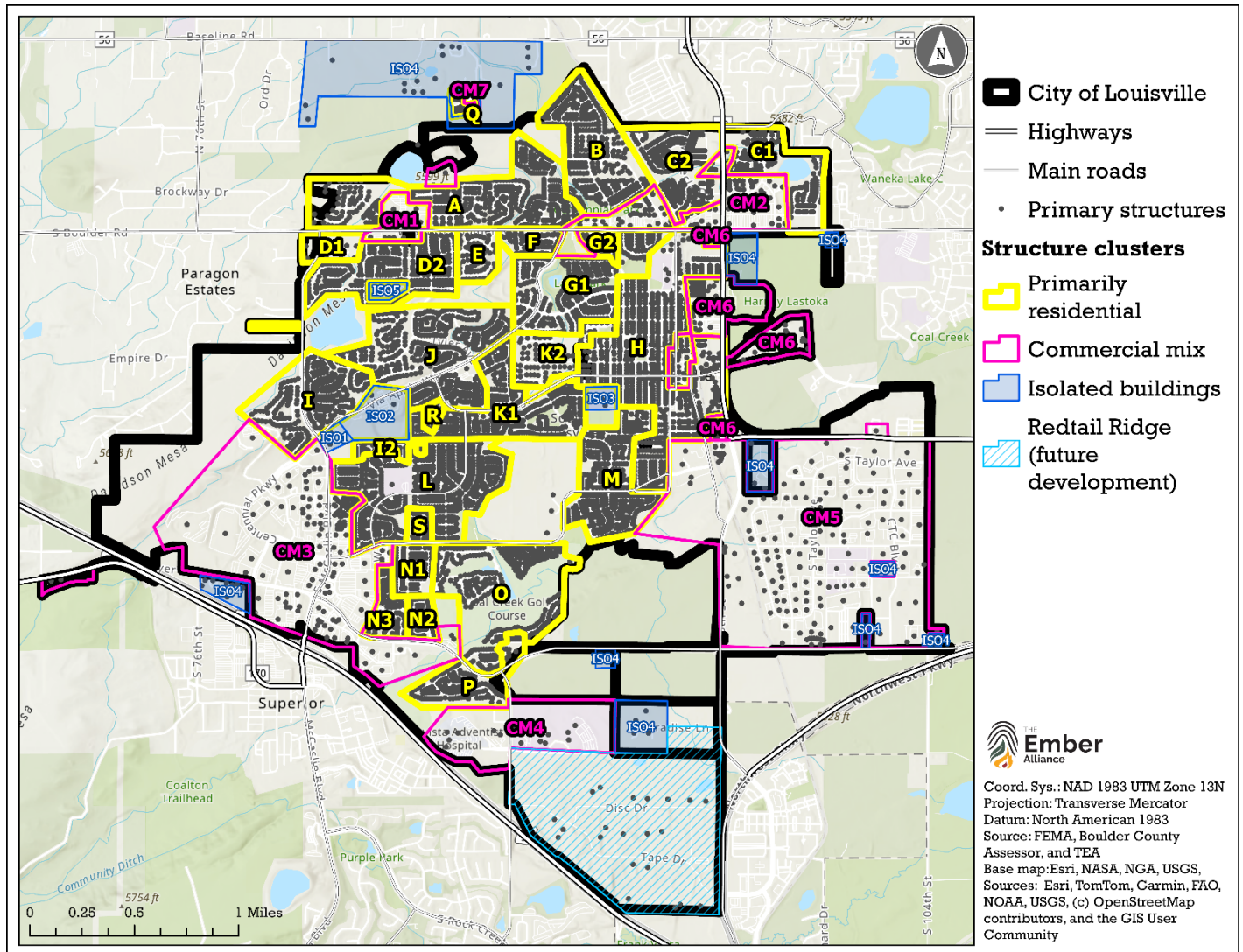


Figure 31. The City of Louisville was divided into 38 clusters of similar building construction date, development patterns, and land use to facilitate collection of structure characteristics required for the AGNI-NAR model.

Building Factor

The InFoRM, LLC team calculated a building factor for each structure to introduce the local effect of HIZ on ignition. Building factors range from 0 to 1, and higher building factors are associated with a higher likelihood of ignition if a fire encounters that structure. Building factors were calculated as the sum-product of the odds ratio associated with HIZ conditions for each of the ten HIZ characteristics, the probability of a structure having that condition, and the relative weight for each characteristic (**Figure 32**). The probability of a structure having that condition was 1 or 0 for structures with known conditions based on data from the Boulder County Assessor, and for structures with unknown conditions, it was the percentage of buildings in its cluster with that condition. The relative weight for each characteristic is the maximum odds ratio of conditions for that characteristic divided by the sum of the maximum odds ratio for all characteristics (**Figure 33**).

Based on this analysis, buildings with the highest potential ignitability (i.e., highest building factors) if they were to encounter sufficient radiant or convective heat or embers are located in Downtown Louisville (cluster H) and several clusters in the center of the city (cluster E, J, K1, and N1) (**Figure 34**). Ignitability is based on ten HIZ characteristics (**Table 5**), and there is not one primary factor that accounts for higher potential ignitability in these clusters. Older structures in Downtown Louisville tend to have more flammable building materials and

more established vegetation in defensible space zone 1 and zone 2. Clusters E, J, and K1 have a high percentage of structures with elevated wooden decks, wooden siding, and wooden fences. Cluster N1 has a high percentage of structures with wooden siding, wooden fences, and moderate to high fuel loads in defensible space zone 1 and zone 2. The AGNI-NAR model does not include a variable for manufactured homes, so the potential for ignitability is likely underestimated for manufactured home neighborhoods in the City of Louisville.

Structures that are closer to other structures also have a higher likelihood of ignition, especially if structures have more flammable building materials and fuel in their HIZ (Maranghides et al., 2022). Structure proximity influences the exposure of structures to radiant heat, convective heat, and embers from other structures in the AGNI-NAR model. Almost 85% of structures in the City of Louisville are within 30 feet of other structures, which increases their potential for ignition from adjacent structures according to research by the National Institute of Standards and Technology (Maranghides et al., 2022). About 18% of the structures are extremely close to other structures (<6 feet apart). Structures that are extremely close to other structures are scattered across the city, but there is a higher abundance of extremely close structures in the northeastern part of Louisville and in the neighborhoods northeast of Dutch Creek Park and north of Avista hospital (**Figure 35**).

Structure ID	Cluster ID	Structure characteristic	Condition	Odds ratio	Condition probability	Odds ratio x condition probability	Cumulative score for fencing
1	A	Fence	None	0.7	25%	0.175	1.0
1	A		Non-combustible	1.1	75%	0.825	
1	A		Combustible	1.8	0%	0	
2	A	Fence	None	0.7	25%	0.175	1.0
2	A		Non-combustible	1.1	75%	0.825	
2	A		Combustible	1.8	0%	0	
25	B	Fence	None	0.7	0%	0	1.135
25	B		Non-combustible	1.1	95%	1.045	
25	B		Combustible	1.8	5%	0.09	

Sum of cumulative score
X
characteristic relative weight*
for each conditions
=
Building factor

Obtained from
Porter et al.
(2021)

Percentage of
structures in a
cluster with that
condition

Calculated for
each of 10
building and HIZ
characteristics

*Relative weight = maximum odds ratio for that characteristic divided by the sum of the maximum odds ratio for all 10 characteristics

Figure 32. Illustration of how building factors were calculated for each structure. Higher building factors are associated with a higher likelihood of ignition if a fire encounters that structure. Odds ratios for each condition are presented in **Table 5**. Characteristic relative weights are shown in **Figure 33**.

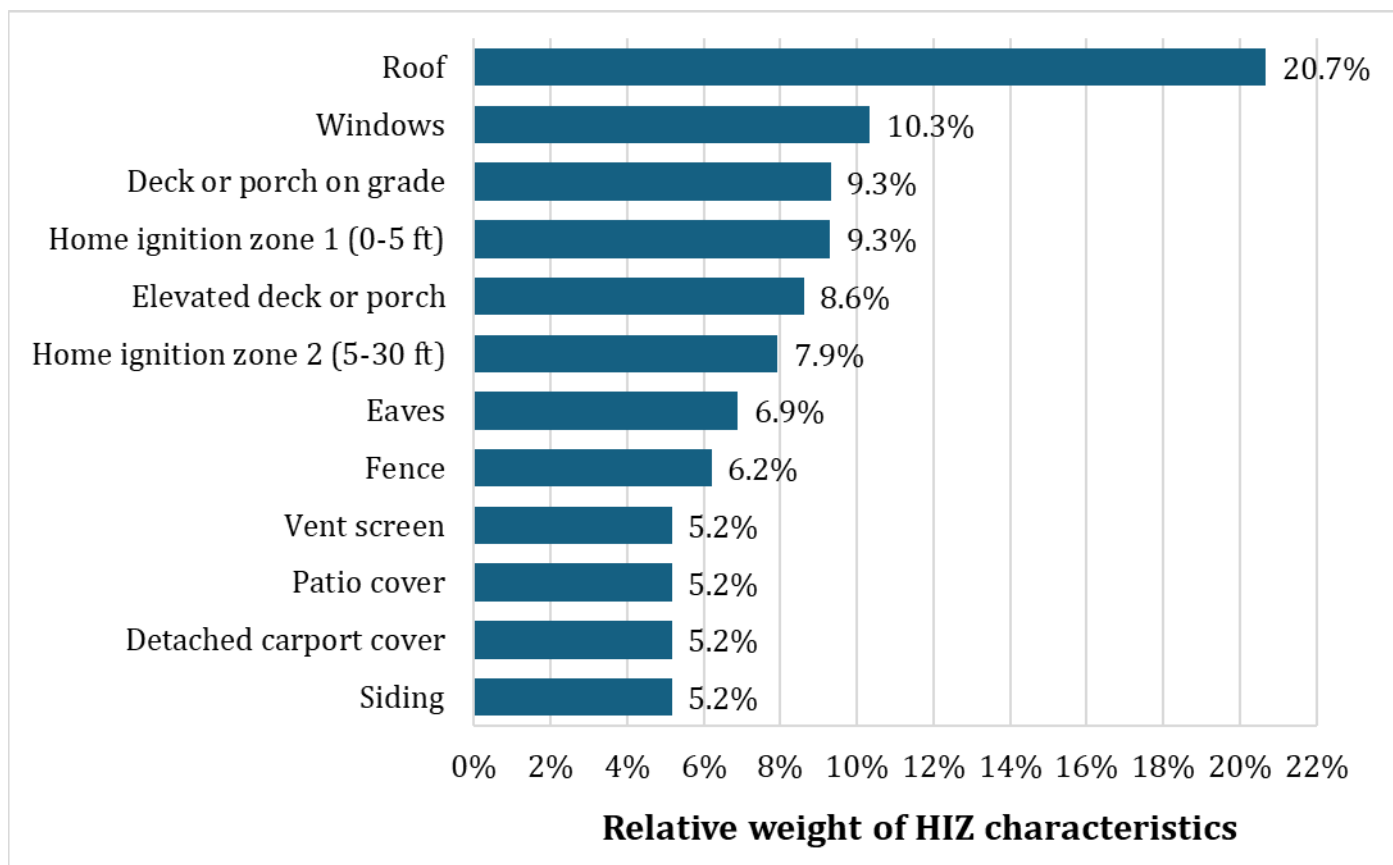


Figure 33. The relative weight for each characteristic used to calculate the building factor for each structure is the maximum odds ratio of conditions for that characteristic divided by the sum of the maximum odds ratio for all characteristics. Odds ratios for each condition are presented in **Table 5**.

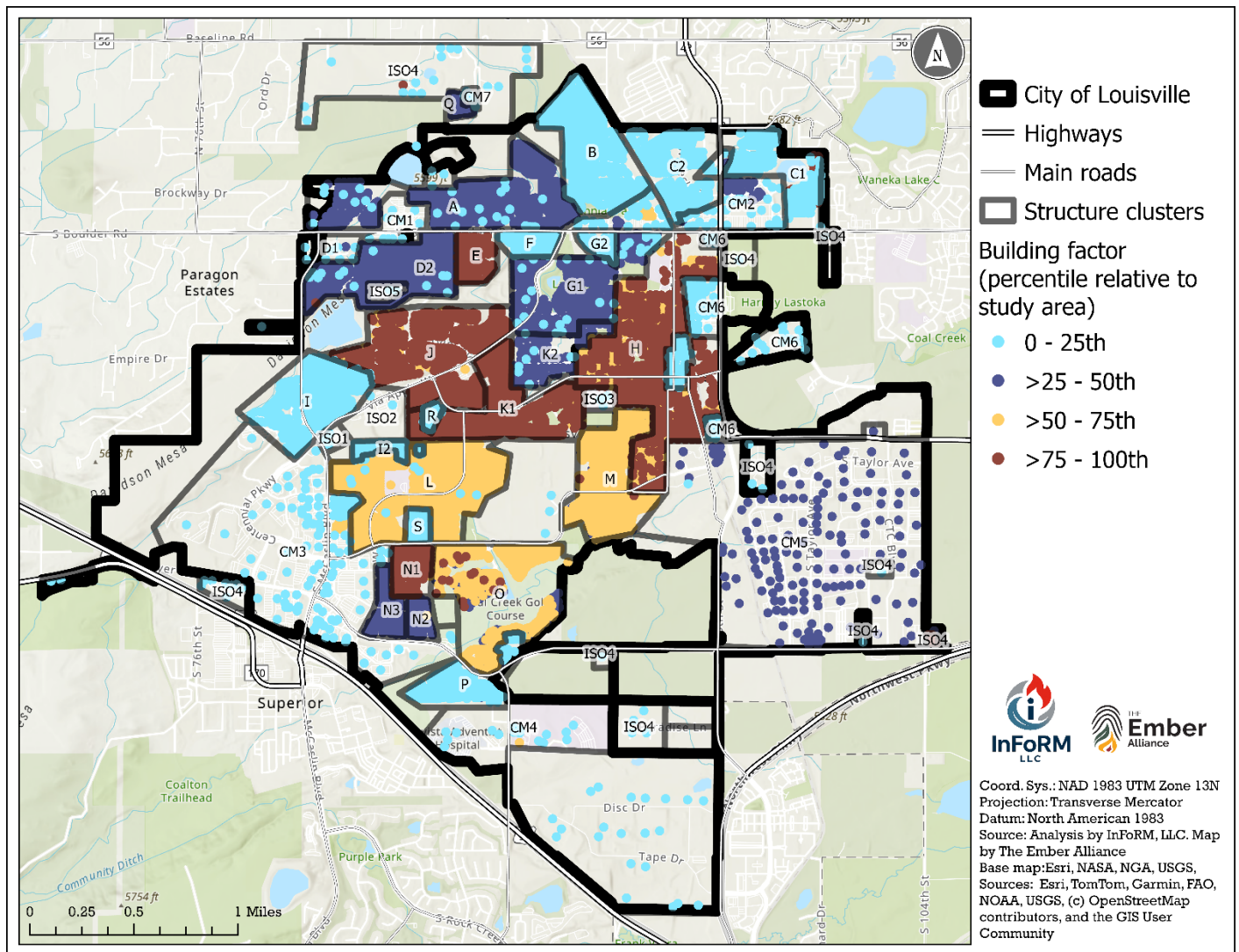


Figure 34. Building factors based on the 10-characteristics of the HIZ described in *Table 5*.

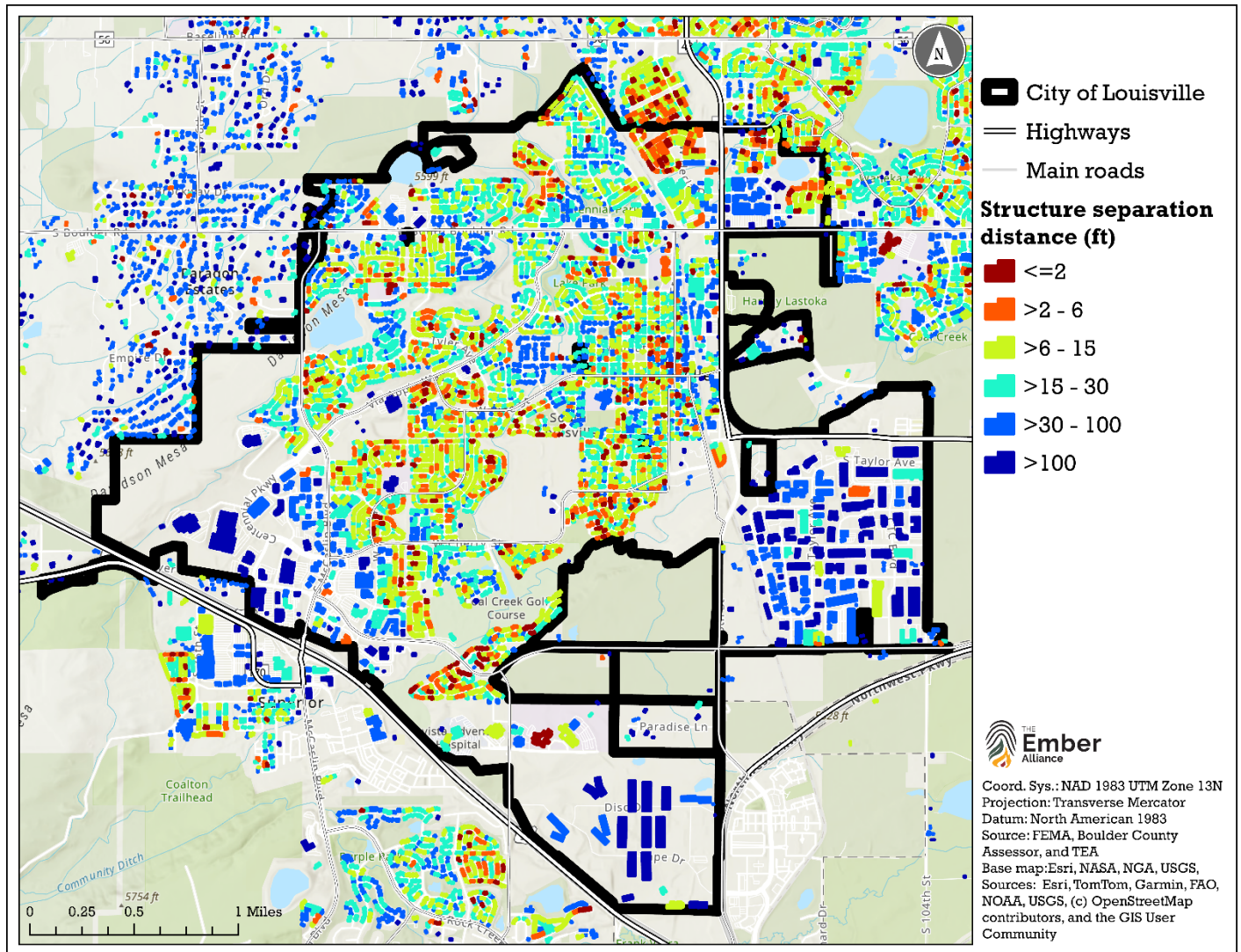


Figure 35. Structure separation distance is strongly related to home-to-home fire spread (Maranghides et al., 2022) and an important factor influencing structure vulnerability to wildfire in the AGNI-NAR model. Research by the National Institute of Science and Technology suggests that the risk of structure-to-structure spread is elevated for structures <30 feet apart, moderate for structures 30-100 feet apart, and lower for structure >100 feet apart (Maranghides et al., 2022).

Modeling Scenarios

Several scenarios were evaluated to explore the impact of future development, HIZ mitigation, and vegetation management on public land, shared land, and ditches. Scenarios were evaluated for 45 mph winds out of the west and out of the north. The same random 1,000 ignition points were used for each scenario to produce the cumulative fire zone. Scenarios were conducted under 45 mph winds out of the north and west because vulnerability was so high and widespread for 85 mph winds that it reduced the ability to make meaningful inferences. The one exception is the scenario considering ongoing vegetation management by the City of Louisville Department of Parks, Recreation, and Open Space that was modeled with both 45 and 85 mph winds for comparison to baseline conditions.

Future Development

A scenario was evaluated for potential future conditions incorporating changes to fuels and the addition of 21 structures that will result from the [Redtail Ridge development](#) in the southern part of the city. Grass fuel types were converted to unburnable parking lots around buildings and to timber litter to simulate irrigated and mowed lawns with intermittent trees (**Figure 28**).

Home Ignition Zone Mitigation

Scenarios were evaluated with different levels of HIZ mitigation strength (i.e., percent reduction in potential ignitability as measured by building factor) and different levels of participation in HIZ mitigation practices (i.e., percentage of structures experience mitigation) to understand their impact on cumulative fire zones and likelihood of damage to buildings. Levels of building mitigation strength were 25, 50, 75, and 100%, equating to a 25, 50, 75, and 100% reduction in the building factor of selected structures. Reductions in building factors can be accomplished by various combinations of home hardening and fuel removal in the HIZ. These scenarios do not specify which actions were taken to reduce structure ignitability by 25, 50, 75, or 100%.

Levels of participation were 25, 50, 75, and 100% of structures in the cumulative fire zone, with structures selected for mitigation based on their node importance rank (i.e., greatest potential to transit fire to other structures). For example, for the scenario with 25% participation, the structures with >75th percentile node importance rank received mitigation actions.

A scenario was also evaluated assuming that every structure had no fuel in defensible space zone 1. The goal was to assess the potential impact of this type of WUI building code on fire spread and structure vulnerability to wildfire.

Vegetation Management on Public Land, Shared Land, and Ditches

Nine scenarios were evaluated with different amounts of vegetation management on open space, other shared land, such as parks and greenbelts, and ditches (**Table 6; Figure 36**). Scenario 1 considers ongoing vegetation management by the City of Louisville Department of Parks, Recreation, and Open Space, scenario 2 focuses on the impact of linear fuel treatments such as mowing along the perimeter of public land and clearing vegetation along ditches, scenario 3 considers management of all public land, and scenario 4 considers ongoing vegetation management plus additional management on properties identified in the 2023 Louisville Wildfire Hazard Assessment (City of Louisville, 2023). Scenarios 5-9 assess the impact of fuel modification on 20, 40, 60, 80, and 100% of burnable vegetation. For scenarios 5-9, vegetation nodes were selectively removed based on their transmission capacity, starting with those having the highest influence on fire spread to other nodes. For example, scenario 5 simulates fuel modification on 20% of burnable pixels with these pixels having transmission capacities in the 80-100th percentile based on modeling using the baseline fuel scenario and 45 mph winds.

Modeling results from these scenarios are not intended to determine the exact amount of vegetation management that should be undertaken by public land managers. Some of the scenarios are not practical or ecologically appropriate, for example, fuel mitigation on all public lands, or fuel mitigation on >60% of burnable vegetation. Public land managers do not manage land with the sole goal of mitigating wildfire risk; public land is valued by citizens for wildlife habitat, biodiversity, aesthetics, recreation, property values, and other reasons. The purpose of evaluating these scenarios is to compare the impact of different degrees of HIZ mitigation and different degrees of vegetation management on cumulative fire zones and structure vulnerability.

A novel approach was used for this project to simulate vegetation management by assigning different fuel models to nodes receiving simulated treatments based on the potential for that treatment to impact flame lengths, rates of spread, and ember production. The previous approach used by InFoRM, LLC, was to convert fuel nodes to unburnable fuels to assess the impact of vegetation removal on cumulative fire zones and structure vulnerability. The approach used for this project reflects more realistic changes to wildfire risk that could result from vegetation management.

Mowing, grazing, broadcast burning, vegetation removal along ditches, herbicide, and shrub thinning were considered potential mitigation actions. Many of these approaches are currently utilized or being considered by the City of Louisville and partner agencies. See the 2023 Louisville Wildfire Hazard Assessment for a description of objectives, pros, and cons of these different actions (City of Louisville, 2023). Potential mitigation approaches were selected based on vegetation type, landownership, the size of the area, and location (**Table 7**). The same modifications to surface fuels were made for mowing, grazing, broadcast burning, and vegetation along ditches, and the impact of these actions was assumed to be greater than that of herbicide and shrub removal (**Table 8**). This assumption is supported by research summarized in Table 4-1 of the 2023 Louisville Wildfire Hazard Assessment (City of Louisville, 2023). If more than one mitigation measure were feasible for a location, the measure that resulted in more substantial modifications to the surface fuels was selected. For scenarios 5-9, vegetation management occurred on pixels regardless of landownership.

Table 6. Description of vegetation management scenarios used to assess the impact of different locations and levels of management on structure vulnerability.

Scenario ID	Description
Baseline	Current surface fuels in the absence of any ongoing mitigation practices by the City of Louisville.
Scenario 1—current management	Scenario incorporating vegetation changes from current mitigation practices by the City of Louisville, which includes goat grazing, cattle grazing, perimeter mowing, and vegetation removal along ditches. Data on treatment locations was provided by the City of Louisville Department of Parks, Recreation, and Open Space. The scenario did not include ongoing trail mowing unless the trails were along the perimeter of the property. The resolution of surface fuels for the model was 30 x 30 meters (98 x 98 feet), and the width of this already exceeds the typical widths for perimeter mowing by the city (about 12-15 feet), so including trail mowing would overestimate the potential impact of ongoing vegetation on fire transmission.
Scenario 2—all linear treatments and perimeter mowing	Scenario assuming baseline fuel conditions (i.e., no ongoing mitigation by the City of Louisville) plus fuel mitigation along the perimeter of all public land and along all ditches. Public land owned by the City of Louisville, Boulder County, and the City of Lafayette were included. City of Louisville properties included open space, parks, undesignated land, water treatment plant properties, and the Coal Creek Golf Course.
Scenario 3—management of all public land	Scenario assuming fuel mitigation on all public land and along all ditches. Public land owned by the City of Louisville, Boulder County, and the City of Lafayette were included. City of Louisville properties included open space, parks, undesignated land, water treatment plant properties, and the Coal Creek Golf Course. Fuels in prairie dog colonies were not altered except where prairie dog colonies fell along the perimeter of public land or along ditches.

Scenario ID	Description
Scenario 4—current management (scenario 1) plus management of other properties identified in the 2023 Louisville Wildfire Hazard Assessment	Scenario incorporating vegetation changes from current mitigation practices by the City of Louisville (scenario 1) plus fuel mitigation on all additional properties in the low, moderate, high, and highest risk categories according to the 2023 Louisville Wildfire Hazard Assessment (City of Louisville, 2023). Properties included in this scenario (listed from highest to low risk) were Howard Berry Water Treatment Plant, Keith Helart Park, Annette Brand Park, North Open Space, Davidson Mesa Open Space, Damyanovich Open Space, Gateway Open Space, City of Louisville Water Treatment Plan, Coal Creek Regional Trail Corridor, Dutch Creek Open Space, Garfield Utility Corridor, Louisville Cemetery, CTC Open Space, and Elephant Park. Fuels in prairie dog colonies were not altered except where prairie dog colonies fell along the perimeter of public land or along ditches.
Scenario 5—treating vegetation with $\geq 80^{\text{th}}$ percentile transmission capacity	Scenario assuming baseline fuel conditions (i.e., no ongoing mitigation by the City of Louisville) plus fuel mitigation on all pixels with $\geq 80^{\text{th}}$ percentile transmission capacity (value of 1.0). Percentiles were determined based on transmission capacity for all burnable pixels with non-zero transmission potential based on modeling under 45 mph winds and baseline fuel conditions.
Scenario 6— treating vegetation with $\geq 60^{\text{th}}$ percentile transmission capacity	Scenario assuming baseline fuel conditions (i.e., no ongoing mitigation by the City of Louisville) plus fuel mitigation on all pixels with $\geq 60^{\text{th}}$ percentile transmission capacity (value >0.6160 to <1.0). Percentiles were determined based on transmission capacity for all burnable pixels with non-zero transmission potential based on modeling under 45 mph winds and baseline fuel conditions.
Scenario 7— treating vegetation with $\geq 40^{\text{th}}$ percentile transmission capacity	Scenario assuming baseline fuel conditions (i.e., no ongoing mitigation by the City of Louisville) plus fuel mitigation on all pixels with $\geq 40^{\text{th}}$ percentile transmission capacity (value $>0.2277 - 0.6160$). Percentiles were determined based on transmission capacity for all burnable pixels with non-zero transmission potential based on modeling under 45 mph winds and baseline fuel conditions.
Scenario 8— treating vegetation with $\geq 20^{\text{th}}$ percentile transmission capacity	Scenario assuming baseline fuel conditions (i.e., no ongoing mitigation by the City of Louisville) plus fuel mitigation on all pixels with $\geq 20^{\text{th}}$ percentile transmission capacity (value $>0.0664 - 0.2277$). Percentiles were determined based on transmission capacity for all burnable pixels with non-zero transmission potential based on modeling under 45 mph winds and baseline fuel conditions.
Scenario 9— treating all vegetation non-zero transmission capacity	Scenario assuming fuel mitigation on all pixels with non-zero transmission capacity.

Table 7. Criteria used to determine which mitigation measure could be applied to different locations for the vegetation scenarios.

Type of mitigation	Criteria ¹	Rationale
Perimeter mowing	Vegetation type (fuel models): Grasslands and shrublands (GR1, GR2, GS1, GS2, and SH2). Forested areas excluded (TL6 and TU1). Landownership / land use type: Any public land or ditches. Location: Areas along the boundaries of public land or along ditches (1-pixel wide).	The City of Louisville currently mows along the edge of public land and along trails to create fuel breaks. Mow strips are usually 10-15 feet wide (up to 30 feet). This is narrower than 1 pixel (98-feet x 98-feet), but the analysis could not model changes less than a pixel wide.
Interior mowing	Vegetation type (fuel models): Grasslands (GR1 and GR2) and grass-shrub (GS1 and GS2). Shrublands and forested areas excluded (SH2, TL6, and TU1). Prairie dog colonies excluded. Landownership / land use type: Parks, undesignated areas, non-treed portions of the golf course, and properties around schools and water treatment plants. Open space excluded.	The City of Louisville currently mows some of its properties for recreation opportunities at parks and golf courses and to mitigate vegetation around critical infrastructure.
Herbicide application	Vegetation type (fuel models): Grasslands (GR1 and GR2) and grass-shrub (GS1 and GS2). Shrublands and forested areas excluded (SH2, TL6, and TU1). Prairie dog colonies excluded. Landownership / land use type: Any public land or ditches.	The City of Louisville is considering the application of herbicide to assist with the conversion of grasslands invaded by smooth brome into shortgrass prairie with lower fuel loads and more widely spaced native plants.
Grazing with cattle	Vegetation type (fuel models): Grasslands (GR1 and GR2). Prairie dog colonies excluded. Landownership / land use type: Open space owned by the City or County. Location: Patches of vegetation >7.75 acres in size.	The City of Louisville has used cattle grazing on open space for many years to restore grassland vegetation, support the local economy, and reduce the height of grasses. Recently grazed areas on Davidson Mesa and North Open Spaces are all >8 acres in size.
Grazing with goats	Vegetation type (fuel models): Grass-shrub (FS1 and GS2), shrublands (SH2), and riparian areas (TU1 and TL6). Prairie dog colonies excluded. Landownership / land use type: Open space owned by the City or County. Location: Patches of vegetation >2 acres in size.	The City of Louisville recently began using goat grazing to support the local economy and reduce the height of grass and shrubs. Recently grazed areas on North, Coyote Run, and Dutch Creek Open Spaces are all >2 acres in size.
Broadcast prescribed burning	Vegetation type (fuel models): Grasslands (GR1 and GR2) and grass-shrub (GS1 and GS2). Prairie dog colonies excluded. Landownership / land use type: Open space owned by the City or County. Location: Patches of vegetation >4.9 acres in size that are not surrounded by housing developments.	The City of Louisville is exploring the idea of broadcast prescribed burning on a 5-acre area at Damyanovich Open Space to restore shortgrass prairie and reduce wildfire risk. Boulder County has successfully used broadcast prescribed burning in the past.
Removing vegetation in ditches	Vegetation type (fuel models): Any vegetation.	The City of Louisville is working with ditch companies to remove fuels in and around

Type of mitigation	Criteria ¹	Rationale
	Landownership / land use type: Any ownership. Location: Along ditches.	ditches via mowing, removing shrubs, and removing downed woody debris.
Shrub thinning	Vegetation type (fuel models): Grass-shrub (GS1 and GS2) and shrublands. Landownership / land use type: Any ownership.	

¹ For scenarios 5-9, vegetation management occurred on pixels regardless of landownership.

Table 8. Modifications to surface fuel models made to simulate the impact of vegetation management on potential flame lengths, rates of spread, and ember production. The potential impact of herbicide and shrub thinning is assumed to be lower than that of mowing, grazing, or broadcast burning based on research summarized in Table 4-1 of the 2023 Louisville Wildfire Hazard Assessment (City of Louisville, 2023). See (Scott and Burgan, 2005) for a description of fuel models.

Original surface fuel model	Modified surface fuel model for mowing, grazing, ditch management, or broadcast prescribed burning	Modified surface fuel model for herbicide or shrub thinning
GR1 (101)	TL2 (182)	TL2 (182)
GR2 (102)	TL2 (182)	GR1 (101)
GS1 (121)	GR1 (101)	SH1 (141)
GS2 (122)	GR1 (101)	GS1 (121)
SH2 (142)	SH1 (141)	SH1 (141)
TU1 (161)	TL2 (182)	
TL2 (182)	TL1 (181)	
TL3 (183)	TL1 (181)	
TL6 (186)	TL5 (185)	

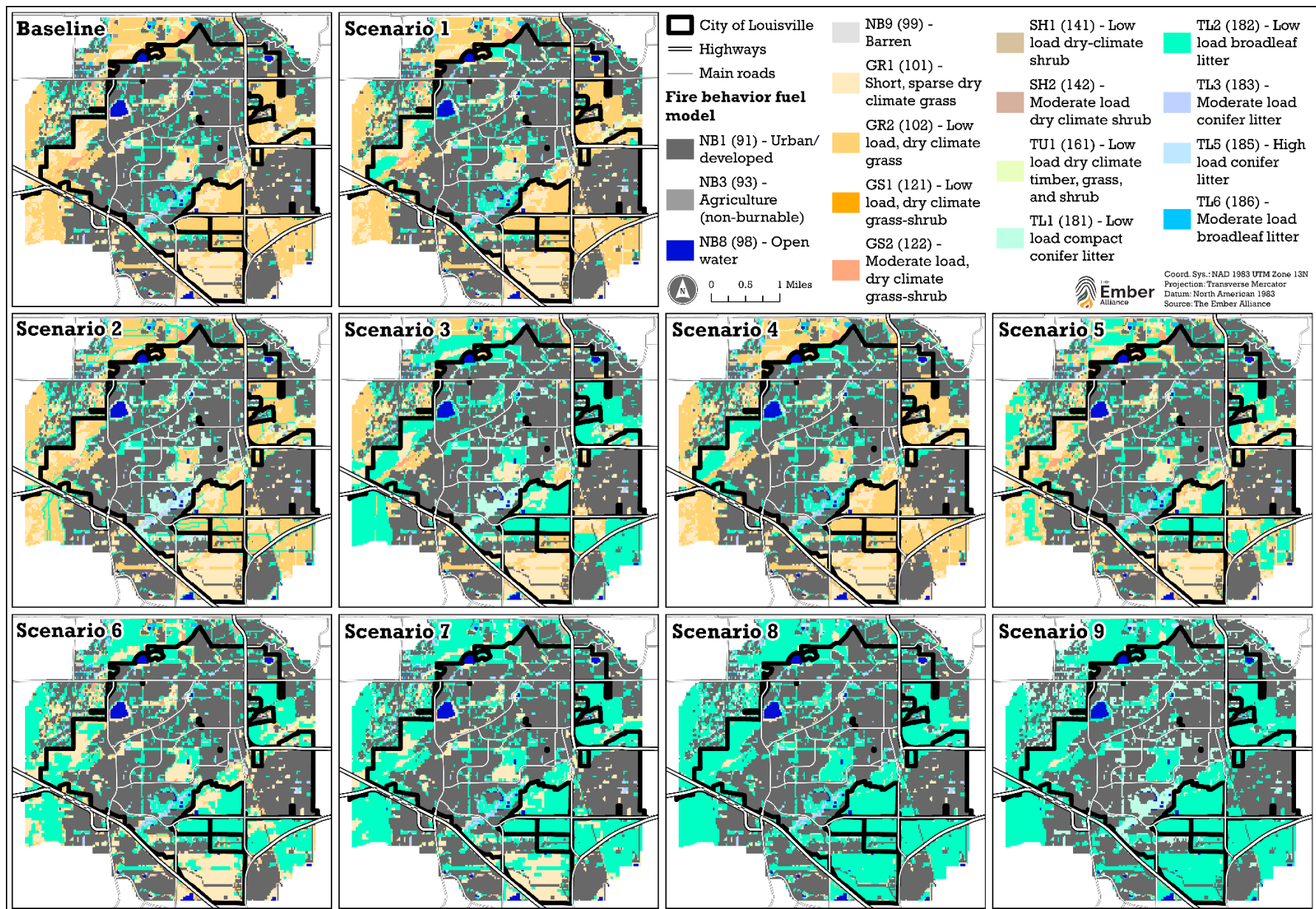


Figure 36. Surface fuel models for the nine scenarios developed to assess the impact of vegetation modification on potential fire spread and structure vulnerability. Scenarios are described in **Table 6**.

Appendix B. Additional Results

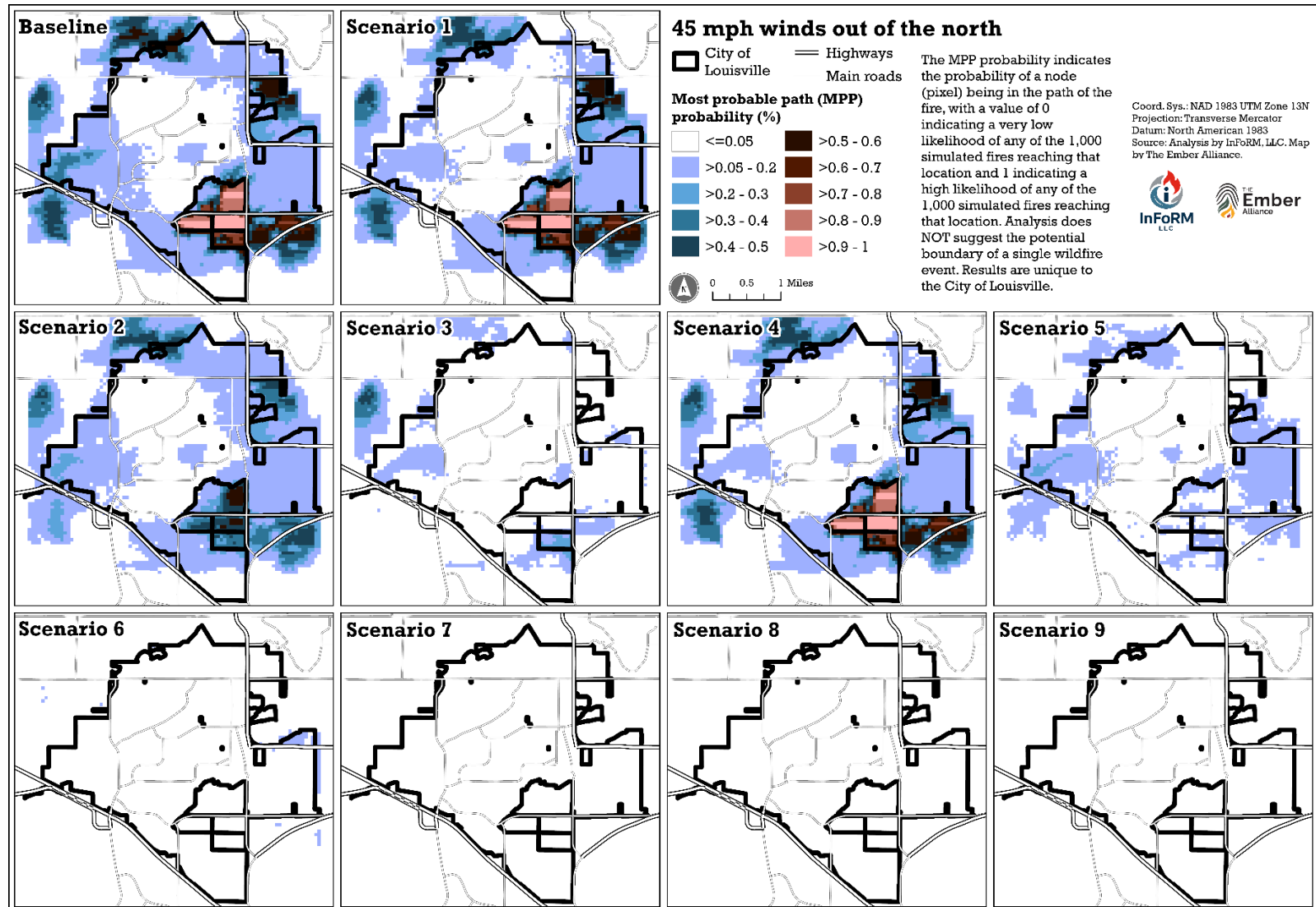


Figure 37. Most probable path (MPP) probabilities in the cumulative fire zone under very dry fuels and 45 mph winds out of the north for scenarios developed to assess the impact of vegetation modification on potential fire spread and structure vulnerability. Scenarios are described **Table 6**. MPP probabilities indicate the likelihood of a fire reaching an area, with high values indicating a high likelihood. Areas with an MPP probability of <0.1 were excluded from the cumulative fire zone. This analysis does not indicate the potential boundary of a single fire event—it depicts potential pathways of fire spread within the cumulative fire zone based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

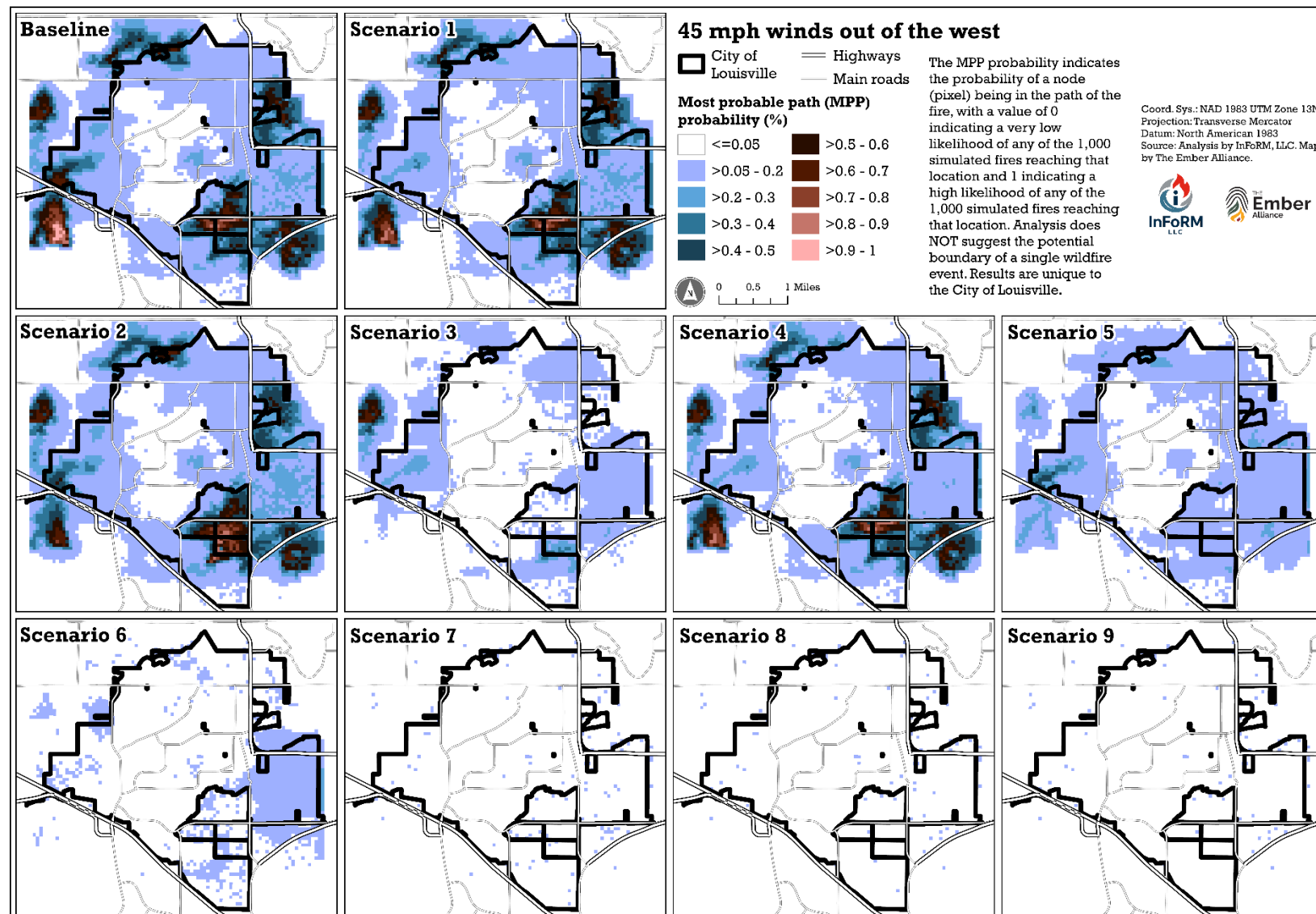


Figure 38. Most probable path (MPP) probabilities in the cumulative fire zone under very dry fuels and 45 mph winds out of the west for scenarios developed to assess the impact of vegetation modification on potential fire spread and structure vulnerability. Scenarios are described **Table 6**. MPP probabilities indicate the likelihood of a fire reaching an area, with high values indicating a high likelihood. Areas with an MPP probability of <0.1 were excluded from the cumulative fire zone. This analysis does not indicate the potential boundary of a single fire event—it depicts potential pathways of fire spread within the cumulative fire zone based on fire perimeters produced from 1,000 scenarios with random ignitions. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

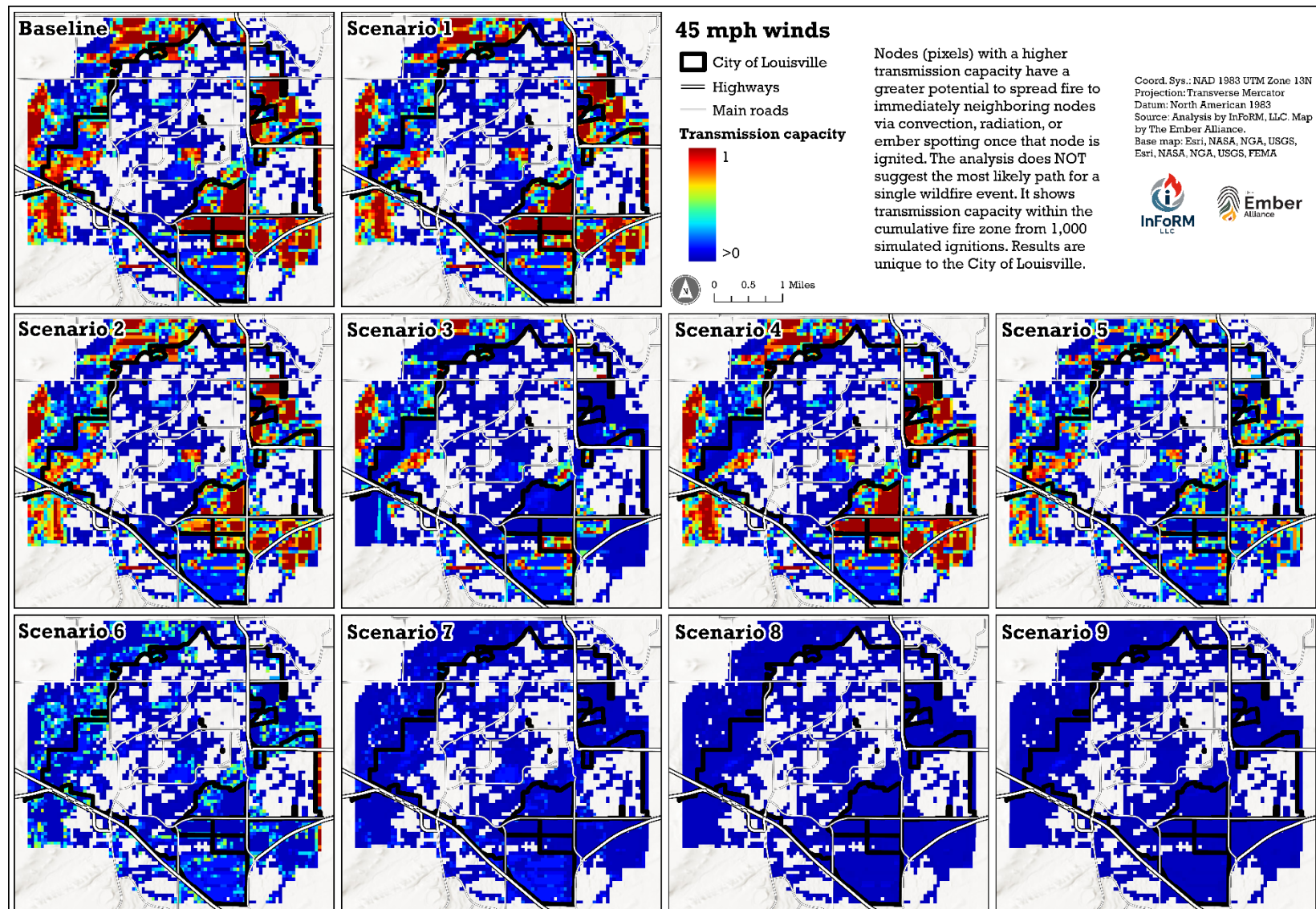


Figure 39. Transmission capacity in the cumulative fire zone under very dry fuels and 45 mph winds for scenarios developed to assess the impact of vegetation modification on potential fire spread and structure vulnerability. Scenarios are described **Table 6**. Transmission capacity ranges from 0 to 1 and indicates the potential for a node with burnable vegetation to spread fire to immediately neighboring nodes with burnable vegetation via convection, radiation, or ember spotting once that node is ignited. Transmission capacity shows only slight variation under different wind direction scenarios because transmission capacity is based on fire spread between immediately adjacent cells. Transmission capacity was utilized to guide the development of fuel mitigation scenarios. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

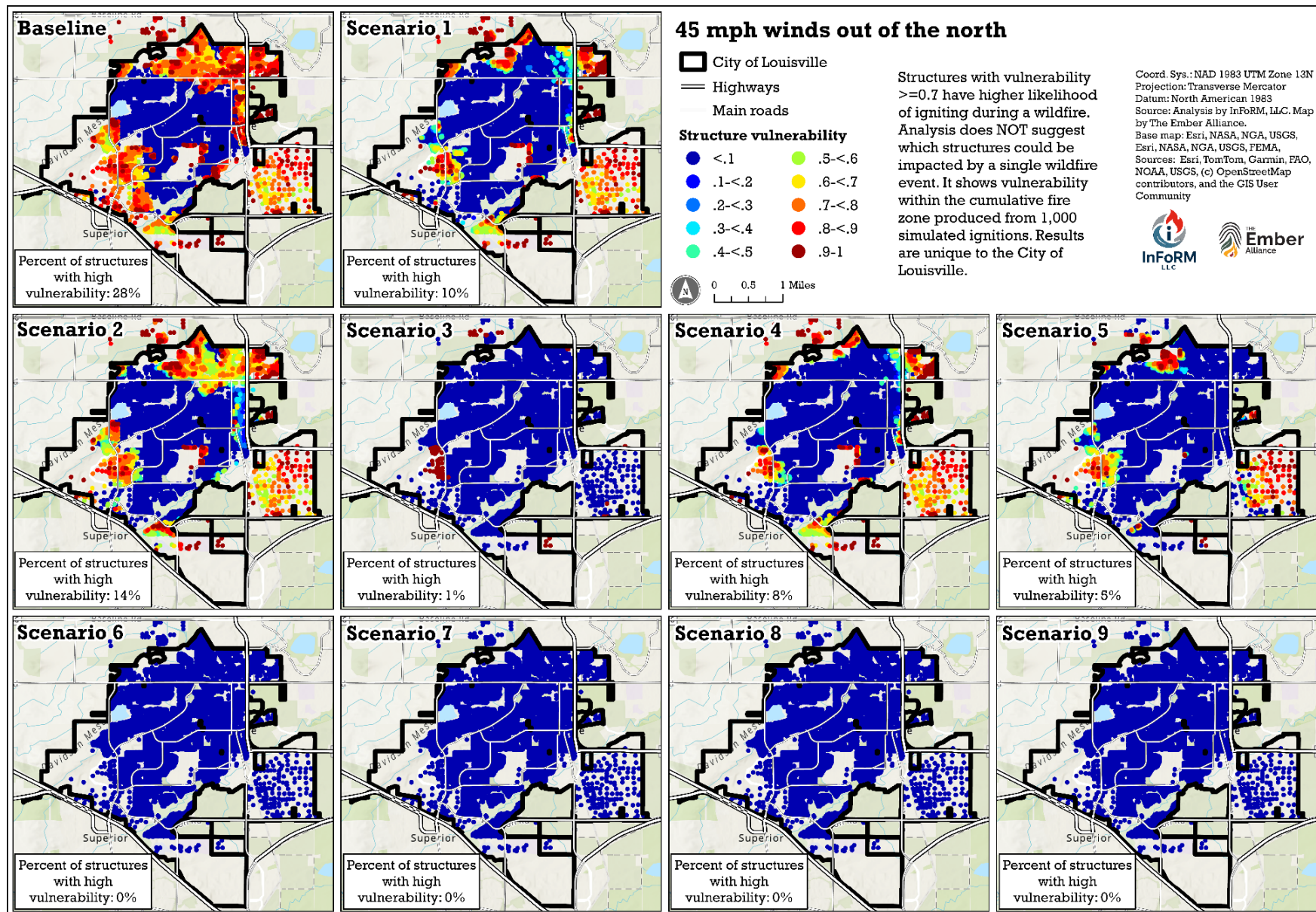


Figure 40. Structure vulnerability in the cumulative fire zone under very dry fuels and 45 mph winds out of the north for scenarios developed to assess the impact of vegetation modification on potential fire spread and structure vulnerability. Scenarios are described **Table 6**. Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.

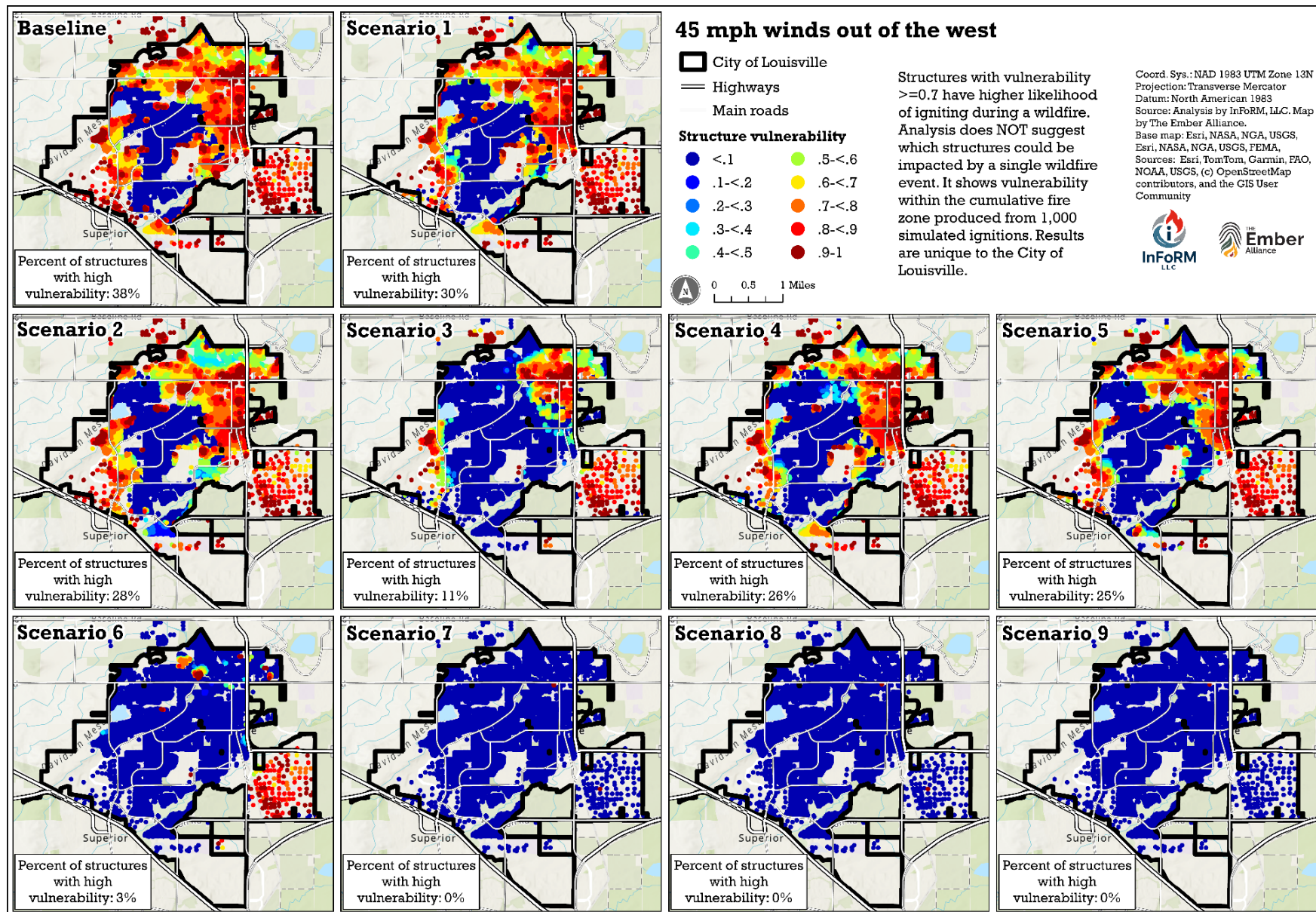


Figure 41. Structure vulnerability in the cumulative fire zone under very dry fuels and 45 mph winds out of the west for scenarios developed to assess the impact of vegetation modification on potential fire spread and structure vulnerability. Scenarios are described **Table 6**. Higher vulnerability indicates a higher likelihood of a structure being damaged from wildfire relative to other structures in the community. This analysis shows vulnerability in the cumulative fire zone, and it does not suggest which structures might be impacted by a single fire event. These results are specific to the City of Louisville and its unique network of vegetation and buildings across the community.



2026 Louisville Wildfire & Conflagration Risk Assessment (WCRA)

WCRA Purpose

This WCRA complements the 2023 WRA for Public Lands by focusing on residential areas and the broader built environment, delivering targeted strategies for households and neighborhoods

Prepared By:
Lynker Corporation
&
The Ember Alliance

Prepared For:
City of Louisville
749 Main Street
Louisville, Colorado 80027

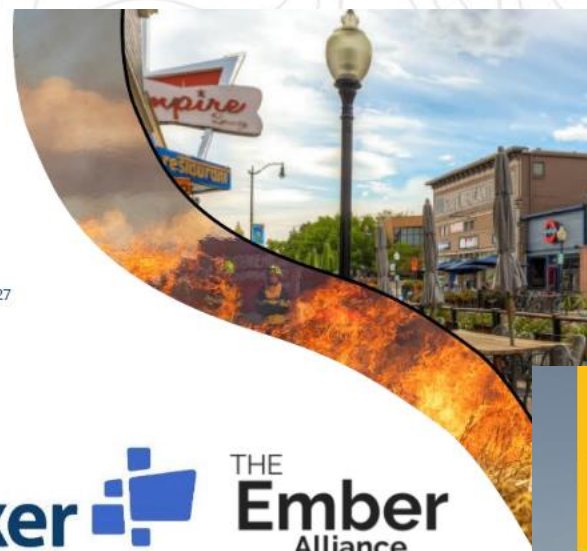


Wildfire Hazard and Risk Assessment of Louisville Public Lands

October 9, 2023

FINAL

lynker.com



CITY OF LOUISVILLE
BOULDER COUNTY, COLORADO

Wildfire and Conflagration Risk Assessment

Page 185 of 408

WCRA Supporting the Fire Adaptation Journey

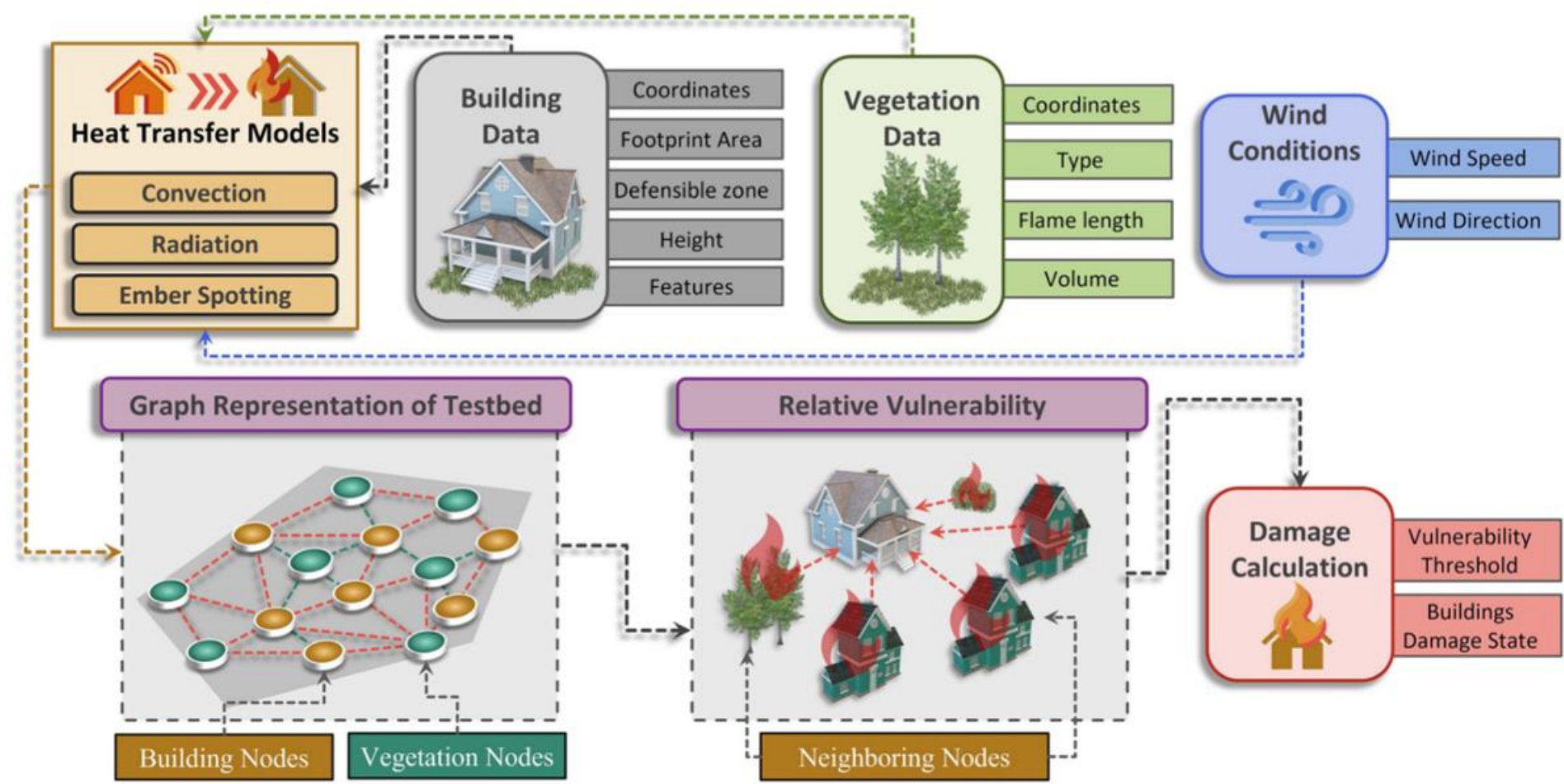


Urban Conflagration



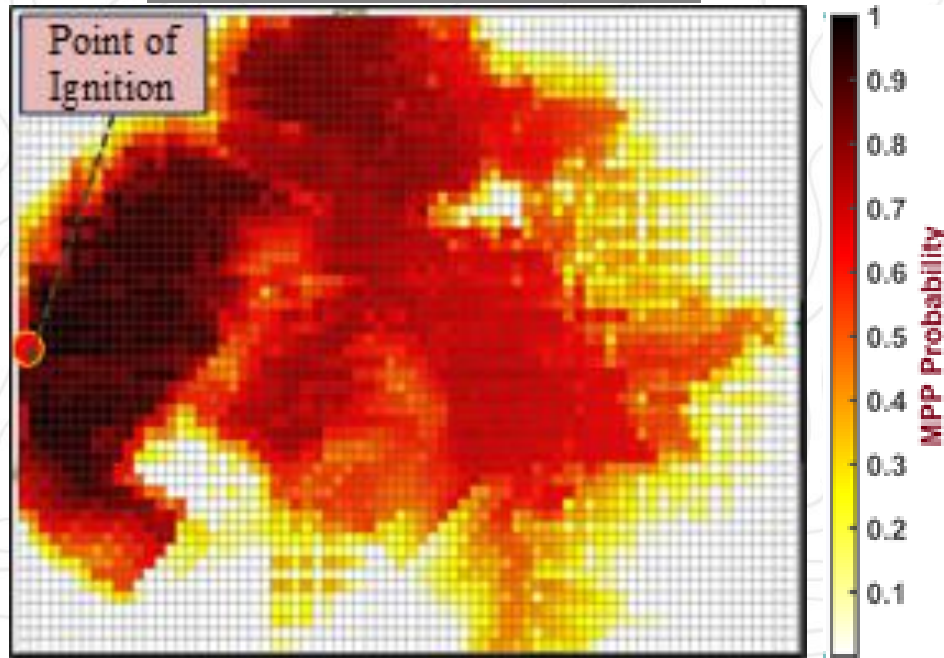
Urban conflagrations are wildland fires that transition into the built environment and escalate into destructive, self-sustaining structure-to-structure fire events (Calkin et al., 2023; Giammanco et al., 2023)

AGNI-NAR Model



Validation of the Medel

Modeled 2021 Marshall
Fire Boundary



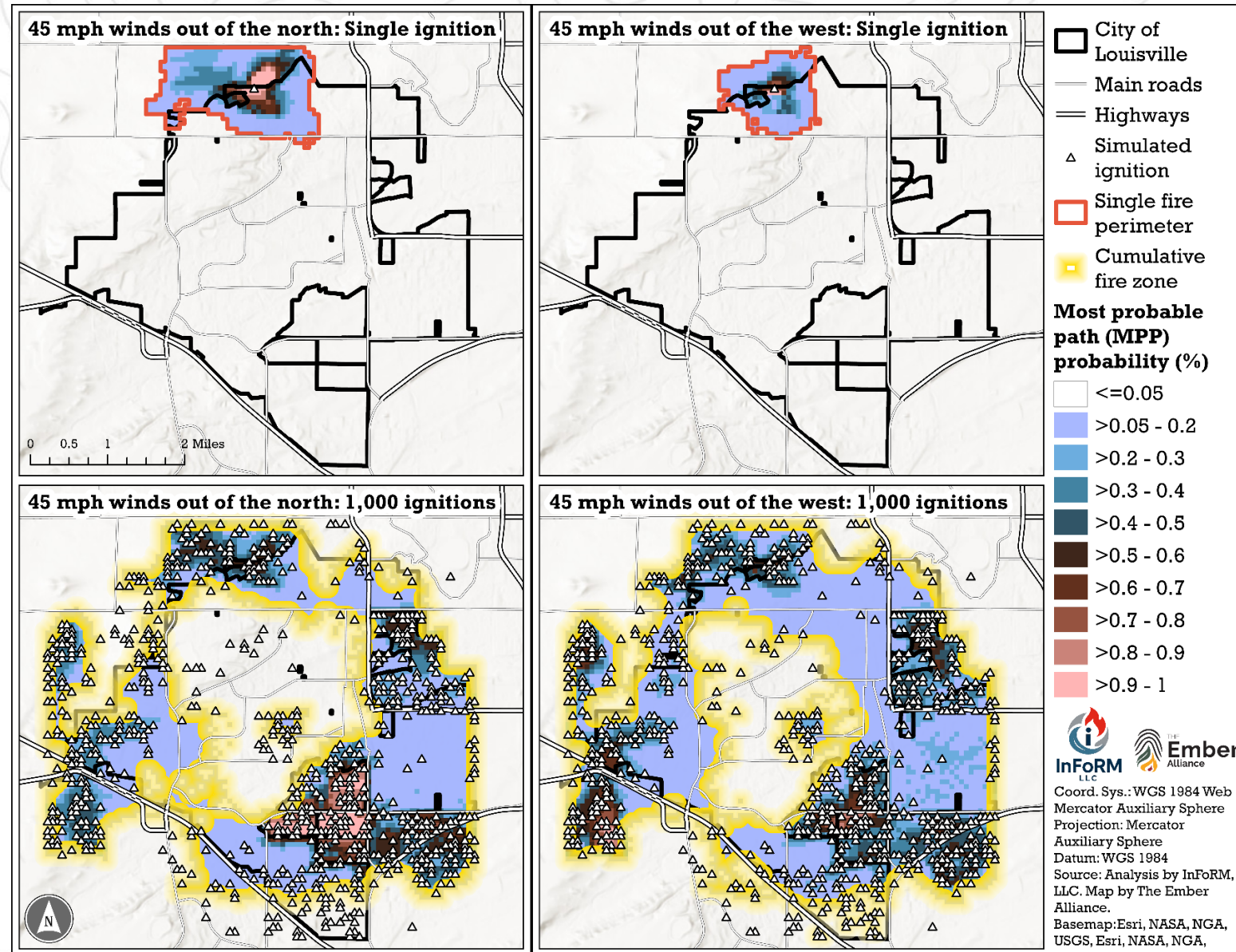
Observed 2021 Marshall
Fire Boundary



The predicted fire boundary from AGNI-NAR showed strong agreement with the observed 2021 Marshall Fire, and the model was 72% accurate in predicting damage to structures.

Cumulative Fire Zone

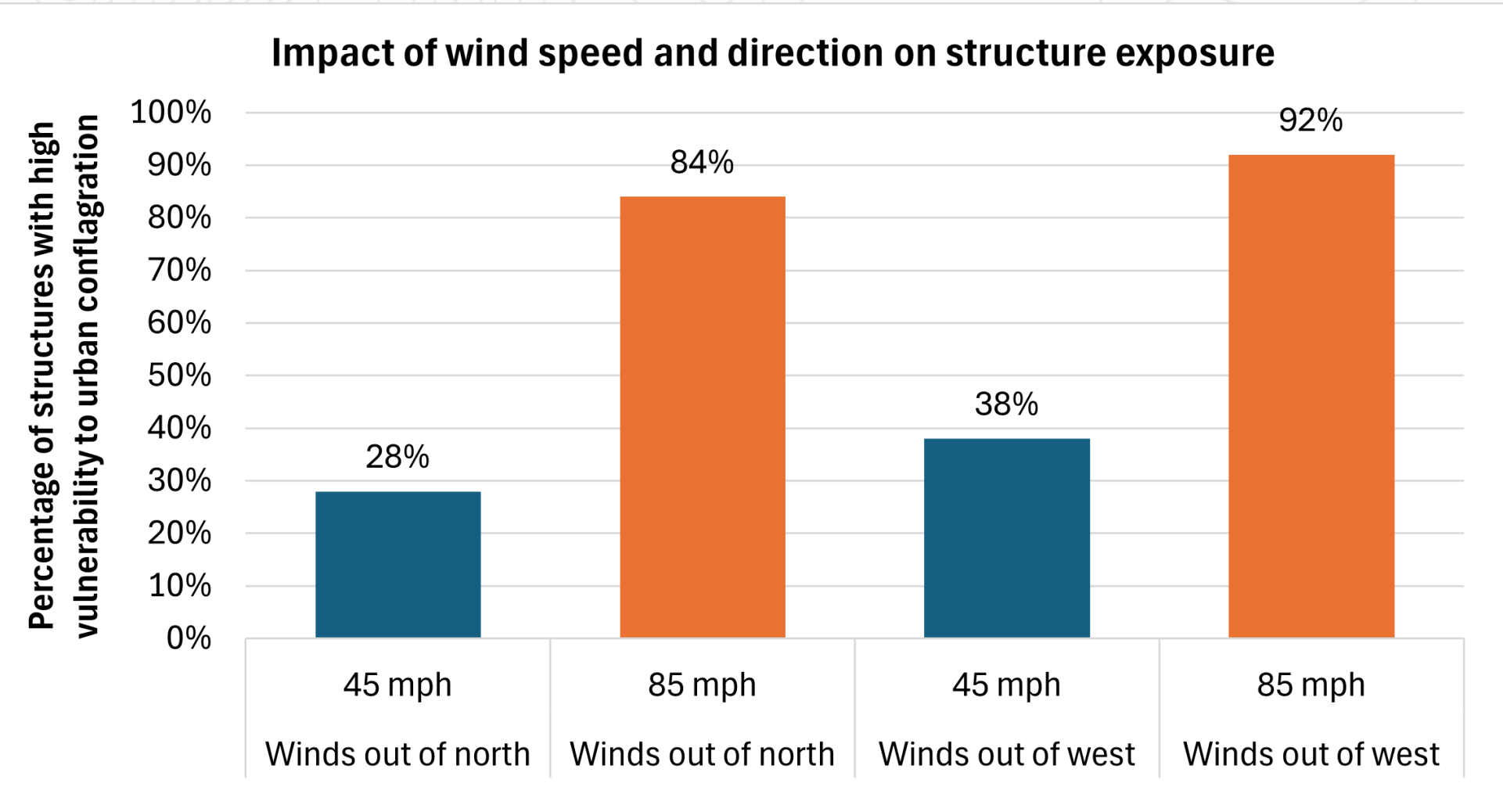
Maps of the cumulative fire zone do not represent the predicted fire perimeter for a single event, and maps of relative vulnerability of structures to urban conflagrations do not represent potential vulnerability and structure loss during a single event



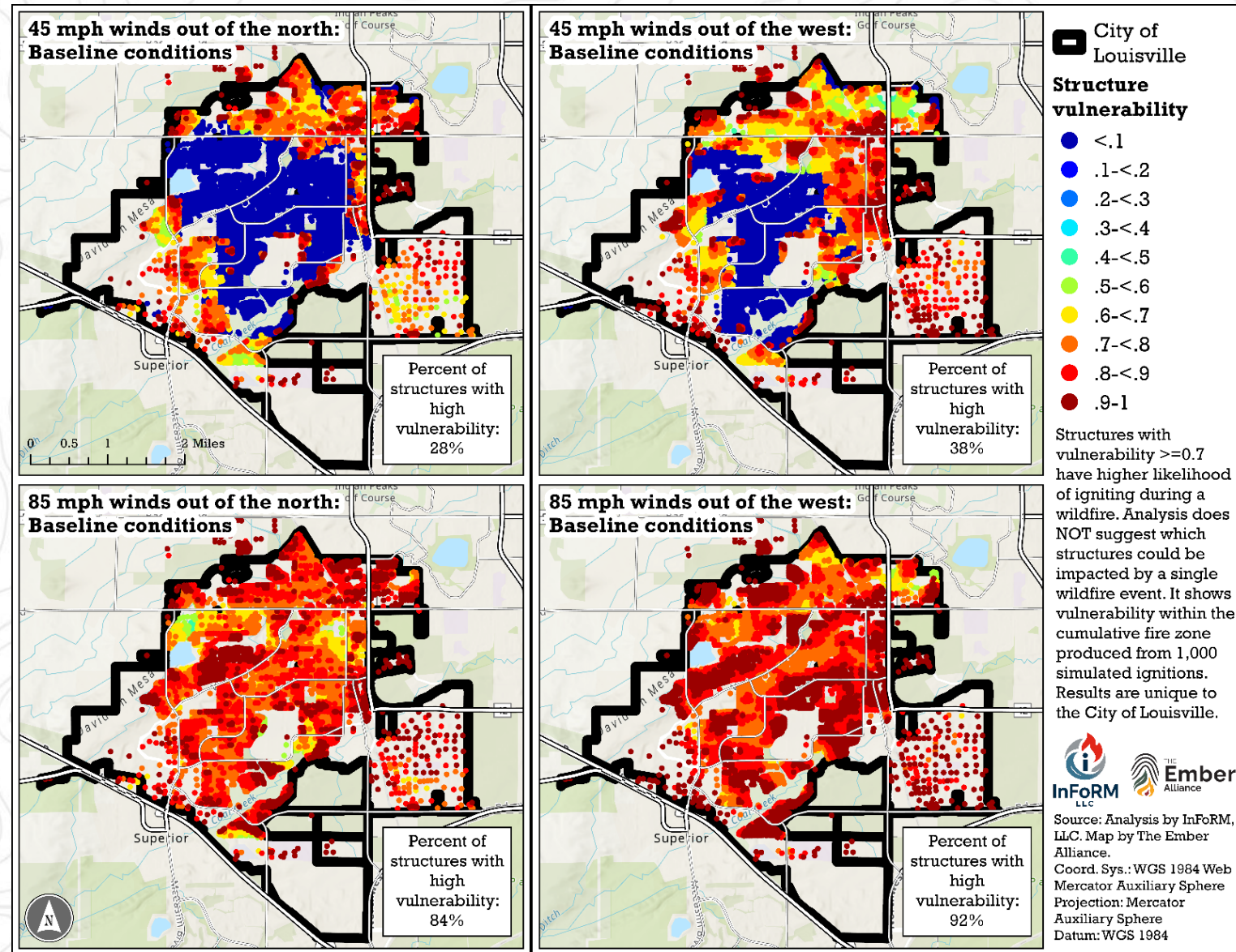
Key Findings

1. Wind is key in fire behavior.
2. Risk of structure loss during conflagration is widespread.
3. HIZ mitigation is important, and participation is more important than perfection.
4. Public land management is helping.
5. Vegetation mitigation should be targeted.

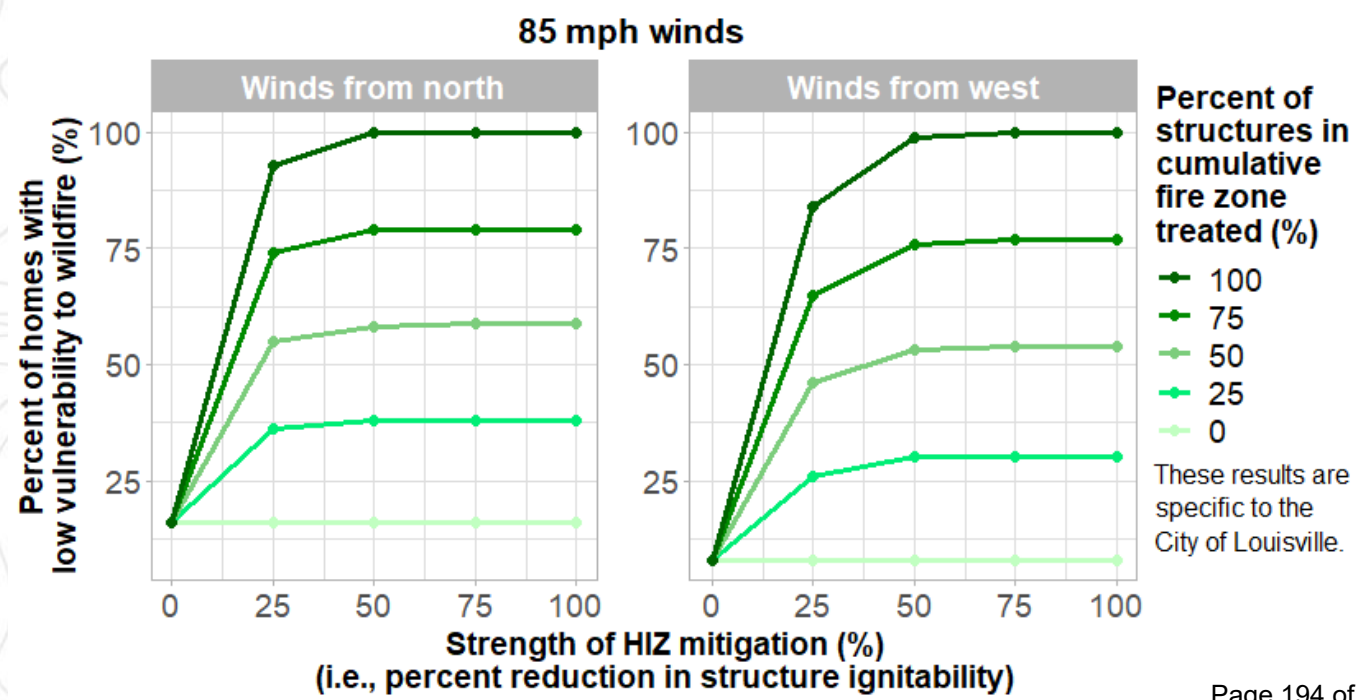
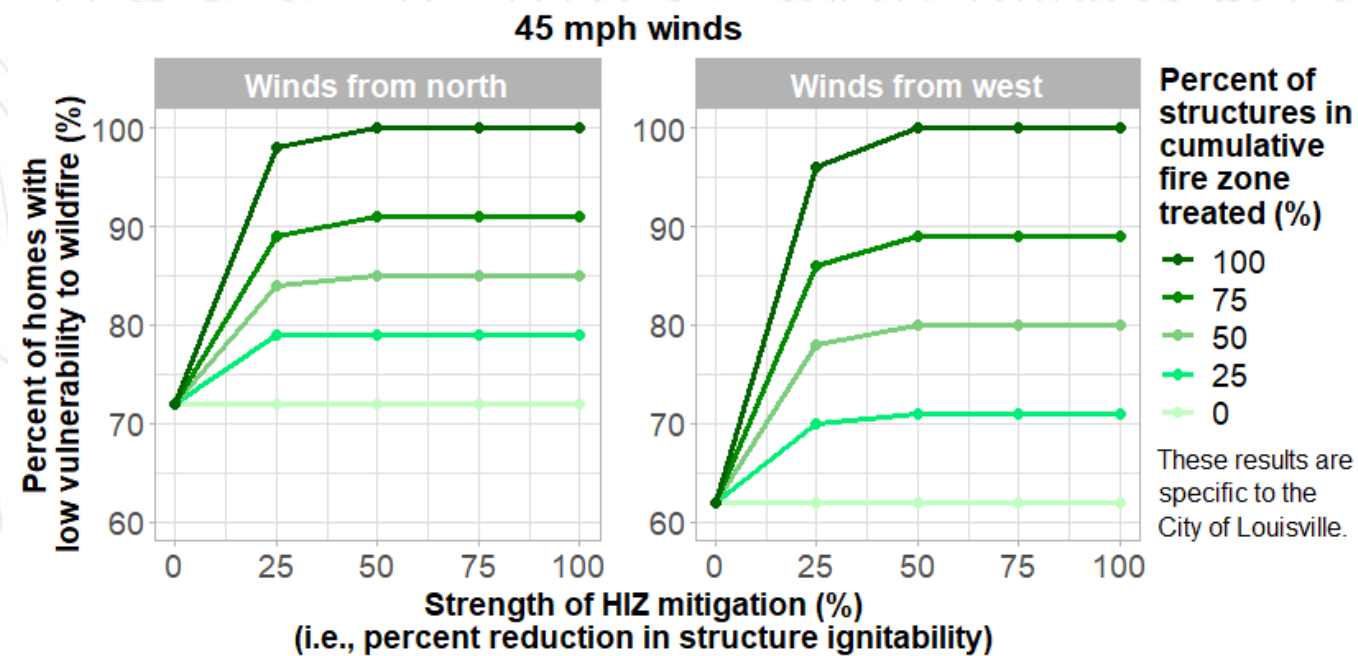
Wind is key in fire behavior



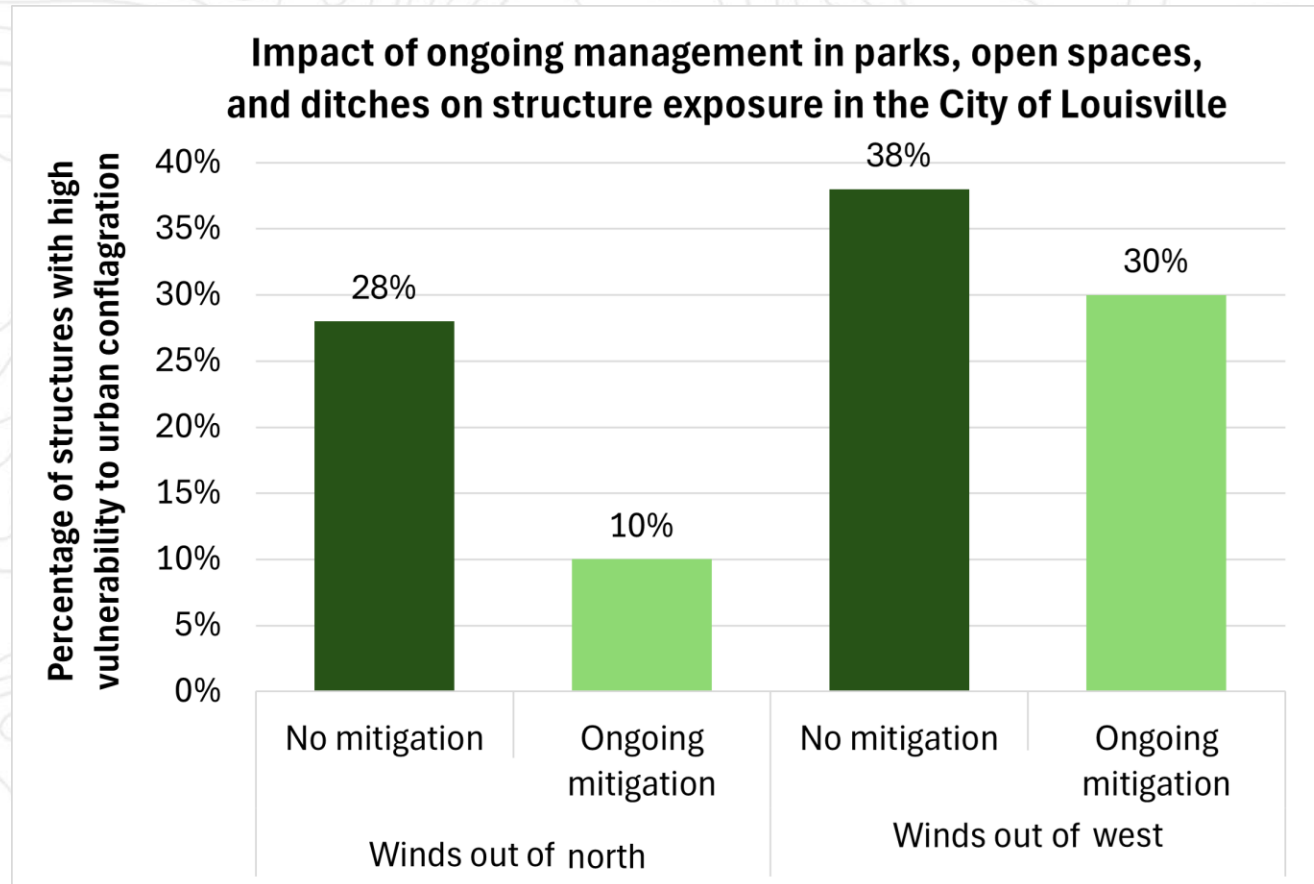
Risk of structure loss during conflagration is widespread



HIZ mitigation is important, and participation is more important than perfection



Public land management is helping reduce wildfire risk



The background of the slide is a light gray topographic map with intricate contour lines. The lines are more densely packed in some areas, indicating steeper slopes, and more spread out in others, indicating flatter terrain. The overall pattern is complex and organic, typical of a natural landscape map.

Public land management is helping reduce wildfire risk

Vegetation mitigation should be targeted

Removing vegetation in high-risk areas such as ditches with a potential to transmit wildfire to adjacent vegetation and nearby structures can further reduce conflagration risk



Implementation

Recommendation	Responsibility
Short-term	
Finalize Wildland Urban Interface (WUI) delineation and associated WUI code	City of Louisville Planning Department, Community Development, and Building Code Board of Appeals
Continue implementing mitigation actions on parks and open space	City of Louisville Parks, Recreation, and Open Space Department
Get an individual home assessment	Residents
Get involved with community mitigation planning	HOAs, Community Liaisons, Residents
Utilize leaf & branch drop off & collection	Residents
Mid-term	
Complete annual measures to protect your home	Residents
Apply for grants for multi-homeowner projects	HOAs, Community Liaisons, Residents
Long-term	
Increase staff capacity dedicated to wildfire mitigation	City of Louisville, LFPD
Develop a dedicated wildfire mitigation funding mechanism	City of Louisville, LFPD

Residents

- **Get an individual home assessment**
- **Mitigate the HIZ, complete home hardening, and create defensible space**
- **Get involved with your HOA**
- **Get involved with Wildfire Partners community advising and community mitigation planning**
- **Utilize leaf & branch drop off & collection**
- **Take advantage of community chipping**
- **Apply for grants for multi-homeowner projects**

Louisville Fire Protection District

- **Conduct targeted outreach and support in higher-risk areas**
- **Expand individual home assessment capacity**
- **Conduct public outreach and education on alternative landscape recommendations**
- **Increase staff capacity dedicated to wildfire mitigation inspections and enforcement**
- **Add or designate staff resources to develop targeted mitigation assistance program**
- **Develop a dedicated wildfire mitigation funding mechanism**

Open Space

- **Continue implementing mitigation actions on parks and open space**
- **Expand vegetation mitigation actions into additional high-risk areas**

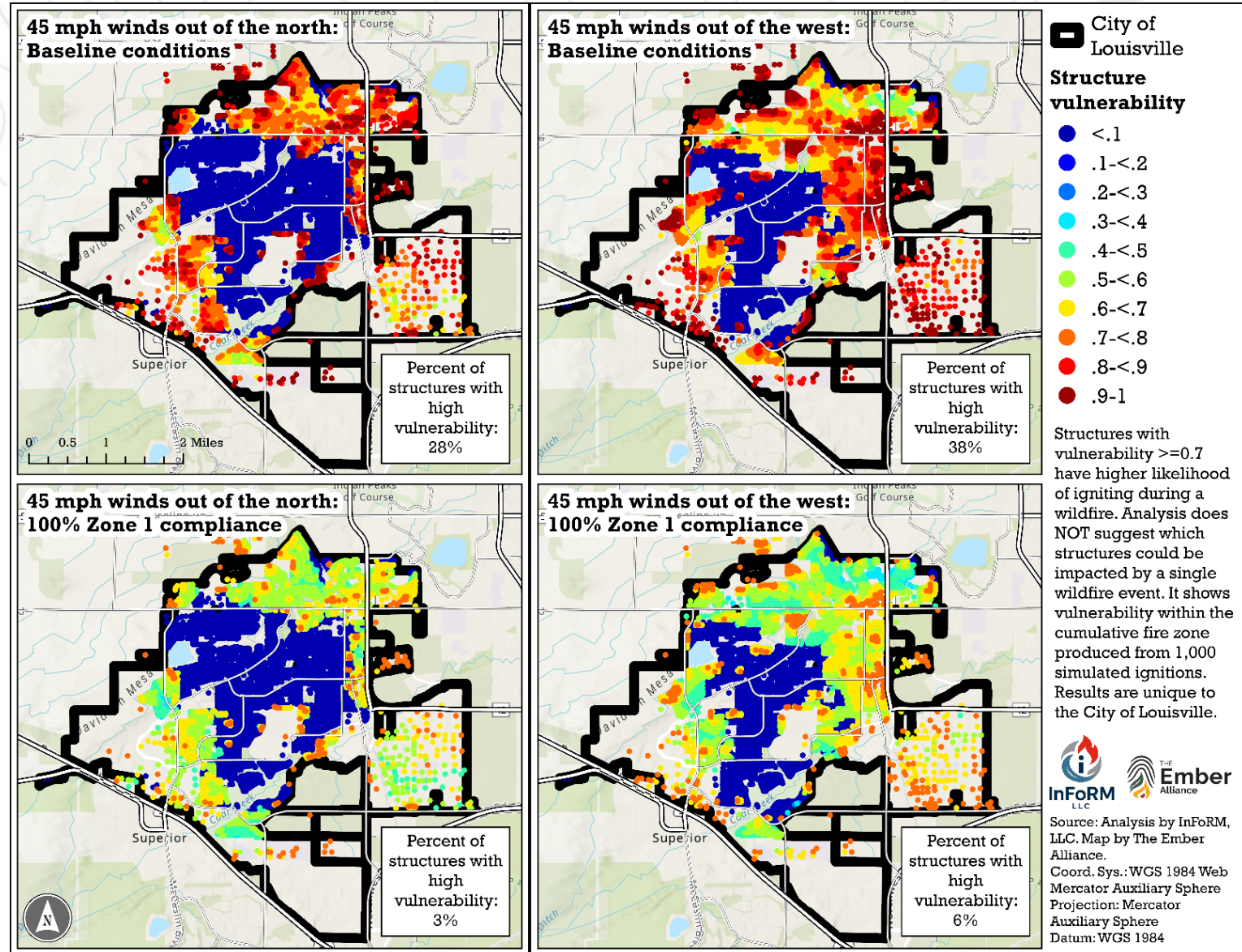
Wildfire Partners

- **Expand individual home assessment capacity**
- **Encourage widespread participation in community advising and community mitigation planning**

WUI

Widespread HIZ mitigation will require regulations, compliance, and enforcement that cover not only new construction but existing buildings as well (e.g., replacing structure features).

The formal delineation of the WUI and development of the WUI code are outside the scope of this project. The analysis and findings in this report are intended to directly inform and support the WUI delineation and code work.



Thank You

Questions?



Subject: Ordinance No. 1917, Series 2026 — An Ordinance Amending Title 17 of the Louisville Municipal Code Concerning Electronic Vehicle ("EV") Charging Stations - 1st Reading, Set Public Hearing
1st Reading includes the Staff Presentation and questions from Council. There is no opportunity for public comment. The Public Hearing (2nd Reading) will be set on this item for a later date. The Public Hearing will allow 2 rounds of public comment.

Date: February 17, 2026

Prepared By: Jeff Hirt, Planning Manager

Presented By: Jeff Hirt, Planning Manager

Summary:

This zoning code amendment updates the classification and review of electric vehicle (EV) charging facilities to address City environmental sustainability goals and comply with Colorado House Bill 24-1173. The amendment allows EV charging facilities as a primary land use in commercial, mixed-use, and industrial zoning districts and updates the approval process for these facilities. The amendment does not modify current City regulations addressing the amount of required EV charging spaces or applicable development and design standards for such facilities.

Background / Prior Discussions:

[Colorado House Bill 24-1173](#)

Colorado House Bill 24-1173 was adopted to reduce regulatory barriers to electric vehicle (EV) charging infrastructure and to promote consistent, predictable local review processes. The overall goal of the bill is to support the expansion of EV charging facilities by limiting local land use restrictions that may unreasonably delay or discourage their development, while preserving local authority over objective development and safety standards.

The bill requires local governments to ensure that EV charging facilities are allowed through clear land use regulations and reviewed through administrative processes where feasible. HB 24-1173 provides local jurisdictions with three compliance options: (1) adopting model state regulations, (2) allowing EV charging facilities by right in all zoning districts subject to objective standards, or (3) adopting locally tailored regulations that meet the intent and minimum requirements of the bill. Staff are proposing that the City comply with HB 24-1173 by adopting its own regulations that clarify the classification, permitted locations, and review process for EV charging facilities within Title 17, while reserving broader consideration of environmental sustainability policies for the planned comprehensive development code update beginning in 2026.

Current EV Charging Regulations in Louisville

Louisville's zoning code currently includes requirements for EV charging spaces as part of off-street parking standards, including minimum quantities and design specifications. These requirements are not proposed to be changed as part of this amendment.

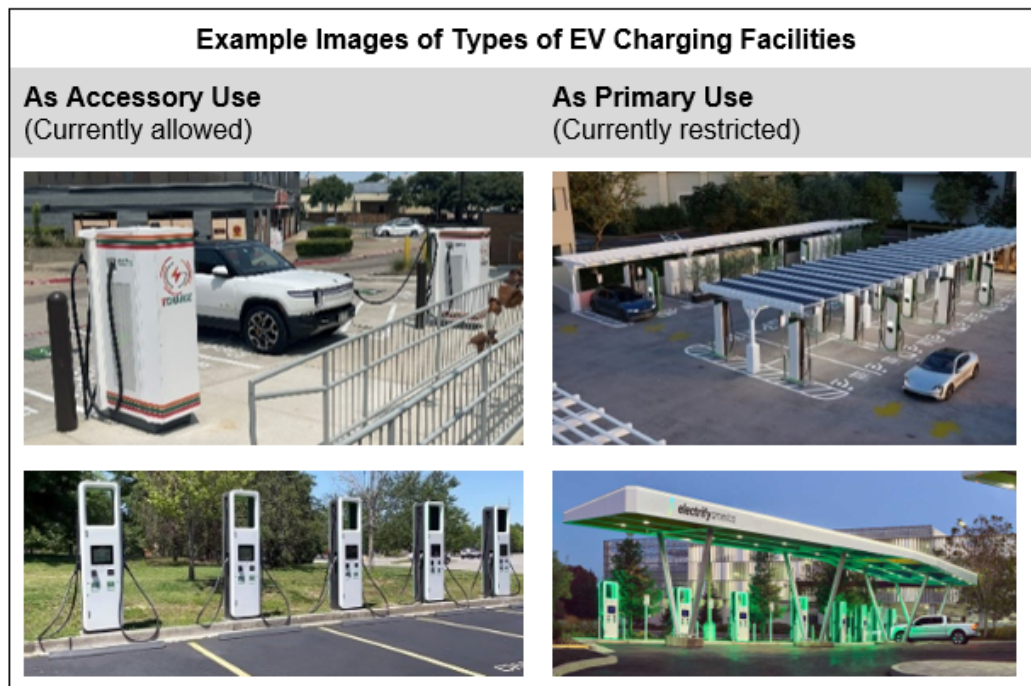
Title 17 provides limited guidance regarding EV charging facilities as a primary land use versus an accessory land use. The code includes a regulation that EV charging facilities developed as a primary use are classified as gas stations (*LMC Sec. 17.20.170.D*). Gas stations are subject to specific limitations in the code, including a cap on the total number allowed citywide, and are no longer permitted in most zoning districts (*LMC Sec. 17.6.340*). As a result, EV charging facilities proposed as a primary land use are effectively not allowed in any zoning district under the current code.

Types of EV Charging Facilities

Most EV charging facilities in Louisville and comparable communities are developed as accessory uses to a primary land use, such as retail, office, multifamily residential, or institutional development. These facilities are commonly located within existing or underutilized parking areas and are designed to serve customers, employees, residents, or fleet vehicles. EV charging facilities are also sometimes located on sites formerly occupied by gas stations or integrated into fueling stations, although Louisville no longer permits new gas stations.

EV charging facilities typically consist of charging equipment, associated electrical infrastructure, and parking spaces designated for charging. Unlike traditional fueling stations, EV charging facilities do not involve on-site fuel storage or dispensing of liquid fuels and generally generate minimal noise, emissions, or operational impacts. Vehicle trips are typically short in duration and distributed throughout the day, and facilities typically operate without on-site attendants.

There is a growing trend nationally toward EV charging facilities developed as a primary land use, particularly in commercial and mixed-use areas and along major transportation corridors. While there are limited nearby examples of this development type, the City seeks to ensure that its zoning code provides sufficient flexibility to accommodate evolving EV infrastructure needs. At the same time, allowing EV charging as a primary use through clear standards enables the City to ensure that site design considerations such as parking supply, access, circulation, landscaping, and compatibility with surrounding uses are appropriately addressed.



Development Proposal:

The proposed amendment updates Title 17 to clarify the classification and review for electric vehicle (EV) charging facilities within the zoning code. The amendment is intended to provide regulatory clarity, improve flexibility for EV charging as a primary land use, and align with state law, while maintaining existing development and design standards that would apply to EV charging facilities whether they are a primary or accessory use. Key elements of the amendment include the following:

- EV Charging as a Primary Use - the amendment states that electric vehicle charging stations are allowed as a primary land use in all commercial, mixed-use, and industrial zoning districts. EV charging facilities remain subject to all applicable zoning, development, and design standards of the underlying zone district.
- Parking Standards - the amendment clarifies that EV charging spaces count toward required off-street parking when provided as an accessory use to a primary land use. When EV charging facilities are developed as a primary use, no additional off-street parking is required for that use.
- Administrative Review for PUDs - the amendment allows EV charging facilities proposed as a primary land use that require a new Planned Unit Development (PUD) to be approved administratively, without public hearings, provided the site is less than one acre, meets all applicable development and design standards, and does not request waivers or variances. The Community Development Director may require a PUD with public hearings if a proposed facility is determined to have the potential for major impacts. Amendments to an existing

PUD for EV charging facilities proposed as an accessory use may also be approved administratively under the same conditions (e.g., no waivers, size limitations, etc.).

- Clarification of When EV Charging Requirements Apply - the amendment clarifies that EV charging requirements apply to new development and building expansions, but not to minor building modifications. This clarification addresses ambiguity in the current code and avoids unintended requirements for full site compliance with EV charging standards for minor interior remodels.

Analysis:

Land Use and Community Impacts

The proposed amendment may result in positive community impacts by expanding access to EV charging infrastructure, supporting the transition to electric vehicles, and reducing transportation-related greenhouse gas emissions. EV charging facilities developed as a primary use function similarly to parking or utility-type infrastructure and do not involve on-site fuel storage, emissions, or high-intensity operations. Potential land use impacts are typically limited and may include short-duration vehicle trips, minimal equipment noise, and site lighting, all of which are addressed through existing site design, access, landscaping, and lighting standards, which are not modified by this amendment.

Proposed Administrative Review of EV Charging Facilities

Under the proposed amendment, EV charging facilities would continue to be reviewed using the same commercial development and design standards that apply to similar auto-oriented uses, such as gas stations; these standards are not being changed. The amendment allows EV charging facilities to be approved administratively as a primary land use, with limitations including a one-acre size cap and no allowance for waivers or variances from City standards. Projects that do not meet these requirements, exceed the size threshold, or are determined to have the potential for major impacts would require a public hearing through a Planned Unit Development (PUD). The Community Development Director retains discretion to require public review when warranted.

Consistency with Adopted City Plans

The proposed amendment is consistent with the [Sustainability Action Plan](#), which identifies transportation electrification and expanded EV charging infrastructure as key strategies to reduce greenhouse gas emissions from the transportation sector and increase access to clean energy options (pp. 22, 24, 53). By clarifying land use regulations and facilitating the development of EV charging facilities, the amendment advances the City's adopted sustainability and transportation goals while maintaining land use compatibility and development standards.

Compliance with Colorado HB 24-1173

Colorado House Bill 24-1173 directs local governments to reduce barriers to the development of electric vehicle (EV) charging infrastructure by establishing clear, objective standards and administrative approval processes where practicable. The

proposed amendment implements this direction by defining EV charging facilities as a primary land use and allowing such facilities by right within commercial, mixed-use, and industrial zoning districts. The amendment also establishes an administrative review process for EV charging facilities, providing a predictable and efficient approval pathway while retaining compliance with applicable zoning and building code requirements.

Council Work Plan:

This amendment advances the 2025 City Council Work Plan by supporting economic vitality and core services through clear, predictable development regulations, while furthering the City's environmental sustainability goals by facilitating expanded access to electric vehicle charging infrastructure in a manner consistent with adopted guiding documents and applicable City Code standards.

Fiscal Impact:

Not applicable. There is no fiscal / budget impact for this item.

Alternatives:

The City Council may approve, approve with amendments, or decline to adopt the ordinance amendment. Not adopting the ordinance may leave the City in violation of House Bill 24-1173, which may result in loss of eligibility for future state funding and create legal challenges for the City.

Recommendation:

Planning Commission Recommendation:

On January 8, 2026, the Planning Commission recommended approval of the proposed ordinance as written with Resolution 1, Series 2026. Video of that meeting is available [here](#).

Staff Recommendation:

Staff recommend approval of Ordinance No. 1917, Series 2026, amending Title 17 of the Louisville Municipal Code to allow electric vehicle charging stations as a primary land use in the City's nonresidential zoning districts and to provide for administrative approval of such facilities.

Attachments:

1. Ordinance No. 1917, Series 2026
2. PC Resolution 1 - EV Charging

**ORDINANCE NO. 1917
SERIES 2026**

**AN ORDINANCE AMENDING TITLE 17 OF THE LOUISVILLE MUNICIPAL CODE
CONCERNING ELECTRONIC VEHICLE (“EV”) CHARGING STATIONS**

WHEREAS, during the 2024 legislative session the Colorado General Assembly adopted House Bill 24-1173 (the “Act”), which requires City Council to either adopt a standard and process for electronic vehicle (“EV”) charging stations, adopt a local administrative process using objective standards that comply with the Act’s provisions, or adopt a resolution or ordinance will rely on existing regulations rather than adopt new provisions in compliance with the Act; and

WHEREAS, the City Council finds the amendments to its current EV charging regulations advance the City’s environmental sustainability goals and meet the requirement in the Act for a local administrative process using objective standards that comply with the Act.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LOUISVILLE, COLORADO:

Section 1. The definition of *Electric Vehicle Charging Stations (ECVS)* in Section 17.20.170.B of the Louisville Municipal Code is hereby amended to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.20.170 Electric vehicle charging infrastructure.

B. *Definitions.* The following definitions shall apply to this Section:

Electronic vehicle charging stations (EVCS) means a designated parking space facility with parking spaces that is are provided with a dedicated branch circuit with wiring capable of supporting a minimum 40-ampere, 208/240-Volt circuit that terminates at a receptacle, plug, junction box, or an installed electric vehicle supply equipment within close proximity of the parking space. There shall be adequate reserved space in an electrical panelboard or switchboard to meet the electric vehicle requirements.

Section 2. Section 17.20.170.D of the Louisville Municipal Code is hereby amended to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.20.170 Electric vehicle charging infrastructure.

D. *Permitted locations.*

4. EVCS are permitted in every zoning district when accessory to a principal permitted use. Such stations located at single-family and designated multi-family units shall be private restricted use only.
2. ~~If the primary use of the parcel is the retail electric charging of vehicles, then the use shall be considered an automotive fueling station for zoning purposes. Installation shall be located in zone districts which permit this use.~~

Section 3. Section 17.20.170.F of the Louisville Municipal Code is hereby amended to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.20.170 Electric vehicle charging infrastructure.

F. The requirements of this section shall be implemented through the building permit process and shall apply to:

1. All new construction; or expansion or modification projects for which a building permit has not been issued as of November 24, 2021; and
2. All planned unit developments for which a building permit has not been issued as of November 24, 2021, irrespective of whether such planned unit development was approved or approved and recorded prior to such date, unless a waiver was expressly granted through the planned unit development review process set forth in chapter 17.28.

Section 4. The Use Groups table in Section 17.12.030 of the Louisville Municipal Code is hereby amended by the addition of a new row for Electric Vehicle Charging Stations, to be inserted alphabetically with following rows to be renumbered, to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.12.030 Use groups.

Use Groups		Districts																	
		A	A-O	B-O	* AO-T	R-RR	SF-R	SF-E	R-R R-E R-L	SF-LD SF-MD SF-HD	R-M	R-H	C-N	C-C	C-B	I	** PCZD	***MU-R	****OS
66	<u>Electric vehicle charging stations</u>	R	<u>Yes</u>	<u>Yes</u>		<u>No</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>R</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u>			

Section 5. Chapter 17.14, Table 1 of the Louisville Municipal Code is hereby amended by the addition of a new row for Electric Vehicle Charging Station for Principal Uses, to be inserted alphabetically, to read as follows (words added are underlined; words deleted are stricken):

TABLE 1: PRINCIPAL USES ALLOWED IN THE MIXED USE ZONE DISTRICTS		
Yes = Permitted By Right		No = Not Permitted
R = Permitted Subject to Special Review		
PRINCIPAL USES	CC	MU-R
Commercial Use Group		
Electric Vehicle Charging Station	Yes	Yes

Section 6. Section 17.72.090.B.22 of the Louisville Municipal Code is hereby amended to read as follows (words added are underlined; words deleted are stricken):

Sec. 17.72.090 Commercial and office.

B. *Uses permitted.* The following commercial and noncommercial uses may be permitted within any planning area designated as “commercial” on the adopted planned community development general plan:

22. ~~Reserved~~ Electric vehicle charging stations.

Section 7. Section 17.72.100 of the Louisville Municipal Code is hereby amended by the addition of a new subsection F to read as follows (words added are underlined; words deleted are stricken):

Sec. 17.72.100 Industrial uses permitted.

The following industrial and nonindustrial uses may be permitted within any planning area designated “industrial” on the adopted planned community development general plan:

F. Electric vehicle charging stations.

Section 8. Section 17.20.020 of the Louisville Municipal Code is hereby amended by the addition of a new subsection I to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.20.020 Parking standards designated for each use.

I. Electric vehicle charging stations as a primary use have no minimum parking requirements. Electric vehicle charging stations as an accessory use shall count towards any minimum parking requirements for the primary use.

Section 9. Section 17.20.170 of the Louisville Municipal Code is hereby amended by the addition of new subsections G and H to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.20.170 Electric vehicle charging infrastructure.

G. Electric vehicle charging stations as a primary use that require approval of a planned unit development may be approved by the Community Development Director provided that:

1. The application meets the criteria for approval of planned unit developments in Section 17.28.120 of this Code;
2. The application is not requesting any waivers or variances to any development or design standard set forth in this Code or the applicable design standards and guidelines;
3. The application does not exceed one (1) acre in size;
4. The Community Development Director has determined that the impacts from the application are minimal enough to not require public hearings as a planned unit development under Chapter 17.28.

H. Electric vehicle charging stations as an accessory use that require approval of a planned unit development amendment may be approved by the Community Development Director provided that:

1. The application meets the criteria for approval of planned unit developments in Section 17.28.120 of this Code;
2. The application is not requesting any waivers or variances to any development or design standard set forth in this Code or the applicable design standards and guidelines; and
3. The Community Development Director has determined that the impacts from the application are minimal enough to not require public hearings as a planned unit development under Chapter 17.28.

Section 10. Section 17.28.130 of the Louisville Municipal Code is hereby amended to read as follows (words added are underlined; words deleted are ~~stricken~~):

Sec. 17.28.130 Application procedure.

The procedure set out in Sections 17.28.140 through 17.28.230 shall be required for all planned unit development except that public hearings shall not be required for electric vehicle charging stations as a primary or accessory use that meet the requirements for administrative approval by the Community Development Director pursuant to Section 17.20.170.G or H of this Code.

Section 11. If any portion of this ordinance is held to be invalid for any reason, such decision shall not affect the validity of the remaining portions of this ordinance. The City Council hereby declares that it would have passed this ordinance and each part hereof irrespective of the fact that any one part be declared invalid.

Section 12. The repeal or modification of any provision of the Municipal Code of the City of Louisville by this ordinance shall not release, extinguish, alter, modify, or change in whole or in part any penalty, forfeiture, or liability, either civil or criminal, which shall have been incurred under such provision, and each provision shall be treated and held as still remaining in force for the purpose of sustaining any and all proper actions, suits, proceedings, and prosecutions for the enforcement of the penalty, forfeiture, or liability, as well as for the purpose of sustaining any judgment, decree, or order which can or may be rendered, entered, or made in such actions, suits, proceedings, or prosecutions.

Section 12. All other ordinances or portions thereof inconsistent or conflicting with this ordinance or any portion hereof are hereby repealed to the extent of such inconsistency or conflict.

**INTRODUCED, READ, PASSED ON FIRST READING AND ORDERED
PUBLISHED THIS ____ DAY OF _____, 2026.**

**PUBLIC HEARING AND SECOND READING WILL BE THE ____ DAY OF
_____, 2026, AT 6:00 P.M. AT LOUISVILLE CITY HALL, 749 MAIN STREET,
LOUISVILLE, CO 80027.**

Christopher M. Leh, Mayor

ATTEST:

Genny Kline, City Clerk

**PASSED AND ADOPTED ON SECOND AND FINAL READING, THIS ____ DAY
OF ____, 2026.**

Christopher M. Leh, Mayor

ATTEST:

Genny Kline, City Clerk

APPROVED AS TO FORM:
KELLY PC

By: _____
Kathleen Kelly, City Attorney

**RESOLUTION NO. 1
SERIES 2026**

**A RESOLUTION RECOMMENDING APPROVAL OF AN ORDINANCE AMENDING
TITLE 17 OF THE LOUISVILLE MUNICIPAL CODE CONCERNING ELECTRIC
VEHICLE (“EV”) CHARGING STATIONS**

WHEREAS, the City of Louisville (the “City”), is a Colorado home rule municipal corporation duly organized and existing under laws of the State of Colorado and the City of Louisville Home Rule Charter (the “City Charter”);

WHEREAS, the Colorado General Assembly enacted House Bill 24-1173 (the “Act”), which requires City Council to either adopt a standard and process for electronic vehicle (“EV”) charging stations, adopt a local administrative process using objective standards that comply with the Act’s provisions, or adopt a resolution or ordinance will rely on existing regulations rather than adopt new provisions in compliance with the Act; and

WHEREAS, the Planning Commission finds the amendments to the current EV charging regulations advance the City’s environmental sustainability goals and meet the requirement in the Act for a local administrative process using objective standards that comply with the Act; and

NOW THEREFORE, BE IT RESOLVED that the Planning Commission of the City of Louisville, Colorado does hereby recommend approval of an ordinance amending Louisville Municipal Code to address electric vehicle charging stations.

PASSED AND ADOPTED this 8th day of January, 2026.

By: 

Steve Brauneis, Chair
Planning Commission

Attest: 

Cullen Choi, Secretary
Planning Commission

Subject: Ordinance No. 1915, Series 2026 — An Ordinance Amending the City's Development Design Standards and Title 17 of the Louisville Municipal Code to Prohibit Nonfunctional Turf, Artificial Turf, and Invasive Plant Species for Certain New Development and Redevelopment — 2nd Reading, Public Hearing (advertised City of Louisville Website 02/05/2026)

The Public Hearing is opened and 2 rounds of public comment are taken, along with Council questions and discussion. Final action will be taken on this item.

Date: February 17, 2026

Prepared By: Emily Cline-Gibson, Planner II

Presented By: Emily Cline-Gibson, Planner II

Summary:

The Colorado General Assembly recently adopted Senate Bill (SB) 24-005 and House Bill (HB) 25-1113, which prohibit nonfunctional turf, nonfunctional artificial turf, and invasive plant species in new non-residential development, certain redevelopment projects, and multifamily residential projects with twelve or more units, while allowing functional turf only in designated recreational areas by January 1, 2026. The legislation also requires local governments to regulate turf installation for all new residential properties by January 1, 2028. To comply with these requirements and ensure consistency across City regulations, staff propose adding a new section to Louisville Municipal Code (LMC) Chapter 17.16 and making related terminology updates to Chapters 17.16, 17.28, and the Sign Code.

Background / Prior Discussions:

Senate Bill (SB) 24-005

The purpose of SB 24-005 is to conserve Colorado's water resources by prohibiting the installation of nonfunctional turf, artificial turf, and invasive plant species for landscaping purposes. Under the bill, turf is defined as continuous plant coverage consisting of nonnative grasses or grasses not hybridized for arid conditions. Nonfunctional turf is turf that is installed for ornamental purposes instead of for designated recreational use.



Example of nonfunctional turf.

The prohibition on nonfunctional turf applies to commercial, institutional, and industrial properties, community properties, street rights-of way, medians, and transportation corridors. This requirement also applies to redevelopment projects where more than 50% of the existing landscape area will be removed or disturbed.

Recreational use areas, such as athletic fields, playgrounds, picnic areas, parks, and other spaces that are regularly used for civic, community, or recreational purposes may allow turf as an acceptable material, as this is considered functional turf. Turf used as part of an approved water-quality treatment solution with no irrigation and no pesticide application is also considered functional turf. The bill does not prohibit the continued maintenance of nonfunctional turf, artificial turf, or invasive species that were planted prior to January 1, 2026.



Example of functional turf.

The City's Parks, Recreation, and Open Space (PROS) Department manages landscaping at City facilities, within rights-of-way, and along medians. PROS is actively implementing a median conversion program to replace bluegrass turf with water-wise plantings, which aligns with the requirements of SB 24-005. The amendments proposed in this ordinance apply specifically to LMC Title 17 and the adopted development design standards.

House Bill (HB) 25-1113

HB 25-1113 expands the implementation of SB 24-005 by extending the same turf limitations outlined in SB 24-005 to multifamily residential developments of 12 or more

dwelling units. The House Bill also clarifies that artificial turf may be used as a permitted material in functional recreation use areas. Both of these measures from HB 25-1113 are included with the proposed ordinance.

The House Bill also requires local governments to adopt regulations that address the installation of turf in all new residential developments, including single-family properties, by January 1, 2028. This section of the bill is not part of this proposal and is anticipated to be addressed in the development code re-write, which is scheduled to begin this year.



Example of artificial turf.

Currently, the proposed ordinance applies only to new non-residential developments, certain redevelopments if over 50% of the total landscaped area is disturbed, and new multi-family and mixed-use developments with 12 or more dwelling units.

Title 17 and Adopted Design Standards

Title 17 of the LMC establishes zoning and development requirements, including yard and bulk standards, allowable uses, and criteria for Planned Unit Development review. Landscaping standards are not located within Title 17 and are instead contained in the City's adopted development design standards and guidelines.

The Commercial Development Design Standards and Guidelines (CDDSG), Industrial Development Design Standards and Guidelines (IDDSG), and the Mixed-Use Design Standards and Guidelines (MUDDSG) were adopted by City Council between 1997-2007. Each design standard includes a landscaping chapter which references turf, sod, lawn, and grass as acceptable plant materials, without distinguishing between native and non-native species. To comply with SB 24-005 and HB 25-1113, staff proposes to amend these documents only to remove references to plant materials that constitute nonfunctional turf and to replace them with allowable grass species that are native to Colorado or hybridized for arid conditions. The Design Standards for Downtown Louisville do not address landscaping. The development code update will also more comprehensively address each of these design standards and guidelines.

The City of Louisville Sign Code, adopted in 2019, regulates all signage within the City. The section pertaining to freestanding signs includes landscaping requirements that reference turf as acceptable material (Sign Code p. 33). Only this section of the Sign Code is affected by the State legislation.

Development Proposal:

Proposed Addition to Title 17

A new section is proposed for Chapter 17.16 – General Regulations to implement the requirements of SB 24-005 and HB 25-1113. This section establishes clear prohibitions on nonfunctional turf and nonfunctional artificial turf for all new commercial, industrial, mixed-use, and institutional development, new multifamily residential developments of 12 or more dwelling units, and development on common property, like areas maintained by homeowners' associations. The new section also prohibits the planting of invasive species, as defined by state law, on any property.

Summary of Changes to Design Standards

The CDDSG, MUDDSG, and IDDSG are amended through the attached draft ordinance to comply with state law. The revisions remove outdated references to sod, grass, turf, and lawn where these terms previously referred to nonfunctional turf and replace them with terms that clarify that the grass must be native to Colorado or hybridized for arid conditions. These amendments are limited to the landscaping chapters of each document, which are Chapter 5 of the CDDSG and IDDSG and Chapter 7 of the MUDDSG. No other chapters of the design standards are affected. These amendments do not modify the amount of landscaping required, the landscape buffer widths, or any other design or landscaping standards.

Below is a summary of all locations in each design standard that include proposed amended language. The proposed language to be added is underlined, and language to be removed is stricken.

Table 1. Design Standards Guide for Page / Section Amendments

Design Standard	Page(s) / Section(s) Containing Amendments
MUDDSG	P. 20
CDDSG	Landscape Design 5-2, 5-3, 5-4, 5-8, 5-9
IDDSG	P. 36, 38, 42, 43, 44

Proposed Amendment to Sign Code

Section 4.10.5 of the sign code is proposed to be amended as follows:

When required, landscaping shall include shrubs, ornamental grasses, perennials, ground covers and other enhancements. Landscaping areas shall not consist of more than twenty-five (25) percent ~~turf or native grasses~~ Grass native to Colorado or hybridized for arid conditions.

Analysis:

The proposed addition to Chapter 17.16 places the new turf and invasive plant species restrictions in a central section of the Louisville Municipal Code, rather than within the development design standards. This ensures that the requirements of SB 24-005 and HB 25-1113 are applied consistently to all qualifying development types, including

multifamily residential developments containing 12 or more dwelling units, since there are no adopted comprehensive design standards for residential developments. Providing these regulations in Title 17 allows for a clear framework that can be applied uniformly for all new qualifying development and redevelopment.

The amendments to the CDDSG, IDDSG, and MUDDSG are complementary updates to the new Title 17 section. These changes remove outdated references to turf, sod, lawn, and grass where those terms previously implied the use of plant materials that are now prohibited under state law. Replacing these terms with references to grass species native to Colorado or hybridized for arid conditions aligns the City's design standards with the State's definition of turf, which is defined only as nonnative grasses or grasses not hybridized for arid conditions. The revisions are limited in scope and do not alter landscape quantities, buffer requirements, screening standards, or other elements of the design standards. These terminology updates provide clarity for applicants and staff while preserving flexibility for compliance with the adopted landscape design standards.

The proposal is also supported by the City of Louisville's Sustainability Action Plan, which includes strategies to expand water-conservation education for residents and businesses (Action Plan p. 37). The City's Drought Management Plan further outlines the need for water-efficient landscaping by establishing drought response strategies and conservation goals that include reducing unnecessary outdoor water use and discouraging the installation of landscapes with higher water use (Drought Plan p. 6).

Under SB 24-005, redevelopment is defined as a project requiring a building permit or design review in which more than 50% of the existing landscaped area is disturbed. Staff anticipate that most commercial and industrial redevelopment projects in Louisville will not trigger this threshold. Projects that do meet the threshold typically involve full-site redevelopment where existing landscaping would be replaced regardless of the state requirement.

Landscape compliance for commercial and industrial projects will continue to be evaluated during staff review of Planned Unit Development applications, which require detailed landscape plans and full plant material lists. New freestanding signs requiring sign permits will also be reviewed for compliance with the amended landscaping provisions. Staff will apply the updated regulations and design standard terminology to ensure all new development and redevelopment proposals are consistent with the requirements of SB 24-005 and HB 25-1113.

Council Work Plan:

This code amendment supports the 2025 City Council Work Plan Core Services priority by conserving the City's water supply.

Fiscal Impact:

Not applicable. There is no fiscal / budget impact for this item.

Alternatives:

The City Council may approve, approve with amendments, or decline to adopt the ordinance amendment. Unless the City approves the ordinance, the City will be in violation of SB 24-005 and HB 25-1113. This may result in loss of eligibility for state funding and create legal challenges for the City.

Recommendation:

On December 11, 2025, the Planning Commission recommended approval of the proposed ordinance as written by Resolution 19, Series 2025. Video of that meeting is available [here](#).

Staff recommend approval of Ordinance 1915, Series 2026, amending the City's Development Design Standards and Title 17 of the Louisville Municipal Code to prohibit nonfunctional turf, artificial turf, and invasive plant species for certain new development and redevelopment.

Attachments:

1. Ordinance No. 1915 Series 2026
2. Planning Commission Resolution No. 19, Series 2025
3. Colorado State Senate Bill 24-005
4. Colorado State House Bill 25-1113

**ORDINANCE NO. 1915
SERIES 2026**

**AN ORDINANCE AMENDING THE CITY'S DEVELOPMENT DESIGN STANDARDS
AND TITLE 17 OF THE LOUISVILLE MUNICIPAL CODE TO PROHIBIT
NONFUNCTIONAL TURF, ARTIFICIAL TURF, AND INVASIVE PLANT SPECIES FOR
CERTAIN NEW DEVELOPMENT AND REDEVELOPMENT**

WHEREAS, in order to mitigate the impacts of climate change, green urban spaces such as urban tree canopies are a vital adaptation tool, especially for mitigating the urban heat island effect, which can increase energy costs, air pollution, and heat-related illnesses and deaths; and

WHEREAS, water supply in the western United States is under increasing pressure due to climate change and increasing demand; and

WHEREAS, the City Council finds the overuse of nonnative grass for landscaping purposes requires large amounts of water to maintain; and

WHEREAS, the City Council further finds that, while there are appropriate and important uses for turf, including for civic, community, and recreational purposes such as use in parks, sports fields, and playgrounds, much of the turf in the non-residential and certain multifamily areas of the City is nonfunctional, located in areas that receive little, if any use, and could be replaced with landscaping that adheres to water-wise landscaping principles without adversely impacting quality of life or landscape functionality; and

WHEREAS, prohibiting the installation, planting, or placement of nonfunctional turf in non-residential areas and certain multifamily areas of the City can help conserve the City's water resources; and

WHEREAS, installed vegetation that adheres to water-wise landscaping principles can help reduce outdoor demand of water; and

WHEREAS, installation of artificial turf can cause negative environmental impacts, such as exacerbating heat island effects in urban areas and releasing harmful chemicals, including plastics, microplastics, and perfluoroalkyl and polyfluoroalkyl chemicals, into the environment and watersheds; and

WHEREAS, the Colorado General Assembly enacted Senate Bill 24-005, which added a new Article 99 to the Colorado Revised Statutes, prohibiting nonfunctional turf, artificial turf, and invasive plant species, and which requires local entities, including the City, to prohibit the installation, planting, or placement of any nonfunctional turf, artificial turf, or invasive plant species as part of a new non-residential development project or redevelopment project within the City; and

WHEREAS, the Colorado General Assembly enacted House Bill 25-1113, which supplements Senate Bill 24-005 by expanding the definition of “applicable property” to include multifamily residential housing of more than 12 dwelling units, and further requires local entities, including the City, on or before January 1, 2028, to enact or amend its laws regulating new development and redevelopment projects within its jurisdiction so as to limit the installation of turf to reduce irrigation water demand for residential real property; and

WHEREAS, the City Council has adopted ordinances amending Title 17 of the Louisville Municipal Code to implement the Louisville Commercial Development Design Standards and Guidelines (the “CDDSG”), the Louisville Industrial Development Design Standards and Guidelines (the “IDDSG”), and the Louisville Mixed Use Design Standards and Guidelines (“MUDSG”), all of which contain certain regulations regarding landscaping for commercial, industrial, and mixed-use development; and

WHEREAS, the City Council has adopted a Sign Code, which is set forth in Appendix B to Title 17 of the Louisville Municipal Code, and which Sign Code establishes the requirements, standards, and guidelines applicable to signs within the City; and

WHEREAS, after a duly noticed public hearing held on December 11, 2025, at which evidence and testimony were entered into the record, including the Louisville Planning Commission Staff Report dated December 11, 2025, the Louisville Planning Commission has recommended the City Council adopt the amendments to the Louisville Municipal Code set forth in this ordinance; and

WHEREAS, City Council has provided notice of a public hearing on said ordinance by publication as provided by law and held a public hearing as provided in said notice; and

WHEREAS, the City Council finds it is in the interest of the public health, safety and welfare of the City and its residents to prevent the installation, planting or placement of nonfunctional turf, artificial turf, and invasive plant species on non-residential property as set forth herein.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LOUISVILLE, COLORADO:

Section 1. Louisville Municipal Code Chapter 17.16 – General Regulations is hereby amended by the addition of a new Section 17.16.370 as follows:

Sec. 17.16.370 – Water Efficient Landscaping Standards.

A. *Applicability.* The requirements of this section apply to:

1. All new commercial, industrial, mixed-use, and institutional development;
2. All new multifamily residential development containing twelve (12) or more dwelling units;
3. All new development on common property; and
4. Any redevelopment of the above properties where more than 50% of the existing landscaped area is proposed to be removed or disturbed.

B. *Turf limitations.* Turf and artificial turf may be installed only within functional recreational use areas, including playgrounds, sports fields, picnic areas, and other spaces that are regularly used for civic, community, or recreational purposes. All turf and artificial turf located outside of these areas is considered nonfunctional and is prohibited. Functional recreational use areas do not include decorative lawn areas, narrow landscape strips, parking lot islands, or rights-of-way.

C. For the purpose of this section, “turf” is defined in C.R.S. § 37-60-135 (2)(i) as continuous plant coverage consisting of nonnative grasses or grasses not hybridized for arid conditions and “artificial turf” shall be interpreted consistent with state law definitions for functional and nonfunctional artificial turf as set forth in C.R.S. § 37-99-102.

D. *Invasive plant species.* Invasive plant species, as defined in C.R.S. § 37-60-135 (2)(e), are prohibited in all landscaped areas.

E. In the event that this section conflicts with landscaping requirements set forth in any other applicable section of Title 17, including all adopted design standards, the provisions of this section shall control.

Section 2. Section 4.10.5 of the Sign Code adopted by reference in Section 17.24.010 and set forth in full as Appendix B to the Louisville Municipal Code is hereby amended to read as follows (words to be added underlined; words to be deleted ~~stricken~~):

4.10 Freestanding Signs.

5. When required, landscaping shall include shrubs, ornamental grasses, perennials, ground covers and other enhancements. Landscaping areas shall not consist of more than twenty-five (25) percent ~~turf or native grasses~~ Grass native to Colorado or hybridized for arid conditions.

Section 3. The Mixed-Use Development Design Standards and Guidelines referenced in Appendix A to Chapter 17.16 of the Louisville Municipal Code is hereby amended to read as set forth in Exhibit A to this ordinance, attached hereto and incorporated herein by this reference (words to be added underlined; words to be deleted ~~stricken~~).

Section 4. The Commercial Development Design Standards and Guidelines referenced in Appendix A to Chapter 17.28 of the Louisville Municipal Code is hereby amended to read as set forth in Exhibit B to this ordinance, attached hereto and incorporated herein by this reference (words to be added underlined; words to be deleted ~~stricken~~).

Section 5. The Industrial Development Design Standards and Guidelines referenced in Appendix C to Chapter 17.28 of the Louisville Municipal Code are hereby amended to read as set forth in Exhibit C to this ordinance, attached hereto and incorporated herein by this reference (words to be added underlined; words to be deleted ~~stricken~~).

Section 6. If any portion of this ordinance is held to be invalid for any reason, such decision shall not affect the validity of the remaining portions of this ordinance. The City Council hereby declares that it would have passed this ordinance and each part hereof irrespective of the fact that any one part be declared invalid.

Section 7. The repeal or modification of any provision of the Municipal Code of the City of Louisville by this ordinance shall not release, extinguish, alter, modify, or change in whole or in part any penalty, forfeiture, or liability, either civil or criminal, which shall have been incurred under such provision, and each provision shall be treated and held as still remaining in force for the purpose of sustaining any and all proper actions, suits, proceedings, and prosecutions for the enforcement of the penalty, forfeiture, or liability, as well as for the purpose of sustaining any judgment, decree, or order which can or may be rendered, entered, or made in such actions, suits, proceedings, or prosecutions.

Section 8. All other ordinances or portions thereof inconsistent or conflicting with this ordinance or any portion hereof are hereby repealed to the extent of such inconsistency or conflict.

**INTRODUCED, READ, PASSED ON FIRST READING AND ORDERED
PUBLISHED** this ___ day of _____, 2026.

Christopher M. Leh, Mayor

ATTEST:

Genny Kline, City Clerk

APPROVED AS TO FORM:
Kelly PC

Kathleen Kelly, City Attorney

PUBLIC HEARING AND SECOND READING WILL BE THE ____ DAY OF _____, 2026, AT 6:00 P.M. AT LOUISVILLE CITY HALL, 749 MAIN STREET, LOUISVILLE, CO 80027.

PASSED AND ADOPTED ON SECOND AND FINAL READING, this ____ day of _____, 2026.

Christopher M. Leh, Mayor

ATTEST:

Genny Kline, City Clerk

Exhibit A
Mixed Use Development Design Standards and Guidelines

**LOUISVILLE, COLORADO
IMPLEMENTATION OF THE HIGHWAY 42 REVITALIZATION AREA PLAN**

**Appendix A
MIXED USE DEVELOPMENT DESIGN STANDARDS AND GUIDELINES**

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CITY OF LOUISVILLE MIXED USE DESIGN STANDARDS AND GUIDELINES

INTRODUCTION

PURPOSE AND INTENT

Major improvements to U.S. Highway 42 and the potential development of a commuter rail station in Louisville are creating the conditions for significant development and change in the Highway 42 Revitalization Area. In anticipation of such change, the City of Louisville hereby declares that it is the purpose and intent of these Mixed Use Development Design Standards and Guidelines (MUDDSG) to:

1. Implement the Highway 42 Revitalization Area Comprehensive Plan;
2. Strengthen and enhance adjacent residential neighborhoods while protecting them from potential adverse impacts associated with new development;
3. Complement and integrate the area with historic downtown Louisville through the establishment of strong pedestrian, and multimodal connections;
4. Capture the potential for high-quality, mixed use development that will serve adjacent neighborhoods and the citizens of Louisville and enhance the city's long-term tax base;
5. Avoid incompatible industrial and large-scale or heavy commercial growth;
6. Adopt a regulatory framework that promotes and encourages redevelopment to integrate principles of sustainable architecture and energy conservation.
7. Adopt design standards for the development of a commuter rail station that promote the public health and safety, adequate ingress and egress, and parking.
8. Decentralized surface parking shall be constructed in a manner so that it does not overwhelm the redevelopment area.
9. Capture the potential for highway commercial development adjacent to State Highway 42 providing a restricted range of retail sales and services.

APPLICABILITY

The regulations and requirements of this manual shall apply to all land, existing development, and proposed development in the Residential Mixed Use Zone District (MU-R), and the Commercial Community Zone District (CC). All new development, changes in use, or substantial alterations or expansions of an existing use in these zone districts shall comply with these Mixed Use Development Design Standards and Guidelines.

HOW TO USE THIS MANUAL

1. *Who Uses This Manual.*

These Mixed Use Development Design Standards and Guidelines are to be used by property owners/applicants and their design consultants in the planning of development in the MU-R or CC Zone District within the City of Louisville. The MUDDSG will also be used by city staff, the planning

commission, and the city council as part of their review of development proposals in the MU-R and CC Districts.

2. How to Use the Mixed Use Development Design Standards and Guidelines.

The MUDDSG are generally organized in a descending order of scale, from overall site planning concerns, to circulation issues, to building and site details, and then to signs and lighting. When first developing overall planning concepts for a development in the MU-R and CC Districts, the earlier sections of the manual will be most relevant. At advanced stages of project design, when architectural details and specific landscaping ideas are being developed, sections appearing later in the manual will be most relevant.

3. How the Manual is Organized.

This manual is organized into sections, with the first five sections comprising this introduction and explaining the manual's intent, how to use this document, and how other city regulations apply and interplay with this Manual. The fifth section in this introduction provides definitions of terms of art used in the Manual and not otherwise defined in the city's Zoning Ordinance (Title 17) of the city's municipal code.

The remainder of the sections each addresses a different substantive area, such as blocks and streets, off-street parking, pedestrian circulation, and architectural and building design. In many cases, the section may refer back to the City of Louisville Commercial Development Design Standards and Guidelines (CDDSG) and direct the user to apply the standards and guidelines in that document to the proposed project in the mixed use zone district. In other cases, the user is directed to apply the relevant CDDSG standard or guideline, but with specific variations appropriate to implementing the vision for the MU-R and CC Districts.

The remaining sections, which are especially applicable to development in the MU-R and CC Districts, are generally comprised of the following components:

- A. **Intent and purpose statement**, which is a broad statement explaining the general or specific reasons and goals for the approach taken and substance found in the particular standard or guideline.
- B. **Standards**, which mandate the specific course of planning and design action that the applicant must incorporate in its project application. Compliance with standards is mandatory. Statements of standards are indicated by use of the word "shall" in the rule or directive. A failure to meet a standard may be used as a basis for the city's denial of a project application.
- C. **Guidelines**, if any, follow the standards and are indicated by the words "may" or "should." Guidelines are voluntary and not mandatory; however, compliance is strongly encouraged to fulfill the intent of the section. A failure to meet a guideline cannot be used by the city as a basis for project denial.
- D. **Graphic illustrations** showing one or more suggested design solutions that would be appropriate or inappropriate with respect to the standards and guidelines. Graphics may include photographs or drawings, and are intended to be illustrative of the text and not regulatory. In the event of a conflict between a graphic illustration and the text of a MUDDSG standard, the text shall control.

RELATIONSHIP TO OTHER REGULATIONS

1. *Relationship to the Louisville Commercial Development Design Standards and Guidelines and Downtown Design Handbook for Downtown Louisville.*

The City of Louisville Commercial Development Design Standards and Guidelines (CDDSG) shall not apply to development subject to these Mixed Use Development Design Standards and Guidelines except as expressly cross-referenced or provided in this manual. The standards and guidelines set forth in the Downtown Design Handbook for Louisville and the yard, bulk, and other requirements applicable to Downtown Louisville (including but not limited to Section 17.12.050 and Section 17.20.025 of this Zoning Ordinance) shall not apply to development subject to these Mixed Use Development Design Standards and Guidelines except as specifically cross-referenced or provided in this manual.

2. *Relationship to General Zoning Regulations.*

When these Mixed Use Development Design Standards and Guidelines state a development or design standard specific to the MU-R or CC Zone District, such standards shall apply in lieu of any general regulation stated in Chapter 17.16 or in other parts of Title 17 that addresses the same subject. When the general development or design regulations in Chapter 17.16 or in other provisions of Title 17 regulate a subject that these standards and guidelines do not clearly address, the general regulation shall apply to development in the MU-R District.

DEFINITIONS

1. **Maximum Extent Feasible**

No feasible and prudent alternative exists, and all possible efforts to comply with the regulation or minimize potential harm or adverse impacts have been undertaken. Economic considerations may be taken into account but shall not be the overriding factor in determining “maximum extent feasible.”

2. **Maximum Extent Practicable**

Under the circumstances, reasonable efforts have been undertaken to comply with the regulation or requirement, that the cost of additional compliance measures clearly outweigh the potential benefits to the public or would unreasonably burden the proposed project, and reasonable steps have been undertaken to minimize any potential harm or adverse impacts resulting from the noncompliance.

MIXED USE DEVELOPMENT DESIGN STANDARDS & GUIDELINES

1. Street and Block Design Standards.

1.1. *Intent.*

In order to encourage a synergistic mix of uses within the MU-R and CC Districts and to complement existing Downtown development, clear pedestrian and automobile links and safe pedestrian movements within the districts and between the districts and Downtown Louisville are essential. With the districts organized into regular-sized blocks, an internal public street system is created that can work to disperse and distribute project-generated traffic to multiple access points, rather than funneling such traffic through a single primary access way. The street and block standards are a fundamental cornerstone in creating a pedestrian-oriented and pedestrian-friendly district. Finally, the street and block standards purposely model the existing street grid and block system in Downtown Louisville to encourage the MU-R and CC Districts to mature as an extension of Downtown, and to enable present and future vehicle, pedestrian, and visual access between the areas.

1.2. *General Street and Block Layout Standards.*

A. To the maximum extent practicable, the general layout of blocks and streets within the Highway 42 Revitalization Area shall conform to an interconnected traditional grid pattern similar in layout, scale, and function as found in the Louisville Downtown Area. (S)

B. Street alignment within the MU-R and CC Districts shall generally conform to the street pattern adopted in the Highway 42 Plan to the maximum extent practicable. To ensure both visual and physical connections to the Downtown, east-west streets in the MU-R and CC Zone Districts shall align with the east-west streets found in the Louisville Downtown Area to the maximum extent feasible. (S)

C. The street grid pattern may be modified to accommodate changes in natural grade, existing property boundary lines, utility easements, or important visual elements within the district (e.g., a street may terminate at a “T” intersection to accentuate a key building or feature). (S)

1.3. *Allowed Block Dimensions.*

The following block standards apply to all new development:

A. Permitted Block Width: (Generally, the east and west sides of block)

1. MU-R District: 270-320 feet. (S)

2. CC-District: 400 feet (S)

B. Permitted Block Length (Generally, the north and south sides of block)

1. MU-R District: 300-400 feet. (S)

2. CC District: 600 feet (S)

C. All block dimensions shall include area devoted to alleys. (S)

1.4. *General Street Design Standards.*

A. *Internal Public Street System.*

All development sites shall provide for multiple blocks and an internal street system according to the street and block standards in this section, and according to the Louisville Public Works Department’s general policies, standards, and guidelines governing street design. (S)

B. Internal Streets.

Internal streets provided according to this section are to be dedicated to the public. All internal streets shall be constructed according to the Louisville Public Works Department's general policies, standards, and guidelines governing public street construction. On a case-by-case basis, the city may approve alternative private street design that varies from the city's adopted public street cross-sections, based on the city's consideration of the proposed intensity of vehicle and pedestrian use, adequacy of emergency safety access, drainage requirements, and similar issues. (S)

C. General Street Design Standards.

Accent paving materials located within the public right-of-way shall meet Louisville Public Works Department criteria. (S)

D. Mid-Block Alleys Encouraged.

Guideline: The city encourages the provision of mid-block through alleys to serve both residential and nonresidential uses. For nonresidential uses, alleys may be used to enable secondary vehicle access and service access. (G)

2. Vehicle Access, Circulation, and Connections.

2.1. Intent.

The vehicle access, circulation and connection standards in this section are intended to minimize the number of curb cuts; maximize the amount of on-street parking available for residents, employees, and visitors to the district; encourage the use of shared access ways to off-street parking areas (including the use of alleys for this purpose).

2.2 Site and Vehicular Access Standards and Guidelines.

All new development in the MU-R and CC Districts shall comply with the following **standards** and **guidelines**:

- A. Site access to the MU-R and CC Districts from Highway 42 shall be from dedicated public streets only. (S)
- B. New curb cuts along Highway 42 to provide direct access to individual parcels via entrance drives are prohibited. Existing curb cuts and entrance drives along Highway 42 that directly access individual parcels shall be closed or consolidated to the maximum extent feasible as parcels are developed or redeveloped. As applicable, applicants shall reference the adopted Access Control Plan as amended from time to time for additional Highway 42 access regulations. (S)
- C. Street intersections providing site access to the district shall be enhanced by incorporating signs, accent paving, special landscaping, and lighting. Materials used in entry features shall be consistent with other materials used in the development. (S)
- D. A minimum separation of fifty (50) feet shall be maintained between adjacent curb-cuts along private streets. (S)
- E. A minimum separation of eighty (80) feet shall be maintained between a public or private street and a parcel curb-cut that is created after the effective date of these standards. (S)
- F. Vision clearance areas shall not be required except with respect to fences, walls, landscaping and service enclosures. (S)
- G. Applicants for development are strongly encouraged to provide mid-block through alleys to provide primary or secondary access to the site for off-street parking or services. (G)

2.3. *Vehicular Circulation and Connection Standards.*

The policy, standards, and guidelines for vehicular circulation stated in Section 2.1.2 of the CDDSG shall apply in the MU-R and CC Districts, except as varied by the following standard for vehicle connections:

A. *Street Connections to Adjacent Uses.*

Connections between adjacent development parcels shall be provided by aligning new perimeter and internal streets to connect with existing and planned external streets of equivalent functional classifications to create through-street connections from mixed-use development to adjacent development. Where it is necessary to prevent cut-through traffic from entering existing residential areas, street alignments may be discontinuous and traffic calming improvements shall be utilized. (S)

2.4. *Service/Delivery, Emergency and Utility Access.*

The policy, standards, and guidelines for service/delivery, emergency and utility access stated in Section 2.1.4 of the CDDSG shall apply in the MU-R and CC Districts. Shared service and delivery access ways between adjacent parcels and/or buildings shall be employed to the maximum extent feasible. The city shall require cross access easements whenever necessary to ensure that adjacent parcels have adequate access if ownership patterns change. (S)

2.5. *Mass Transit Facilities.*

Transit facilities shall be provided in a manner to make transit an attractive mode of travel for residents and employees.

- A. Locate bus shelters close to significant clusters of buildings. Provide a concrete pad in front of bus shelters. Provide protection for bus shelters from prevailing winds. (S)
- B. Coordinate any shelter design and locations with RTD. (S)

3. **Site Planning.**

3.1. *Intent.*

The orientation of a principal building is a major influence on the public realm environment created at the public sidewalk or street edge. When buildings are set back far from the public sidewalk or street, or when a building turns its back on the primary abutting street, the pedestrian experience at the sidewalk or on the street suffers in quality. These building orientation and siting standards are intended to accommodate and invite pedestrians to walk to and between destinations within the MU-R, and CC Districts, to feel safe and comfortable doing so, and to support the use and security of the commuter rail line and transit station located in the Highway 42 plan area.

3.2. *Building Orientation and Building Entrances.*

The policy, standards, and guidelines for building siting and orientation stated in Section 1.1 of the CDDSG shall apply in the MU-R and CC Districts. In addition, the following building orientation standards and guidelines shall apply:

A. *Principal Buildings on Parcels With Highway 42 Frontage.*

- 1. Principal buildings on parcels with Highway 42 frontage shall have primary facades and entrances oriented either:
 - a. Toward Highway 42 subject to the standard in subsection 2 below;
 - b. Toward an abutting internal or perimeter street other than Highway 42, or
 - c. Toward an adjacent public plaza, park, or on-site amenity. (S)

See Figure 1.

2. If the primary façade and entrance to a principal building orients toward Highway 42, a second primary building entrance of equal size, scale, and prominence shall be provided on a different elevation of the building that orients toward an abutting internal or perimeter street other than Highway 42. (S) See Figure 1.

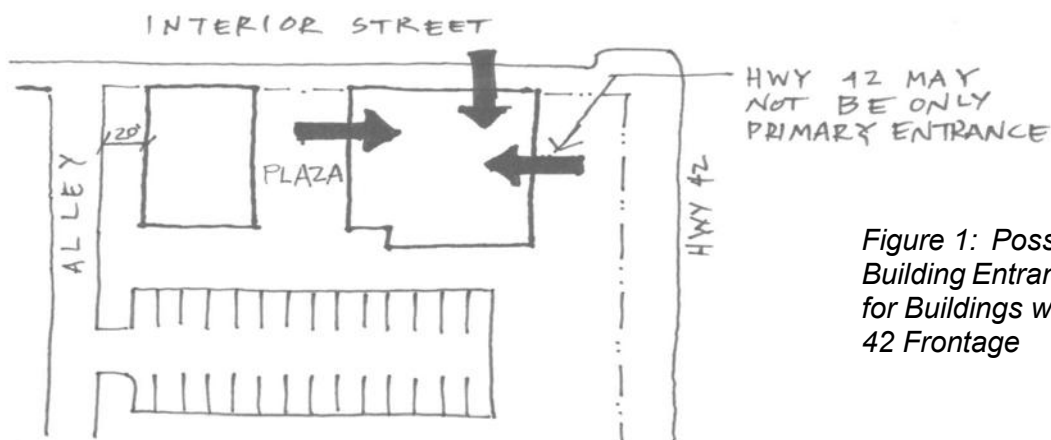


Figure 1: Possible Primary Building Entrance Locations for Buildings with Highway 42 Frontage

3. All primary building entries shall comply with the prominent entry design standards in Section 9.3 below. (S)
4. Secondary building entrances may orient toward and face Highway 42. (G)

B. All Other Buildings.

1. All principal buildings shall have their primary façades and entrances oriented toward public street frontages and shall not face parking lots or alleys. The building's primary façade and entrance shall face the primary abutting access street or an adjacent public plaza, park, or on-site amenity. Primary building entries shall comply with the prominent entry design standards in Section 9.3 below. (S)
2. Secondary entrances may face a rear parking area, or other streets with sidewalks or walkways. (G)

3.3. Utilities, Mechanical, and Telecommunications Equipment.

The policy, standards, and guidelines for utilities, mechanical, and telecommunications equipment stated in Section 1.5 of the CDDSG shall apply in the MU-R and CC Districts, except that utility meters and other above-ground utility boxes and similar equipment shall be located where they will be least visible from an abutting local street. (S)

3.4. Water Quality Control and Drainage.

The policy, standards, and guidelines for water quality control and drainage stated in Section 1.7 of the CDDSG shall apply in the MU-R and CC Districts.

3.5. *Site Grading, Excavation and Erosion Control.*

The policy, standards, and guidelines for site grading, excavation, and erosion control stated in Section 1.8 of the CDDSG shall apply in the MU-R and CC Districts.

4. Off-Street Parking and Loading.

4.1. *Off-Street Parking.*

A. *Intent.*

An adequate supply of off-street parking is necessary for the commercial viability and success of new development in the MU-R and CC Districts. However, commuter rail located within easy walking distance of the entire Highway 42 Revitalization Area may reduce the amount of off-street parking required or supplied in developments where the only travel mode option is the automobile. The city's adopted street design for the Highway 42 Revitalization Area will also ensure that on-street parking spaces can serve the district's visitors and users.

B. *Amount of Off-Street Parking Required.*

1. The amount of off-street parking required for permitted uses in the MU-R and CC Districts is set forth in Table 1 below. Credits and reductions may be allowed according to subsection 4.1.C. below. (S)
2. Unless otherwise specifically noted, all square footage-based parking standards shall be computed pursuant to Section 17.20.025 of the Louisville Municipal Code on the basis of gross floor area, which shall be measured as the floor area primary to the functioning of the particular use of the property and shall exclude stairwells, elevator shafts, hallways, bathrooms, ornamental balconies, space occupied by heating, air conditioning or other utility equipment, common area open spaces (e.g., courtyards), and space devoted to off-street parking or loading. Additionally, the area measured with respect to a restaurant use shall not include floor area designed primarily for use by service and food preparation staff. (S)
3. In all calculations of the minimum or maximum amount of parking, all fractions shall be rounded down to the nearest whole number. (S)
4. Pursuant to Section 17.20.025 of the Louisville Municipal Code, if an off-street parking space has been provided in connection with existing floor area or is added in connection with existing floor area, the existing parking space shall not be eliminated if elimination would result in fewer spaces for the existing floor area than the required ratio set forth in Table 1. Therefore, existing parking may be credited to the parking requirement of Table 1 only if the existing parking space exceeds the required ratio. If the use of a freestanding building occupied solely by a restaurant is changed in whole or part to another use, parking for the floor area changed in use shall be calculated and provided as set forth in this section. (S)

TABLE 1		
AMOUNT OF OFF-STREET PARKING SPACES REQUIRED		
<i>GLA = Gross Leasable Area</i>		
USE CATEGORY ▼	CC DISTRICT	MU-R DISTRICT
All Retail Sales, Service, and Office Uses:		
<i>Professional and Business Office</i>	Minimum: 1 space per 400 square feet of GLA Maximum: 125% of minimum required spaces	Minimum: 1 space per 500 square feet of GLA Maximum: 125% of minimum required spaces
<i>Eating/Drinking Establishments</i>	Minimum: 1 space per 300 square feet of GLA Maximum: 125% of minimum required spaces	Minimum: 1 space per 300 square feet of GLA Maximum: 125% of minimum required spaces
<i>All Other Retail Sales, Service,</i>	1 space per 300 square feet.	Minimum: None Maximum: 1 space per 300 square feet.
All Residential Uses [Note 1]:		
1-bedroom unit	Minimum: 1 space per unit Maximum: 1.25 spaces per unit	Minimum: 1 space per unit Maximum: 1.25 spaces per unit
2-bedroom unit	Minimum: 2 spaces per unit	Minimum: 2 spaces per unit
3-or-more-bedroom unit	Minimum: 2.0 spaces per unit	Minimum: 2.0 spaces per unit
Additional guest parking [Note 2]	1 space per 8 dwelling units in addition to the minimum off-street parking spaces.	1 space per 8 dwelling units in addition to the minimum off-street parking spaces.
Civic, Institutional, and Public Uses:		
<i>Educational Institutions</i>	Minimum and Maximum: 1 per 4 seats or 1 per 1,000 square feet of floor area, whichever requires the greater amount.	Minimum and Maximum: 1 per 4 seats or 1 per 1,000 square feet of floor area, whichever requires the greater amount.
<i>All Other Permitted Public, Institutional, and Civic Uses</i>	Minimum: One 1 per 400 square feet of floor area Maximum: 3 per 1,000 square feet of floor area	Minimum: One 1 per 400 square feet of floor area Maximum: 3 per 1,000 square feet of floor area
Notes to Table 1: 1. Off-street parking spaces located in an enclosed parking garage, including in an accessory residential garage, and which comply with these Mixed Use Development Design Standards and Guidelines, shall not be counted toward the maximum amount of spaces permitted. 2. On-street parking spaces abutting the property line(s) of the primary building housing the use may be counted toward the required number of residential guest parking spaces.		

C. Credits and Reductions.

1. Credit for On-Street Parking.

On-street parking spaces abutting the property line(s) of a primary nonresidential building may be credited toward meeting the minimum required off-street parking spaces. On-street parking

spaces abutting the property line(s) of a primary residential building may be counted toward the required number of guest parking spaces only. On-street parking allowed by this provision shall not be counted toward the maximum amount of off-street parking allowed. (G)

2. *Reduction for Shared Parking.*

The amount of off-street parking required may be reduced by an amount determined by the Planning Director when it can be shown through a parking demand study that sufficient parking is or can be met by the subject uses through shared parking. The parking demand study shall provide information and evidence about the anticipated parking demand at peak times during a day and the distance relationship between available shared parking spaces and the specific uses served. A shared parking agreement shall be executed and recorded prior to the issuance of a certificate of occupancy or prior to the issuance of a certificate of completion by the Building Safety Division. (S)

3. *Maximum Total Reductions.*

Total cumulative reductions to the minimum off-street parking requirements through application of this subsection shall not exceed twenty-five (25) percent. (S)

4.2. *Parking Lots and Structures.*

A. *Intent.*

To ensure a more pedestrian-oriented and pedestrian-friendly environment, off-street parking facilities, especially surface parking lots, must not dominate the street front, but should instead be sited, designed, and screened to be as unobtrusive as possible. Perimeter and interior landscaping shall be required for screening and/or to break up hard-surfaced parking lots and soften their edges.

B. *Remote Parking Allowed.*

The city may permit all or a portion of required off-street parking to be located off-site subject to the following standards:

1. *Location.*

Remote off-street parking spaces shall be located no farther than six hundred (600) feet away from the principal building they are intended to serve, as measured from the nearest point of the remote off-street parking facility to the nearest point of the building or structure served. (S)

2. *Zoning Classification.*

Remote parking areas shall be considered accessory to the principal use that the parking spaces are intended to serve. Parking areas shall require the same or a more intensive zoning classification than that required for the most intensive of the uses served by the remote parking area, provided that remote parking facilities may be located in any zoning district that allows commercial parking lots and garages. (S)

3. *Remote Parking Agreement.*

If a remote parking area is not under the same ownership as the principal use served, an executed and recorded written agreement among the owners of record shall be required. A remote parking agreement may be revoked by the parties to the agreement only if off-street parking is provided under this Section. (S)

C. *Surface Parking Lot Development and Design Standards.*

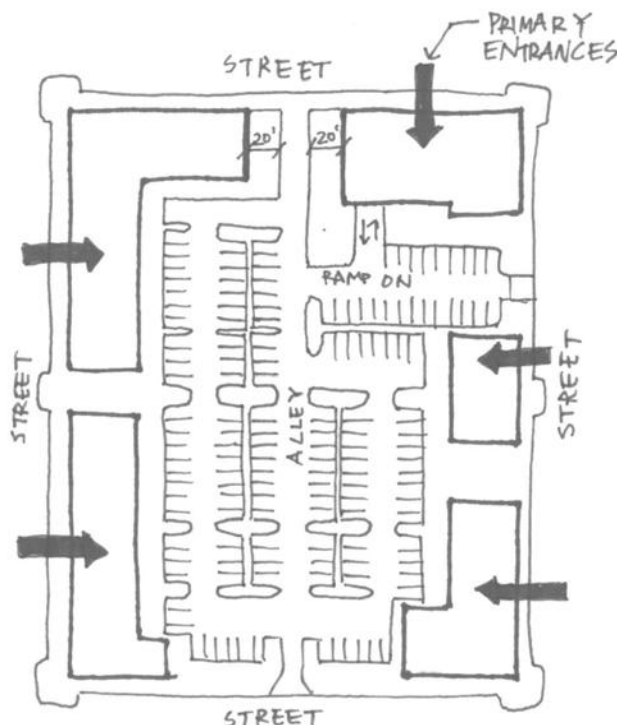


Figure 2: Location of Accessory Surface Parking Lots in the MU-R District.

The policy, standards, and guidelines for surface parking lots stated in Section 2.2.1 of the CDDSG shall apply in the MU-R and CC Districts, except for the minimum parking ratios stated therein. The off-street parking amount standards in Section 4.1.B. shall apply in the mixed use districts. In addition, the following standards and guidelines shall apply in the mixed-use zone districts:

1. *Location of Surface Parking Lots.*

On-site, off-street accessory surface parking lots shall be located to the side or to the rear of a building face that contains a primary building entrance. No on-site, off-street parking lots shall be located between a building's front facade and the adjacent street in the MU-R District. See **Figure 2**. Off-street parking may be permitted between the building's front façade and Highway 42 frontage, subject to parking lot landscape screening requirements for properties zoned CC. (S)

2. *Parking Lot Landscaping and Screening.*

See Section 7 for parking lot landscaping and screening requirements.

D. *Parking Structures and Parking Beneath Buildings.*

The policy, standards, and guidelines for parking structures and parking beneath buildings stated in Section 2.2.2 of the CDDSG shall apply in the MU-R and CC District, except for the standard stated therein regarding ground-level parking structure use and design (Standard 2.2.2.D.) Instead, the use and design of the ground floor of all above-ground parking structures, including a commuter parking structure, are subject to the following standards:

1. *Design of Entries/Access.*

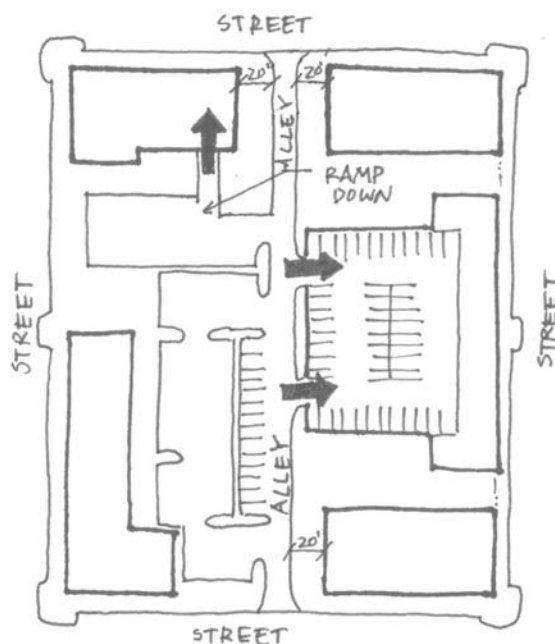


Figure 3: Parking Structure Access

Vehicle entries to off-street parking structures shall be internalized in building groupings or oriented away from the primary street frontage, to the maximum extent practicable. At a minimum, parking structures facilities shall have user vehicle access from alleys or from secondary streets at locations that do not conflict with pedestrian circulation. (S) **See Figure 3.**

2. Ground Floor Parking Structure Use.

The following standard shall apply to all parking structures, but not including parking structures used exclusively as parking for transit riders and commuters:

- a. When structured parking occupies the ground floor of a building or structure, the length of the street-facing wall for that portion of the building/structure containing the parking spaces shall not be credited toward compliance with the "Minimum % of Street-Facing Property Front Lot Line that Must Contain a Building or Building Wall" standard stated in Section 17.14.060.B (Table 3: Mixed Use Zoning Districts Dimensional and Bulk Standards). (S)
- b. In order to maintain an active and attractive street presence, when a parking structure provides commercial or accessory parking, or is integrated into a building containing principal permitted uses, commercial or other nonresidential use of the ground-floor street frontage is strongly encouraged. (G)

3. Ground Floor Parking Structure Design.

In order to maintain an active, attractive, and safe street presence for pedestrians, when a parking structure provides parking on the ground floor, and the ground floor does not contain ground-floor commercial or other nonresidential "active" uses the ground-level façade of the parking structure (at least the first 12 vertical feet of the structure) shall include at least two (2) of the following design features:

- a. Facade articulation and modulation through changes in vertical wall plane and/or a change in building material;
- b. Use of real windows with glazing that may be translucent, but shall not include black or mirrored glass or similar opaque glazing;
- c. Use of false windows defined by frames, lintels, or sills;
- d. Integration of multiple building entrances;
- e. Buffering of the street edge with landscaping, berms, or landscaped built-in or movable planters; or
- f. Similar architectural detailing consistent with the intent to maintain an attractive and safe streetscape for pedestrians. (S)

See Figure 4.



Figure 4: Example of Ground Floor Parking Structure Design

4. Motorcycle Parking.

The policy, standards, and guidelines for motorcycle parking stated in Section 2.2.4 of the CDDSG shall apply in the MU-R and CC Districts.

4.3. Off-Street Loading.

A minimum of one (1) dedicated, off-street loading space is required for nonresidential uses greater than 50,000 square feet in gross leasable area and for multi-family residential uses containing more than fifteen (15) units. All other uses should have adequate alleys, private drives, or on-street parking spaces available for intermittent loading/delivery needs. If the city determines, based on experience with similar uses, that a particular use typically has a demonstrated need for a dedicated loading area, the city may require the applicant to make provision for an off-street loading area on-site. (S)

5. Pedestrian and Bicycle Circulation.

5.1. General Connectivity Standards.

All new development shall provide pedestrian and bicycle systems that provide continuous connections with off-site destinations according to the following standards:

- A. Provide well-identified and differentiated bicycle and pedestrian access from the development site. Access shall be provided to existing and designated public bike paths or greenways located on or adjacent to the development site. (S)
- B. On-site connections shall be made at points necessary to provide direct pedestrian and bicycle travel from within the development to residential areas and to major pedestrian destinations located within the adjacent neighborhood(s), including, but not limited to adjacent parks, schools, and the Louisville Downtown area. In order to provide direct pedestrian connections to these adjacent destinations, the city may require additional sidewalks, walkways, or bike paths not associated with a street, or the extension of a sidewalk from the end of a dead-end street to another street or walkway. (S)
- C. Connections from a perimeter public sidewalk system to the on-site sidewalks and walkways shall be made at the same block length intervals as exists within the development site. (S)
- D. Separate pedestrian and vehicle movement to the extent practical with the use of landscaping, barriers or other appropriate design solutions recommended in Section 3.3 of the CDDSG.

5.2. Internal Pedestrian Circulation and Connections.

All new development shall provide and contribute to an on-site system of pedestrian walkways and/or public sidewalks throughout the district. The on-site pedestrian circulation system shall provide the most efficient access routes between intended points of travel. Specifically, on-site pedestrian connections shall be provided to and between the following points:

- A. The primary entrance or entrances to each building housing a principal use;
- B. Existing or planned transit stations, shelters, and park and ride locations;
- C. Any sidewalks or walkways on adjacent properties that extend to the boundaries shared with the development site;
- D. Any public sidewalk system along the perimeter streets adjacent to the development site; and
- E. On-site amenities, as provided according to Section 6.3.
- F. On-site and remote surface parking lots. (S)

5.3. On-Site Pedestrian Walkway Design Standards.

In the MU-R and CC Districts, all on-site pedestrian walkways shall maintain a minimum unobstructed pathway of five (5) feet at all times. (S) **See Figure 5.**

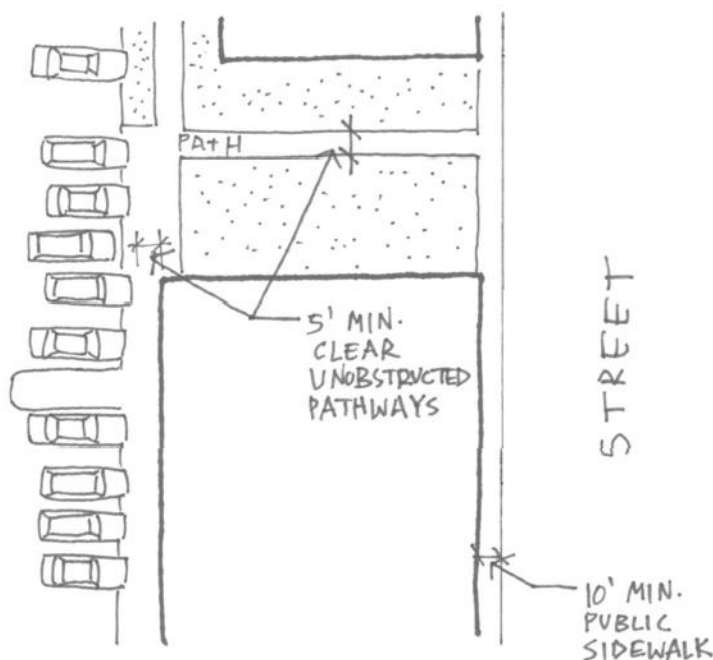


Figure 5: 5-Foot Unobstructed On-Site Pedestrian Pathways

5.4. Public Sidewalk Design Standards.

A. Sidewalks provided within a public street right-of-way shall comply with the City of Louisville public street standards and the standards stated in this subsection. In the case of conflict between the city's public street standards and this subsection's public sidewalk standards, the public sidewalk standards in this Section shall apply and control. (S)

B. In the MU-R and CC Districts, all public sidewalks shall be a minimum of ten (10) feet wide incorporating tree planting within the right-of-way. The right-of-way shall be landscaped with street trees and other living plant material or, as an alternative, tree grates for street trees combined with decorative paving and/or moveable planters may be utilized. (S)

1. Provide a minimum of one (1) tree per twenty (20) lineal feet of public and private street frontage. (S)
2. Place annual and perennial planting areas at project entries. (G)
3. Trees shall be irrigated from subsurface irrigation. (S)

5.5. Bicycle Parking Standards.

A. Functional and convenient bike parking shall be provided in adequate numbers for both customers and employees.

1. Provide one (1) bicycle parking space for every ten (10) required off-street automobile parking spaces up to a total of twenty (20) bicycle parking spaces. (S)
2. Providing protection from the elements for bicycle parking is encouraged. (G)

3. Coordinate the design of the bicycle shelter with adjacent buildings or other street furniture designs. (G)
4. Do not position bicycle racks or shelters where they will obstruct building entrances or the flow of pedestrian traffic. (S)

6. Open Space and On-Site Amenities.

6.1. Intent.

An attractive public realm is a fundamental ingredient in the success of a mixed use development. Open air and semi-enclosed public gathering spaces can act as central organizing elements in a mixed use district. They can also help to shape the relationship between different uses and provide focal points and anchors for pedestrian activity. On-site amenities can create a strong image and unique character for a mixed use development, making it a special place for the community, instead of just a project.

This subsection is intended to create on-site amenities and features, such as outdoor plazas, parks, and public art. Such amenities and features provide desirable open space, create an inviting image for customers, visitors, and employees, enhance the pedestrian environment and streetscape in a zone district, offer attractive spaces for people to gather, interact, rest, shop, and eat, and contribute to the character of the city.

6.2. Applicability.

This section shall apply to all commercial and mixed-use development in the MU-R and CC Zone districts.

6.3. Provision of On-Site Amenities.

A. Pedestrian amenities should be incorporated into both overall and individual site development plans.

1. Furnish spaces with pedestrian amenities such as benches, landscaping, fountains and play areas. These outdoor spaces should be 'functional' and accessible for a substantial part of the year. (S)
2. Delineate areas of pedestrian activity with accent paving, landscaping, lighting and furnishings. (S)
3. All common amenities within commercial developments shall be owned and maintained by the developer or by an organization established for such purpose. (S)

B. In addition, development on sites smaller than one (1) acre shall incorporate at least one (1) of the following on-site amenities or features, and developments on sites one (1) acre or larger shall incorporate at least two (2) of the following on-site amenities or features, as highly-visible, easily-accessible, focal points or gathering places for residents, employees, or other visitors to the development site: (S)

1. Patio or plaza with seating area, provided such patio or plaza has a minimum depth and width of ten (10) feet, and a minimum total area of one hundred fifty (150) square feet.
2. For outdoor patios or plazas, asphalt is prohibited as a paver; use of decorative pavers or textured, colored concrete is required.
3. Patios and plazas shall include pedestrian amenities intended to support these places as gathering areas. Amenities may include, but are not limited to, seating, lighting, special paving, planting, food and flower vendors, artwork, and/or special recreational features.

4. Landscaped mini-parks, squares, or greens, provided such park or green has a minimum depth and width of ten (10) feet and a minimum total area of two hundred fifty (250) square feet. Such parks, squares, or greens shall include pedestrian amenities intended to support these places as gathering areas. Amenities may include, but are not limited to, seating, lighting, additional landscaping and plantings, food and flower vendors, artwork, and/or special recreational features.
 5. Protected pedestrian walkways; arcades; recessed corner entries with a minimum area of 100 square feet; or easily identifiable building pass-throughs containing window displays and intended for general public access.
 6. Water feature, such as a pond or fountain, provided the feature is easily accessed by pedestrians and includes or integrates seating areas for pedestrians.
 7. Outdoor public art, as approved by the city, in an area that is:
 - a. Visible from an adjacent public sidewalk or street, and
 - b. Easily accessed for viewing by pedestrians (e.g., a sculpture mounted to an exterior building wall).
 8. Any other, well-designed area and/or focal feature that, in the city's judgment, is consistent with the intent of this section, and adequately enhances such development and serves as a gathering place for visitors, customers, and employees. (S)
- C. On-site amenities provided according to this Section 6.3 may be located on the interior of the development site, and need not be accessible or visible to the general public, unless a provision in Section 6.3.B expressly states otherwise. (G)
- D. Credit for one (1) on-site amenity otherwise required in Section 6.3.B. may be taken for any park dedicated to the City by the developer located within one hundred (100) feet of the development site's boundary. (G)

6.4. *Buildings Adjacent to Outdoor Amenities.*

Providing good public visibility of outdoor amenities is intended to encourage pedestrian use of on-site outdoor amenities, while at the same time enhancing the security of such places. Accordingly, when a building will be adjacent to a pedestrian plaza, patio, or park provided under this subsection, the building wall facing such outdoor amenity shall contain at least one (1) of the following elements: (S)

- A. A building entry;
- B. Windows facing onto the outdoor amenity;
- C. Arcades along the edges of the outdoor amenity;
- D. Outdoor seating areas or cafes; or
- E. A similar feature that the city finds will, to at least the equivalent degree, bolster security and encourages pedestrian use of the outdoor amenity.

6.5. *Maintenance.*

The property owner shall be responsible for the continued maintenance and repair of all on-site amenities provided according to this subsection. (S)

7. Landscaping and Buffers.

7.1. Perimeter Landscaping Adjacent to Public and Private Roads.

A. Applicability in the MU-R and CC Districts.

The perimeter landscaping standards and guidelines shall apply only to parcels adjacent to Highway 42 and South Boulder Road as set forth in Section 7.2.

B. Applicability of Parking Lot Buffer Provisions.

In the MU-R and CC Districts, the perimeter of all surface parking lots adjacent to a public plaza, park, or public or private street (including alleys) shall be screened from view. Visual buffering shall be incorporated by the provision of planting strips between public right-of-way and edge of the parking lot pavement. The following parking lot buffer standards and guidelines shall apply:

1. The buffer area shall be installed between the parking lot edge and the back of the public sidewalk or right-of-way, and shall have a minimum five (5) foot width. (S)
2. As applicable, screening materials shall be installed to align with the adjacent front building lines to continue the prevailing street wall on a block face. (S)
3. Raised planters and masonry screen walls may be incorporated to provide parking lot screening. (G) Bermed turf areas shall be avoided due to their tendency to waste irrigation water. (S)
4. The minimum width of a buffer area may be reduced from five (5) feet to three (3) feet when used to screen a parking lot. A three (3) foot wide buffer area shall incorporate an ornamental fence or masonry wall. Permitted fence and wall materials shall be limited to brick, stone, and other masonry materials, and to decorative metals (e.g., wrought iron). Use of an ornamental fence or wall shall be combined with live landscaping material such as flowering and evergreen shrubs, grasses native to Colorado or hybridized for arid conditions, vines, and ground cover. The maximum height of a fence or wall shall be no taller than three (3) feet when used to screen the parking lot. All landscaping material shall be installed on the outside of the screening wall (closest to the sidewalk). (S)

7.2. Highway 42 and South Boulder Road Buffer Area.

The required landscaped buffer is intended to convey a uniform and high-quality image of the CC District to persons traveling and using Highway 42 and South Boulder Road, and to screen from public view conditions such as parking or ground-mounted utilities or equipment that might adversely affect the district's image.

A. On all properties adjacent to Highway 42 and South Boulder Road within the CC District, a minimum ten (10) foot wide landscaped buffer shall be provided adjacent to the Highway 42 or South Boulder Road right-of-ways. (S)

B. The buffer area shall be landscaped with a combination of deciduous and evergreen trees, shrubs, and ground covering.

1. Provide a minimum of one (1) tree per 40 lineal feet of public street frontage within ten (10) feet outside the sidewalk, internal to the development. (S)
2. Provide a minimum of one (1) shrub per five (5) lineal feet plus ground cover or native or hybridized grass ~~turf~~ outside the sidewalk, internal to the development. ~~Turf~~ Grass should be limited in this area and when use should be planned in a manner that can be efficiently irrigated. Low water using species should be chosen, providing a green appearance. (S)

3. Landscaping within public easements is limited to shrubs, ground covers, and small ornamental trees. No canopy/shade trees may be planted within such easements. (S)

7.3. *Parking Lot Landscaping.*

A. *Intent.*

These standards are intended to encourage landscaped surface parking lots, including the planting of trees, that will improve the aesthetics of a development site by breaking up expanses of paved areas; will reduce the significant solar heat gain (“urban heat island effect”) from parked automobiles and paved parking areas; and will provide a more pedestrian-friendly environment.

B. *Interior and Perimeter Parking Lot Landscaping.*

The policies, standards, and guidelines for parking lot landscaping shall apply in the MU-R and CC Zone Districts.

1. *Perimeter Landscaping.*

Except for the parking lot buffer required by subsection 7.1.B. above, perimeter parking lot landscaping is not required in the MU-R District.

2. *Interior Parking Lot Landscaping.*

a. *Applicability.*

The parking lot interior landscaping requirements shall apply to all new off-street surface parking lots with more than five (5) parking spaces and to existing lots that are expanded by more than twenty-five percent (25%) of existing spaces.

b. *Minimum Standards.*

i. Parking lots with six (6) to one hundred (100) spaces shall have 5% of the total interior area landscaped. (S)

ii. Utilize landscaped islands and medians to improve the definition of circulation patterns, provide shading for paved areas and break up continuous rows of parking. (S)

iii. No landscaped area within a parking lot shall be less than one hundred (100) square feet. (S)

iv. Surface parking lots with more than one hundred (100) spaces shall have 10% of the interior area landscaped. (S)

C. *Parking Lot Buffer Credit.*

Surface parking lot buffer landscaping in excess of the dimensions required in subsection 7.1.B. may be credited towards meeting the interior landscaping standards. (G)

D. *Spacing of Internal Landscape Islands.*

Internal planting islands shall be spaced no farther than fifteen (15) parking spaces apart. (S)

E. *Spacing of Required Trees.*

One (1) tree shall be provided for every 300 square feet of internal landscaped area. (S)

F. *Landscaping Used to Break Up Large Parking Lots.*

Surface parking lots with more than 50 spaces shall be broken up into blocks of no more than 25 spaces. Each block shall be separated from other parking blocks by a landscaped area that is at least six (6) feet wide, by a pedestrian walkway or sidewalk within a landscaped median with a minimum width of ten (10) feet, or by a low decorative fence or wall with a maximum height of four (4) feet bordered by landscaping on at least one side. (S)

7.4. *Building Site Landscaping.*

A. *Intent.*

Landscaping at the individual building site scale is intended to provide respites from the overall higher densities and intensities of development encouraged in the MU-R and CC Zone Districts, and to provide public and community gathering places.

B. *Applicable Standards.*

The policy, standards, and guidelines for building site landscaping shall apply in the MU-R and CC Zone Districts.

1. *Minimum Landscape Area.*

- a. The minimum landscape area required within each building site shall be ten (10) percent in the MU-R District, and twenty (20) percent in the CC Zone District including hardscaped plazas, outdoor seating/serving areas, walkways within on-site open space areas, and other similar hardscaped on-site amenities. (S)
- b. Hardscaped elements such as those listed in this provision shall account for no more than two-thirds of the minimum landscape area requirement. (S)
- c. In a development proposal including multiple building sites, the percent area required for each building site may be transferred between individual building sites, provided the aggregated landscape area enhances the connection to transit facilities or provides a more centralized landscaped area(s) convenient to the development's residents, employees, and visitors, enhances the pedestrian environment, and creates a publicly accessible space. (S)
- d. Protect landscaping from vehicular and pedestrian encroachments with raised planting surfaces, depressed walks, and /or curbs. (S)
- e. Landscaping within public easements is limited to shrubs, ground covers, and small ornamental trees. No canopy/shade trees may be planted within such easements. (S)

7.5. *Landscape Irrigation/Water Conservation.*

The policy, standards, and guidelines for landscape irrigation/water conservation stated in Section 5.5 of the CDDSG shall apply in the MU-R and CC Zone Districts. Xeriscape concepts shall be incorporated into landscape design without compromising the intent to establish significant visual amenities through landscaping.

A. *Applicable Standards.*

1. Incorporate a 'zoned planting scheme' to reduce water demand by grouping similar varieties of plants that are drought and disease tolerant. (S)
2. For all irrigated areas, potential runoff should be avoided through the proper selection of irrigation devices. (S)

7.6. Landscape Materials Standards, Maintenance, and Replacement.

The policy, standards, and guidelines for landscape standards and plant material selection, for planting size standards, and landscape maintenance and replacement stated in Section 5.6 through Section 5.8 of the CDDSG shall apply in the MU-R and CC Zone Districts.

7.7. Existing Vegetation.

The policy, standards, and guidelines for preserving existing vegetation stated in Section 5.9 of the CDDSG shall apply in the MU-R and CC Zone Districts.

8. Residential Protection and Transitional Standards.

8.1. Intent.

This section is intended to ensure that site planning and building design of new development in the MU-R and the CC Zone Districts mitigate to the maximum extent possible any potential adverse visual or operational impacts on adjacent residentially zoned properties in adjacent neighborhoods.

8.2. Applicability.

This section's standards are applicable to development or redevelopment in a MU-R or CC zone district as a more intensive use adjacent to an existing, less-intense residential use located in an R-L or R-M Residential Zone District. For purpose of this Section, "adjacent" shall include properties separated only by a local or collector street.

8.3. Building Setback and Height Transitions Required.

A. MU Development Across a Street from Residential Zone District (Front Transition).

When new development in a MU-R or CC Zone District is separated from an existing residential use in an R-L or R-M District by a local or collector street, the following transition standards shall apply:

1. Required Building Setbacks.

All buildings and structures on the MU-R, or CC zoned property shall be setback from the street-facing property line at least ten (10) feet. The maximum building setback applicable in the zone district, as stated in Section 17.14.060 of the Zoning Ordinance, shall apply. (S) **See Figure 6.**

2. Transition Building Heights Required.

Within fifty (50) feet from the edge of the street right-of-way, the average height of a building shall not exceed thirty-five (35) feet. (S) **See Figures 6 and 7.**

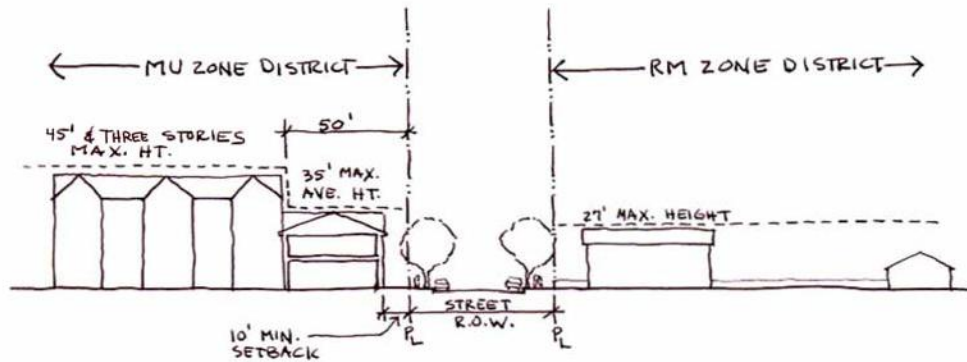


Figure 6: Transition to RM Zone District Across a Street

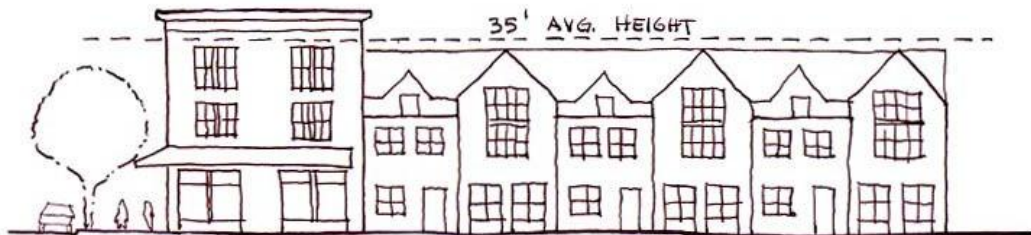


Figure 7: Example of 35 Feet Average Height

B. Development Abutting Residential Zone District or Separated by Alley (Rear or Side Transition).

When new development in a MU-R or CC Zone District is separated from an existing residential use in an R-L or R-M District by only an alley, or abuts the rear or side property line of the protected residential use, the following transition standards shall apply:

1. Required Building Setbacks.

All buildings and structures on the MU-R or CC zoned property shall be setback a minimum of fifteen (15) feet from the rear property line of the R-L or R-M residential use. If the MU-R or CC zoned property abuts the residential use's side yard or property line (rather than its rear yard), the minimum setback for a building or structure on the MU-R zoned property shall be five (5) feet. The maximum building setback applicable in the zone district, as stated in Section 17.14.060 of the Zoning Ordinance, shall apply. (S) **See Figure 8.**

2. Transition Building Heights Required.

Within fifty (50) feet from the alley centerline, or from the rear or side property line of the protected residential use, the maximum height of a building shall not exceed twenty-seven (27) feet. (S) **See Figure 8.**

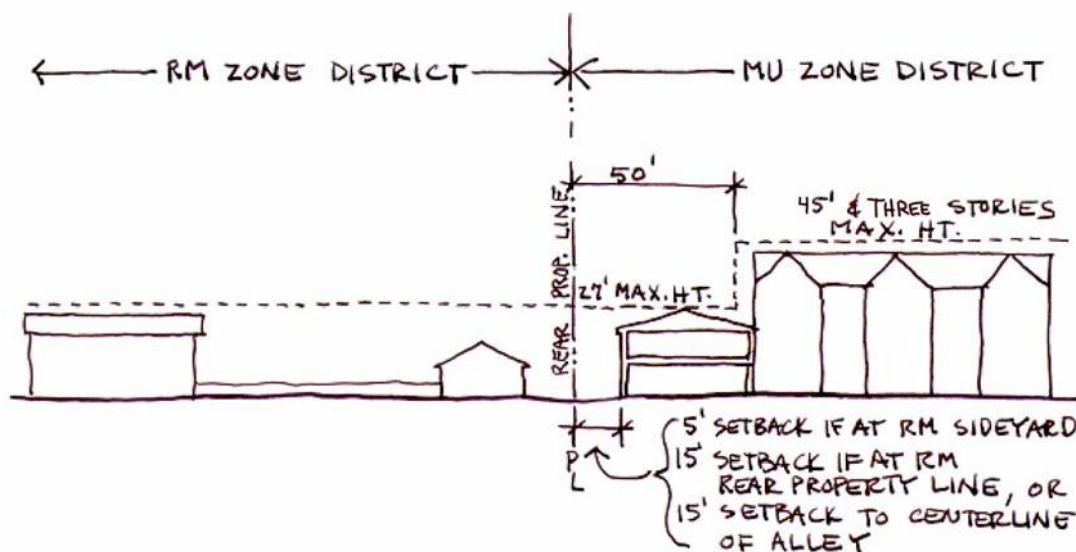


Figure 8: Transition to RM District Across Rear Alley or Rear/Side Property Line

8.4. *Conditions for Operational Compatibility.*

The city may impose conditions upon the approval of rezonings, PUD development plans, site plans, special review uses, and other development actions to ensure that development in a mixed use zone district will be compatible with existing and planned neighborhoods and uses, including but not limited to conditions on the following:

- A. As a condition of rezoning approval only, the availability or ability to develop specific uses otherwise allowed by Chapter 17.14;
- B. Hours of operation;
- C. Hours of deliveries and other similar activities;
- D. Location, intensity, and hours of operation of exterior lighting, including security lighting;
- E. Placement of trash receptacles;
- F. Amplification of music in a commercial place of entertainment;
- G. Location of delivery and loading zones;
- H. Placement and illumination of outdoor activity areas and equipment, including outdoor vending machines;
- I. Venting of nuisance fumes and vapors from non-residential uses;
- J. Illumination of signage and, or architectural building features.

9. **Architectural and Building Design.**

9.1. *Intent.*

The architectural and building design standards and guidelines of this section are intended to promote high-quality building, streetscape, and open area design and construction that will give the MU-R and CC Zone Districts an identifiable character and unique physical image.

More specifically, to create the appearance of development that occurred over a period of time, architectural features of new developments, including rooflines, materials, colors, door and window patterns, and decorative elements, should vary in form and style. Especially important is the ground-floor design of buildings and its interaction with adjacent public streets, sidewalks, and open spaces. The ground-floor is the portion of a building that, if designed well, can create high-quality visual interest and a human scale that pedestrians find comforting, inviting, and safe. Key elements that contribute to such a pedestrian environment include first-floor openings (doors and windows), emphasized customer/user entrances, materials, targeted landscaping, and continuity of the front building line along a block (to heighten the sense of “enclosure”).

9.2. *Applicability.*

The architectural and building design standards and guidelines in this subsection shall apply to all new development in the MU-R and CC Zone Districts. Development of residential uses in the MU-R District shall also comply with the residential site and building design standards in subsection 10 that follows.

9.3. *Building Massing, Forms, Prominent Entries, and Pedestrian Scale.*

The policy, standards, and guidelines for building massing, forms, and pedestrian scale shall apply in the MU-R and CC Zone Districts.

A. *General Standards and Guidelines.*

1. Variations in façade elements should be incorporated to reduce perceived scale and mass. (S)
2. Variations in color and/or texture shall be used. (S)
3. Step downs and step backs shall follow the terrain and be tiered and reinforced by landscape or hardscape elements. (S)
4. Variation in roof forms and height of roof elements should be used. (G)

B. *Ground Floor Façade Design—Doors and Windows.*

The following standards shall apply to the facades of all buildings in the MU-R District.

1. *Amount of Openings Required—Ground Floor Facades.*

In the MU-R Zone District, a minimum of thirty-five (35) percent of the total wall area of each street-facing ground floor building façade shall be comprised of pedestrian entrances (doors), windows, and/or vehicle entry drives. The thirty-five (35) percent shall be measured using elevation views of the building plan, and “ground floor” shall be measured from floor plate to floor plate. In the CC Zone District, the minimum shall be twenty (20) percent. (S)

2. *Minimum Glazing Requirements.*

a. *Nonresidential Uses on Ground Floor.*

Glazing on all ground floor windows shall be transparent. (S)

C. *Building Entries and Doorways.*

The standards, and guidelines for building entrances shall apply in the MU-R and the CC Zone Districts.

1. *Placement of Entries.*

- a. Locate main entrances to be clearly identifiable from the adjoining road or drive. (S)
- b. Design building entrances to contrast with the surrounding wall plane. (S)
- c. Design primary entrances to be accessible to handicapped users without complex ramp systems. (S)

2. *Entry Emphasis Required.*

All building entrances shall be emphasized through incorporation of a building recess, projection, canopy, or similar design element. (S)

3. *Primary Entry Emphasis.*

- a. The primary entry should be recessed through the incorporation of a building recess or projection, or similar design element. (G)
- b. Corner buildings should provide a prominent corner entrance to street level commercial retail uses or common residential or office lobby space in a manner consistent with primary entries, as described in Section C.1.a. As applicable, corner building entries should be anchored at the sidewalk edge and beveled, recessed, and/or sheltered by a covered arcade structure, canopy, or awning to provide an area for retail displays. Recessed entries should be illuminated. (G)

D. *Equal Treatment of Visible Building Facades.*

All sides of a building or structure that face a public street, other than an alley, or that are visible from any commuter rail line, shall be finished with the same mix of primary building materials and the same degree of articulation that is used on the building's primary façade. (S)

9.4. *Roof Forms and Materials.*

The policy, standards, and guidelines for roof forms and materials stated in Section 4.4 of the CDDSG shall apply in the MU-R and CC Zone Districts.

9.5. *Building Materials and Colors.*

Exterior materials and colors should be of a high quality and compatible with materials and colors of nearby structures. The following standards and guidelines shall apply:

A. All sides of building visible to the public from a street, park, public open space, or other public right-of-way shall be finished to an equivalent quality with the primary façade. (S)

B. Large, blank, featureless walls are not allowed. (S)

C. Use materials manufactured in units and measurable in human proportions such as brick, tile and modular stone. Other appropriate materials include: stucco, wood, metal accents, glass and decorative tiles. (S) Painted block or concrete is not an acceptable building material. (S)

9.6. *Service Entrances and Loading Areas.*

The policy, standards, and guidelines for service entrances and loading areas shall apply in the MU-R and CC Zone Districts.

A. *General Standards and Guidelines.*

1. Orient service entrances, loading docks, dumpster enclosures, and other similar uses away from local, collector, and arterial roadways. (S)
2. All dumpster and service enclosures shall be fully screened by masonry wall construction using building materials consistent with materials as employed elsewhere on the building or site. (S)
3. Coordinate the location of service areas with adjacent development, so that shared service drives may be feasible. (G)

B. *Provision of Recycling Centers.*

All new and significantly remodeled structures where refuse is generated by the use for the structure shall provide adequate space for the collection and storage of refuse and recyclable materials per Section 17.16.265 of the Louisville Municipal Code.

9.7. *Energy Conservation Measures.*

New development should evaluate increased opportunities to implement resource conservation and sustainable building practices. Local climate conditions afford the opportunity to incorporate passive and/or active solar energy applications. Buildings should be designed and sited to maximize the use of solar gain.

The policy, standards, and guidelines for energy conservation measures shall apply in the MU-R and CC Zone Districts.

A. Builders and contractors are encouraged to be members of a national green program which promote construction practices and products and materials which improve energy efficiency, and conservation of resources. (G)

B. The following energy design concepts are encouraged but not limited to: (G)

1. Types of materials and insulation characteristics.
2. The arrangement of windows and doors.
3. Direct solar or photovoltaic energy.
4. Daylighting concepts.
5. Recycling of construction materials.
6. Water conservation.
7. The provision of a sustainable roof.
8. Providing an on-premise shower facilities for bicycle commuters.
9. Use of recycled building products

10. **Multi-Family Residential Site and Building Design.**

All development of buildings that are predominantly multi-family in terms of gross square footage or that provide garages serving multi-family units shall comply with this section's standards and guidelines, as applicable.

10.1. *Siting of Accessory Parking Lots and Structures.*

A. *Intent.*

These siting standards for accessory parking lots and structures (private parking garages or carports) are intended to reduce the visual prominence of the garage and open parking lots along multi-family streetscapes and common areas; to encourage a more varied multi-family streetscape through the use of a variety of garage orientations and types; and to emphasize the prominence of primary pedestrian and vehicular entrances, open spaces, and residential units along multi-family streetscapes and common areas.

B. *Applicability.*

The following standards shall apply to development of new multi-family dwellings in the MU-R District.

C. *Residential Alleys Encouraged.*

Private garages, carports, and parking lots accessory to a principal multi-family residential dwelling use should be accessed from a street or alley other than the primary abutting access street. (G)

D. Multi-Family Dwellings Other than Attached Townhomes.

The following standards and guidelines shall apply to development of new predominantly multi-family dwellings in the MU-R District, except that new multi-family townhome dwellings shall comply with the following standards.

1. To the maximum extent feasible, garage entries, carports, parking lots, and parking structures shall be internalized in building groupings or located away from street frontages. (S)
2. When access to parking lots, carports, or common garages is **not** from an alley, the following limitations shall apply. *See also* the limitation on garage parking wall that may occupy a street-facing property line stated in Section 17.14.060 (Dimensional and Bulk Standards) of the Zoning Ordinance.
 - a. Carports and garages shall be limited to sixty-five (65) feet in length. (S)
 - b. Parking lots and freestanding parking structures (detached garages or carports) shall not occupy more than thirty percent (30%) of each perimeter public street frontage. (S)
 - c. To the maximum extent practicable, freestanding parking structures (detached garages or carports) that are visible from perimeter public streets shall be sited perpendicular to the perimeter street in order to reduce visual impacts on the streetscape. (S)
 - d. Garage doors of attached garages shall not comprise more than thirty-three percent (33%) of the total length of a multi-family building's front façade, and the plane of a garage door shall be offset by at least four (4) feet from the plane of an adjacent garage door. (S)
 - e. Rear walls of detached garages over forty (40) feet in length that back onto the perimeter street shall be articulated or punctuated through the use of two or more of the following options:
 - i. Six (6) or more window openings defined by frames, sills and lintels;
 - ii. Three (3) one-hundred (100) square feet trellis structures spaced along the rear wall, planted with an approved vine or creeping plant to cover the trellis structure at maturity;
 - iii. Change in wall plane of at least six (6) inches every ten (10) feet;
 - iv. Vertical change in material or masonry pattern; or
 - v. One (1) roof dormer for each ten (10) feet of length. (S)
 - f. Detached garages and carports shall incorporate compatible materials, scale, colors, architectural details, and roof slopes similar to those of the primary multi-family buildings. (S)

E. Parking Lot/ Structure Design for Townhome Dwelling Developments.

The following standards and guidelines shall apply to development of new townhome dwellings. For purposes of this provision, a “townhome dwelling” is defined as a residential multi-family dwelling containing two (2) or more dwelling units attached by common vertical walls, with each dwelling unit located on its own legal lot.

1. *Access Requirements.*

Residential garages accessed from the public street adjoining the front lot line (“front-loading garages”) are allowed only when access from an adjoining side street or rear alley to a garage is not feasible. (S)

2. *Front-Loading Garages.*

Front-loading garages that protrude towards the street in front of the primary façade of the principal structure are prohibited. Garage doors on all front-loading (street-oriented) garages shall be either:

- a. Recessed a minimum of four (4) feet behind the front façade of the dwelling portion of the structure (including side-loading garages), or a front porch that is at minimum of five (5) feet wide by eight feet long; or
- b. Recessed a minimum of two (2) feet beneath a second floor bay. (S)

3. *Side-Loading Garages.*

Side-loaded garages shall provide windows or other architectural details that mimic the features of the living portion of the dwelling on the side of the garage facing the front street. (S)

4. Front-loading (street-oriented) garage doors shall not comprise more than 45% of the front façade of the principal dwelling structure. (S)

10.2. *Multi-Family Building Design.*

A. *Intent.*

These building design standards and guidelines are intended to improve the appearance of multi-family developments through the incorporation of architectural detailing, façade articulation, and other features designed to provide a more distinct character and human scale for multi-family buildings of all sizes.

B. *Applicability and Conflicting Regulations.*

The building design standards in this subsection shall apply to all new multi-family development in the MU-R District. In case of conflict between a specific multi-family building design standard in this subsection and a more general architectural and building design standard stated in Section 9 of this manual, the more specific multi-family standard in this subsection shall apply.

C. Building Design Standards.

1. All sides of a multi-family building visible from a public right-of-way (not including an alley) shall display a similar level of quality and architectural detailing. The majority of a building's architectural features and treatments shall not be restricted to a single façade. Building details, including roof forms, windows, doors, trim, and siding materials, shall reflect the architectural style of the building. (S)
2. The maximum length of any multi-family building shall be 200 feet. (S)
3. The facades of all multi-family buildings shall be articulated through the incorporation of two (2) or more of the following:
 - a. Balconies,
 - b. Bay or box windows,
 - c. Insets or other relief in the wall plane,
 - d. Porches,
 - e. Dormers,
 - f. Variations in materials; or
 - g. Variations in roof forms. (S)
4. Horizontal variations in materials along the façade of a multi-family building shall occur in conjunction with a change in wall plane, preferably at the inside corner of a wall. (S)

10.3. *Architectural Variety.*

A. Intent.

The architectural variety standards and guidelines in this subsection are intended to ensure that individual groupings of multi-family buildings within a larger development exhibit a distinct variation in size and mass that allows them to be easily distinguished from surrounding building groupings. The standards are specifically intended to avoid the bleak, "barracks-type" appearance associated with large concentrations of identical or very similar structures.

B. Design Standards.

1. Apartments.

- a. Apartment developments shall incorporate a variety of distinct exterior building designs according to the scale of the development, as follows: (S)
 - i. 3-10 buildings: 2 models minimum;
 - ii. 11-20 buildings: 3 models minimum;
 - iii. 21 or more buildings: 1 model for every 6 buildings minimum.
- b. Distinct building designs, as required above, shall be easily distinguished through a minimum of three (3) of the following: (S)
 - i. A variation in length of 30% or more;
 - ii. A variation in the footprint of the building of 30% or more;
 - iii. A distinct variation in color and use of materials;

iv. A variation in the type of dwelling unit contained in the building that results in a significantly different scale and mass, e.g., apartments vs. attached townhomes; or

v. A distinct variation in building height and roof form.

c. Apartment buildings shall provide concentrated unit access points. Monotonous access balconies and corridors running the length of the exterior of a building are prohibited. (S)

2. *Townhomes.*

Within each townhome row or cluster of more than ten (10) attached units, individual units shall be differentiated through two (2) or more of the following methods: (S)

a. Use of distinct variations in materials between individual units;

b. Use of distinct variations in architectural style or features, such as a porch or similar feature, between individual units;

c. Use of distinct variations in roof form,

d. Variation in garage orientations; or

e. A variation in the plane of the front façade to provide a minimum three-foot variation between individual units.

11. Site Furniture and Features.

The policy, standards, and guidelines for site furniture and features stated in Section 5.10 of the CDDSG shall apply in the MU-R and CC Zone Districts.

12. Screen Walls and Fences.

The policy, standards, and guidelines for screen walls and fences stated in Section 6 of the CDDSG shall apply in the MU-R and CC Zone Districts, except as varied by the following provisions:

12.1. *Retaining Walls.*

Use of retaining walls is encouraged to reduce the steepness of man-made slopes and to provide planting pockets conducive to vegetation. Retaining walls shall comply with the following standards:

A. Retaining walls shall not exceed three (3) feet in height from the finished grade. (S)

B. Terracing shall be limited to three (3) tiers, except that the city may approve more than three (3) tiers when a greater number of tiers will result in less land disturbance and less steep man-made slopes. The width of any terrace between any two retaining walls shall be a minimum of four (4) feet with a maximum slope of 3:1. Terraces created between retaining walls shall be permanently landscaped or revegetated. (S)

C. Retaining walls shall be constructed from durable materials such as stone, brick or metal with dark finishes (wrought iron or similar), or a combination of these materials. Wood is not an acceptable material for retaining walls. Concrete walls are permitted if faced with masonry or stone or earth-colored materials similar to the surrounding natural landscape. (S)

13. Sign Design. *Repealed pursuant to Ord. 1779, Series 2019 and replaced with the City of Louisville Sign Code*

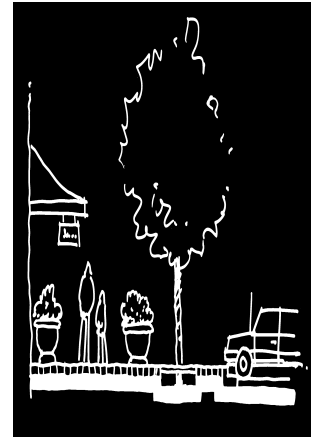
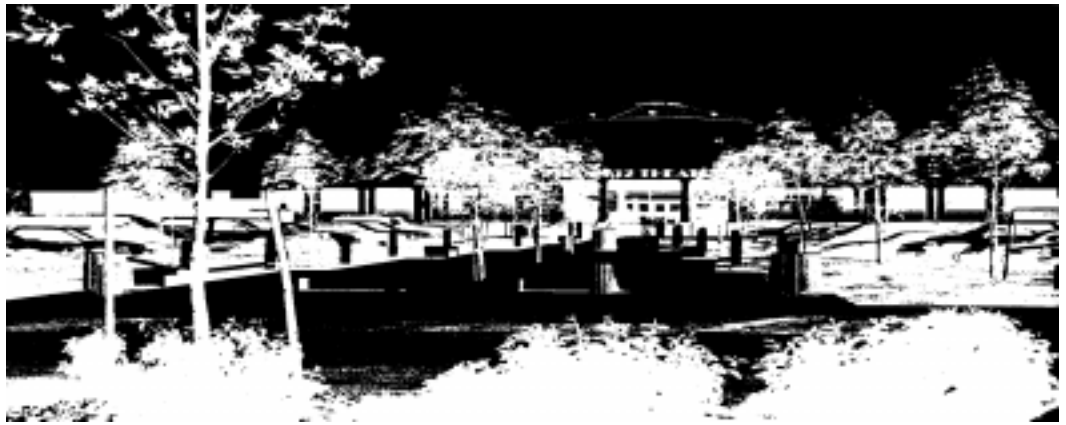
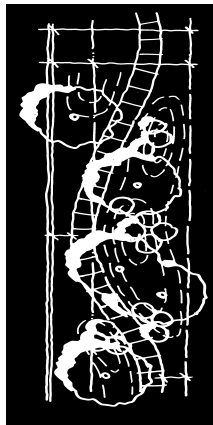
14. Exterior Site Lighting.

The policy, standards, and guidelines for exterior site lighting stated in Section 8 of the CDDSG shall apply in the MU-R and CC Zone Districts.

Exhibit B
Commercial Development Design Standards and Guidelines

City of Louisville

COMMERCIAL DEVELOPMENT DESIGN STANDARDS AND GUIDELINES



J U N E • 1 9 9 7

COMMERCIAL DEVELOPMENT DESIGN STANDARDS AND GUIDELINES

Adopted 17 JUNE 1997 by Ordinance 1242, Series 1996
Amended by Ordinance 1287, Series 1998 &
Ordinance 1341, Series 2000

**PREPARED FOR:
CITY OF LOUISVILLE, COLORADO**

PREPARED BY:
DOWNING, THORPE & JAMES INC.
1881 9th Street Suite #103
Boulder, Colorado 80302

ARCHITECTURE
PLANNING
LANDSCAPE ARCHITECTURE
ENGINEERING



**DOWNING
THORPE
JAMES**

COMMERCIAL DEVELOPMENT DESIGN STANDARDS AND GUIDELINES

June 17, 1997

Acknowledgments and Credits

Honorable Mayor and Members of the City of Louisville City Council

Chairman and Members of the City of Louisville Planning Commission

Downing, Thorpe & James, Inc. (Assisted by: Blackwood & Company)

City of Louisville Departments of Administration, Public Works and Planning

Griffiths & Tanoue, P.C.

CDDSG COMMITTEE MEMBERS:

William Simmons (Chairman), City Administrator

Kevin Howard, City Council

Jay Keany, City Council

Bill Boulet, Planning Commission Chairman

Betty Solek, Planning Commissioner

Chris Pritchard, Planning Commissioner

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INTRODUCTION

A. Purpose

The Commercial Development Design Standards and Guidelines (“CDDSG”) establish design criteria and minimum standards for commercial developments within the City of Louisville. The purpose of the CDDSG is to:

- 1) Enhance and protect Louisville’s quality of life and community image through clearly articulated commercial development design goals and policies, design guidelines and minimum design standards; and
- 2) Protect and promote Louisville’s long-term economic vitality through commercial design standards which encourage and reward high quality development, while discouraging less attractive and less enduring alternatives; and
- 3) Minimize adverse impacts of vehicular circulation to existing neighborhoods and to the surrounding physical environment; and
- 4) Enhance and protect the security and health, safety and welfare of all residents of the City of Louisville.

B. Applicability

The provisions of the Guidelines shall apply to all commercial development within the City, except commercial development for which there exists a vested property right to develop under other approved design guidelines and/or development standards.

The CDDSG provide general design guidelines, as well as mandatory minimum development standards. The CDDSG will be utilized by staff, planning commission, and city council to review commercial development applications submitted under the City’s PUD Development Plan review process.

The goals and policies set forth in this document are expected to be met through compliance with all mandatory design standards and consideration of design guidelines. Modifications to or waivers of mandatory design standards may be recommended by the Planning Commission and authorized by City Council as part of the PUD Development Plan Review process.

C. Who Uses the CDDSG

The CDDSG are to be used by property owners/ applicants and their design consultants in the planning of commercial development projects within the City of Louisville. The CDDSG will also be utilized by staff, planning commission, and city council as part of the PUD Development Plan process in their reviews of commercial projects to which the CDDSG apply.

D. Desirable Elements of Commercial Project Design

The city considers the following design features to be desirable elements of commercial development, and the standards and guidelines set forth in the following chapters are intended to facilitate the incorporation of these features into a commercial project:

1. Prominent access driveways with clear visibility of entrances and retail signage
2. Multi-modal transportation
3. Landscaped and screened parking
4. Quality of exterior building materials, surfaces, and textures
5. Significant landscape and hardscape elements
6. Building locations which provide pedestrian courtyards and common gathering areas with coordinated site furniture and lighting
7. Visual compatibility with development on adjacent sites
8. Visual connections between entrances and associated pedestrian areas of individual buildings to encourage visual and physical integration into a strengthened “sense of place”
9. Step-down of building scale adjacent to pedestrian routes and building entrances
10. Pedestrian-oriented ornamentation and detail at ground level
11. Multi-planed, pitched roofs with meaningful overhangs and arcades
12. Regular or traditional window rhythm
13. Articulated building forms and massing with significant wall articulation (e.g. insets, canopies, wing-walls, trellises)
14. Preservation of natural site features
15. Enhancement of view corridors to open areas and mountain vistas

E. Undesirable Elements of Commercial Project Design

The city considers the following design features to be undesirable elements of commercial development:

1. Poorly defined site access points
2. Disjointed parking areas, or confusing or unsafe circulation pattern
3. Square, “box-like” structures with large, blank, unarticulated wall surfaces
4. Highly reflective surfaces or heavily-tinted glass storefronts
5. Metal siding on primary facades
6. Mix of unrelated styles (such as rustic wood shingles or siding and polished chrome)
7. Strongly thematic architectural styles including some forms of “franchise” architectural styles associated with some chain commercial developments
8. Visible outdoor storage, loading, and equipment areas
9. Signage which is redundant or out of scale with building architecture

F. Relation of the CDDSG to Other City Regulations, Ordinances and Private Development Covenants

The CDDSG are a supplement to the City of Louisville's Zoning and Subdivision Regulations, PUD Ordinance, City of Louisville Department of Public Works Engineering Division Design and Construction Standards, and City of Louisville Storm Drainage Design and Technical Criteria.

Where a mandatory standard in this document is in conflict with any provision of the City of Louisville municipal code, the most restrictive requirement shall take precedence and shall apply. Building and life safety codes and the City of Louisville Department of Public Works Engineering Division Design and Construction Standards, and the City of Louisville Storm Drainage Design and Technical Criteria take precedence over the standards in this document in cases where the standards in this document require action that is in conflict with those codes.

All commercial development within the City of Louisville shall meet the guidelines of the Americans with Disabilities Act (ADA).

G. How to Use the CDDSG

The CDDSG are generally organized in a descending order of scale, from overall site planning concerns, to circulation issues, to buildings, site details, and then signs. When first developing overall planning concepts for a parcel, the earlier sections will be most relevant. At advanced stages of design, when architectural details and specific landscaping ideas are being developed, sections appearing later in the document will be most relevant.

This document has nine chapters and one appendix. Each chapter has four basic components:

1. A goal statement, which sets forth the city's overall design goal to be achieved in the PUD Commercial Planned Unit Development Plan review process with regard to the subject matter of the chapter.
2. A policy statement, which establishes a more specific design goal with regard to a more specific subject matter.
3. The statements of **standards**, indicated with an (S), and **guidelines**, indicated with a (G), which establish the specific design standards with which compliance is mandatory, and the design guidelines with which compliance is strongly encouraged. A failure to meet a mandatory standard may be used as a basis for denial of an application. A failure to meet a guideline shall not be a basis for denial of an application.
4. Graphic Illustrations showing one or more suggested design solutions that would be appropriate or inappropriate with respect to the standards and guidelines. These may be photographs or sketches. In the event of conflict between a graphic illustration and the text of the CDDSG, the text shall control.

H. Definitions

For purposes of this document, the following terms shall have the following meanings:

“Commercial Development”: Any land development activity in the city, including but not limited to retail and office development, but not including development activity intended solely for residential, industrial or light industrial use. Commercial development also includes any addition, remodeling, relocation or construction requiring an amendment to an approved, Final Commercial Planned Unit Development Plan.

“Open Space”: Land that is undeveloped or developed that can support plant materials; or has decorative landscape treatment; or that may be used by customers for recreation, circulation, or may be viewed by them. Walkways, plant beds, lawns, and terraces within an open space area may be included as part of such open space area. Paved parking lot areas used for auto circulation or parking do not qualify as Open Space.

“Parcel”: A parcel is the minimum amount that a single user may occupy. In many cases, more than one parcel will be combined for development of a single building or cluster of buildings to be used by a single user.

“Pedestrian Scale/Human Scale”: The relationship between the dimensions of a building, street, outdoor space, or streetscape element to the average dimensions of the human body.



1. SITE PLANNING

Goal:

Locate buildings to be visible from major roadways and entries, to provide clear orientation and access for both vehicles and pedestrians and to facilitate internal pedestrian circulation. Place structures in consideration of the existing built context, the location of adjoining uses, and the location of major roads. Include an analysis of the site's physical and natural characteristics and other influences. Create pedestrian courtyards and common gathering areas through creative design solutions. Create walkable, well-landscaped environments that encourage pedestrian movement between uses and gathering places.

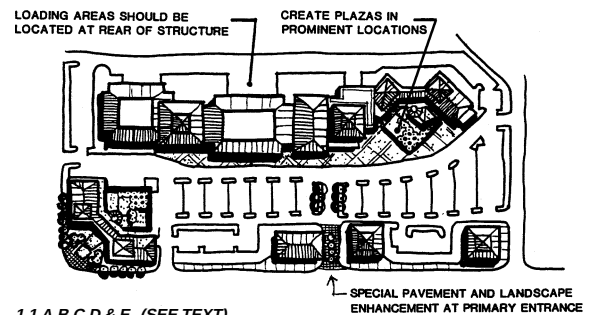
1.1 Building Siting and Orientation

Policy:

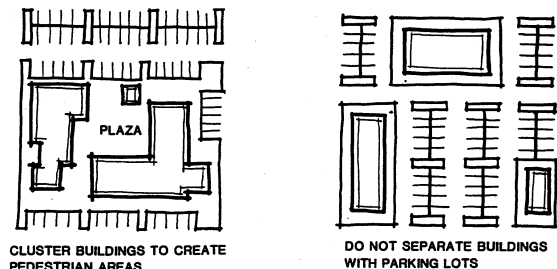
Buildings should be sited so that the character of existing land forms and site features is enhanced; the relationships between buildings are strengthened; and pedestrian and vehicular circulation is facilitated.

Standards and Guidelines:

- A. Provide pedestrian connections from buildings to public walkways and between buildings to buffer pedestrians from vehicle circulation areas. (S)
- B. Locate retail buildings to create plazas and pedestrian gathering places which are of a sufficient size and scale to buffer the pedestrian areas from traffic and circulation areas. (G)
- C. Orient buildings to promote views through and into each commercial development. (G)
- D. Orient single free-standing buildings and their primary facades and primary pedestrian entrances toward streets. (G)
- E. Position entries to buildings so they are easily identifiable from the interior drives and parking lots. (G)



1.1 A,B,C,D & E (SEE TEXT)



1.1 B CLUSTER BUILDINGS TO CREATE PLAZAS AND PEDESTRIAN GATHERING PLACES.

1.2 Building and Parking Setbacks

Policy:

Provide a well-landscaped and pedestrian-friendly character along major streets which promotes a comfortable walkable environment. To attain this objective, all buildings and parking should be set back from perimeter and interior streets a sufficient distance to create a distinct landscape zone between buildings, parking, and adjacent roadways. Varying building setbacks to enhance visual interest along the streetscape is strongly encouraged.

Parking setbacks from all streets should allow for adequate visual buffering or screening.

Surrounding buildings or wrapping the project perimeter with parking lots, especially along the street front is strongly discouraged; orienting some buildings closer to the street to screen parking in the interior of the site and provide strong pedestrian connections to buildings is encouraged.

Standards and Guidelines:

A. Minimum Building Setbacks *EXCEPT WITHIN THE OLD TOWN CC-DISTRICT (for building footprints less than or equal to 30,000 gross square feet): (S)*

• Street R.O.W. Line:	
• Arterial Street	30 ft.
• Collector Street	20 ft.
• Local Street	15 ft.
• Internal/Common Property Boundary	10 ft.
• Internal/Private Driveway (to back of curb)	10 ft.

B. Minimum Building Setbacks *EXCEPT IN OLD TOWN CC-ZONE DISTRICT (for building footprints greater than 30,000 gross square feet): (S)*

• Street R.O.W. Line:	
• Arterial Street	50 ft.
• Collector Street	40 ft.
• Local Street	35 ft.
• Internal/Common Property Boundary	25 ft.
• Internal/Private Driveway (to back of curb)	10 ft.

C. Minimum Parking Setbacks *EXCEPT IN OLD TOWN CC-ZONE DISTRICT (from all perimeter property lines or rights-of-way): (S)*

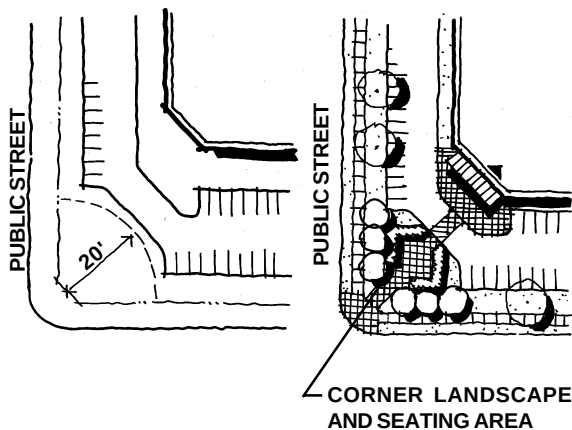
• Property Lines Adjacent to U.S. 36	40 ft.
• Arterial Street R.O.W.	25 ft.
• Collector & Local Street R.O.W.	15 ft.
• Internal/Common Property Boundary	10 ft.

D. No portion of any building, including canopies, overhangs, or other projections shall encroach into the above setbacks. (S)

E. Building and Parking Setbacks at Street Corners - If an intervening parking or a drive aisle is located between a building and the street corner, a corner landscape area must be provided. (S) In addition, no parking may be located within a radius of 15 feet measured from the point of intersection of the required parking setback lines. (S)

F. The clustering of buildings within larger master planned and multiple building projects is strongly encouraged, and the minimum building setbacks may be waived or modified for such purpose. (G) However, all fire and emergency access and building code requirements must be met. (S)

G. Consider orienting buildings, including some of the buildings in multiple building projects, to perimeter streets, rather than orienting all buildings to internal parking lots. (G)



1.2 E TREATMENT OF STREET CORNERS WITH PARKING

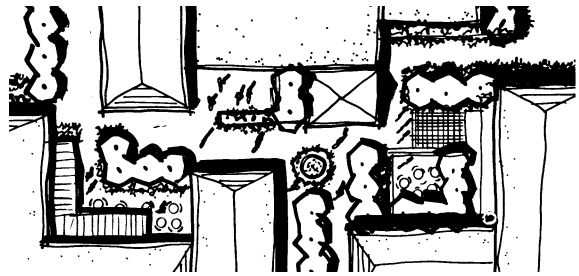
1.3 Pedestrian Amenities

Policy:

Plazas, courtyards or similar pedestrian amenities should be incorporated into both overall and individual site development plans. These areas should be easily accessible and comfortable for a substantial part of the year.

Standards and Guidelines:

- A. Furnish spaces with pedestrian amenities such as benches, landscaping, fountains and play areas. These outdoor spaces should be “functional” and should not appear as “left-over” spaces. (S)
- B. Aggregate open space areas for pedestrian use. (G) Do not distribute them in low impact areas, such as building peripheries, areas behind structures, or where barely visible. (S)
- C. Delineate areas of pedestrian activity with accent paving, landscaping, lighting and furnishings. (S)
- D. Provide seating that is useable year-round. Position seating which is buffered from exposed areas and takes advantage of sunny locations. (S)
- E. All common amenities within commercial developments shall be owned and maintained by the developer or by an organization established for such purpose. (S)
- F. Where feasible, create a sense of enclosure for outdoor seating areas. (G)
- G. Orient open spaces to views of activities, architectural landmarks or distinctive natural land forms. (G)



1.3 A FURNISH OUTDOOR SPACES WITH PEDESTRIAN AMENITIES.



1.3 C DELINEATE AREAS OF INTENSE PEDESTRIAN ACTIVITY.

1.4 Site Coverage Requirements

Policy:

Open space is a valued amenity. Building, parking, and driveway site coverage within each parcel should be limited.

Standards and Guidelines:

- A. The maximum building, parking, and driveway coverage within each parcel and for the entire development is 70%. (S)
- B. The minimum amount of open space provided within a commercial development parcel or cluster of parcels is 30%. (S) Open space can include “pedestrian-oriented” areas such as sidewalks and hardscape plazas within open space areas and pedestrian gathering places. (G) This open space area is in addition to any required public land dedication. (S)

1.5 Utilities, Mechanical, and Telecommunications Equipment

Policy:

The visual and noise impacts of utilities, mechanical equipment, data transmission dishes, towers, and similar antennas and equipment should be mitigated.



1.3 D PROVIDE SEATING THAT IS USABLE YEAR ROUND.

Standards and Guidelines:

- A. Install all permanent utility lines underground. (S)
- B. Temporary overhead power and telephone facilities are permitted during construction only. (S)
- C. Locate transformers away from major pedestrian routes and outdoor seating areas. (S)
- D. Buffer all transformers, telecommunications devices, equipment switching boxes and other utility cabinets from street and pedestrian areas with landscaping or architectural screens. (S) Do not leave meters exposed where visible to the public. (S) (See also Section 6. Screen Walls and Fencing). (S)

1.6 Service, Delivery and Storage Areas

Policy:

Service, delivery and storage areas can be visually obtrusive. The visual impact of service and delivery areas should be minimized, especially views of such areas from public ways and along designated view corridors.

Standard and Guidelines:

- A. Locate loading docks and service areas a minimum of 20 feet from any public street in areas of low visibility such as the rear of buildings. (S)
- B. Combine loading docks and service areas between multiple sites. (G) Screen from public view with fencing, walls and/or landscaping. (S) (See also Section 6. Screen Walls and Fencing).
- C. Clearly identify service entrances with signs to discourage the use of main entrances for deliveries. (G)

1.7 Water Quality Control and Drainage

Policy:

Storm water and snow-melt from rooftops, paved areas, and lawns carry plant debris, soil particles, and dissolved chemicals into the City's storm drainage system. Site development plans should employ management and engineering practices to protect stormwater from these undesirable elements, before releasing water into the City's storm drainage system.

Site drainage should be designed to minimize water collection near building foundations, entrances and service ramps. In addition to the City of Louisville's Storm Drainage and Technical Criteria, the following standards and guidelines apply:

Standards and Guidelines:

- A. Storm water should not drain directly into the public storm drainage system without first going through a detention pond and a grassy swale. (G)
- B. Design and maintain all grassed swales and other drainage channels in accordance with City of Louisville Storm Drainage Design and Technical Criteria. (S)

- C. Avoid hard concrete-lined channel designs. If a hard channel design is required use a more natural approach that incorporates river rock or natural rock channel lining when possible. (G)
- D. Utilize accepted design criteria and recommendations of the Urban Drainage and Flood Control District (UD & FCD) and the City of Louisville for detention pond design to enhance water quality. (S)
- E. The use of consolidated detention pond facilities is encouraged. (G)
- F. Design on-site drainage and detention facilities with attractive, landscape features and amenities. (S)

1.8 Site Grading, Excavation and Erosion Control

Policy:

The design of site improvements should minimize cut-and-fill in order to preserve each site's natural terrain to the maximum extent possible. Site grading designs should be executed in such a manner to avoid drainage impacts (such as erosion and road damage), both on-site and downstream.

Standards and Guidelines:

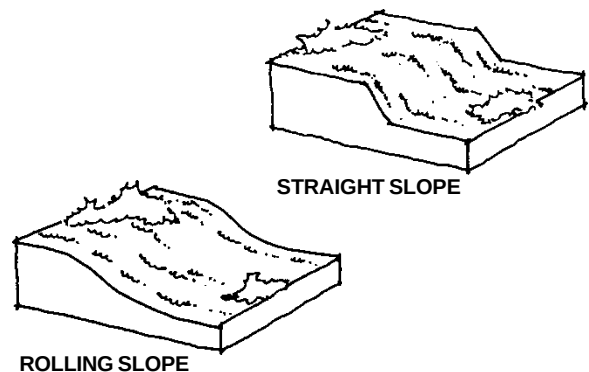
- A. Preserve the natural setting with grading designs that are sensitive to existing land forms and topography. (G)
- B. In developing sites, limit slopes to 4:1 or less. (G) Slopes in excess of 4:1 may be allowed when engineering or site constraints dictate a steeper slope. (G)
- C. In general, transition grades between old and new elevations should be rolling rather than one continuous straight slope. (G)
- D. Avoid grade changes within the drip-line of existing trees that are to be maintained. (G)
- E. Stockpile and protect topsoil during construction. (S)
- F. Preserve existing site vegetation, to the extent possible, during over-lot grading activities. (G) Replant all disturbed soil and slopes with an approved grass mixture or ground cover. (S) Prepare the soil prior to seeding. (S)



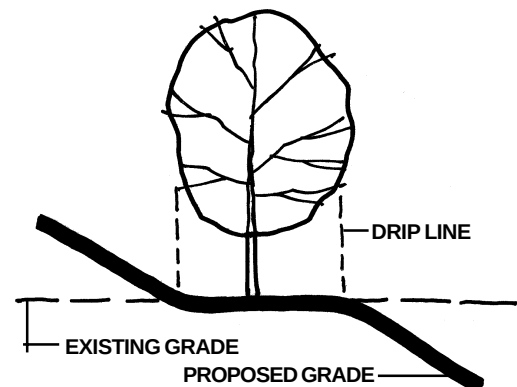
1.7 C AVOID HARD CHANNEL DESIGNS...



... USE GRASSY SWALES WHEN POSSIBLE AND DESIGN ALL ON-SITE DRAINAGE AND DETENTION FACILITIES WITH ATTRACTIVE, YEAR-ROUND SITE FEATURES AND AMENITIES.



1.8 C TRANSITION GRADES SHOULD BE ROLLING RATHER THAN ONE CONTINUOUS STRAIGHT SLOPE.



1.8 D AVOID GRADING WITHIN THE DRIPLINE OF EXISTING TREES.



2. VEHICULAR CIRCULATION AND PARKING

Goal:

The on-site vehicular circulation and parking system is a critical factor in the safety and success of a commercial development. The parking/access/circulation system should provide for the safe, efficient, convenient, and functional movement of multiple modes of transportation both on and off the site where pedestrian/bicycle/vehicle conflicts are minimized. Alternate modes of transportation, including public transit, bicycles and pedestrians should be given priority in the site design.

2.1 Site Access and Vehicular Circulation

2.1.1 Vehicular Access

Policy:

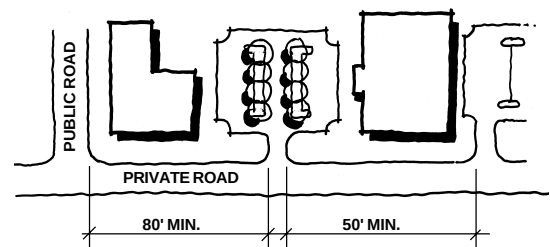
Promote the safety and mobility of through traffic by minimizing the number of access points to private property from public streets. Design vehicle entrances as Gateways.

Standards and Guidelines:

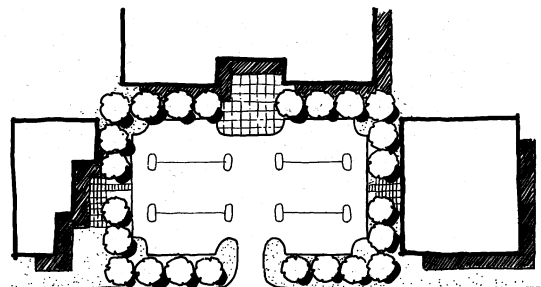
- A. Enhance the intersections of entrance drives with arterial and collector streets by incorporating signs, accent paving, special landscaping and lighting. (S)
- B. Materials used in entry features shall be consistent with other materials used in the development. (S)
- C. Utilize street intersections for access into commercial developments. (G)
- D. Locate site access points as far as possible from street intersections to provide adequate vehicle stacking room. (G) More than one access to a site may be permitted when it will not be hazardous to the safety and operation of the street or to pedestrians. (G)
- E. Maintain a minimum 50.0' separation between adjacent curb cuts along private roadways. (S)
- F. Maintain a minimum 80.0' separation between a public or private road intersection and a parcel curb cut. (S)
- G. When the opportunity exists, provide common or shared entries. (G) (See Section 5.2.C for landscaping details)
- H. Locate site entries to minimize pedestrian/vehicular conflicts. (G)
- I. Design entrances to align with focal points within the development such as landmark towers or landscape features. (G)
- J. Entrances that lead directly into head-in parking are not allowed. (G)
- K. Design internal roadways to incorporate design elements of gateway entries. (G)
- L. Accent pavement materials located within the public right-of-way must meet City of Louisville Public Works Department criteria. (S).



2.1.1 DESIGN VEHICLE ENTRANCES AS ENHANCED "GATEWAYS".



2.1.1 D, E & F MINIMUM SEPARATION BETWEEN INTERSECTIONS AND CURB CUTS



2.1.1 G PROVIDE COMMON OR SHARED ENTRIES WHEN POSSIBLE.



2.1.1 I DESIGN ENTRANCES TO ALIGN WITH FOCAL POINTS SUCH AS LANDMARK TOWERS.

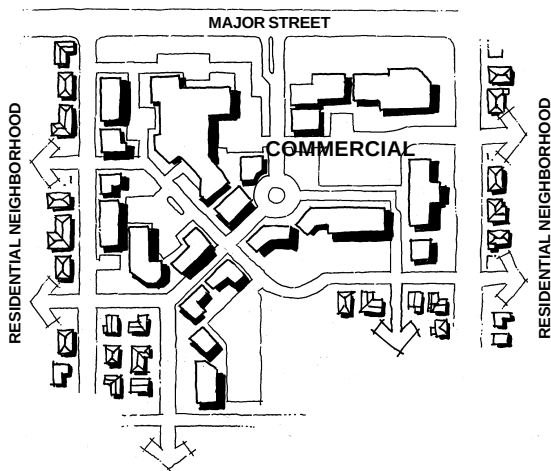
2.1.2 Vehicular Circulation

Policy:

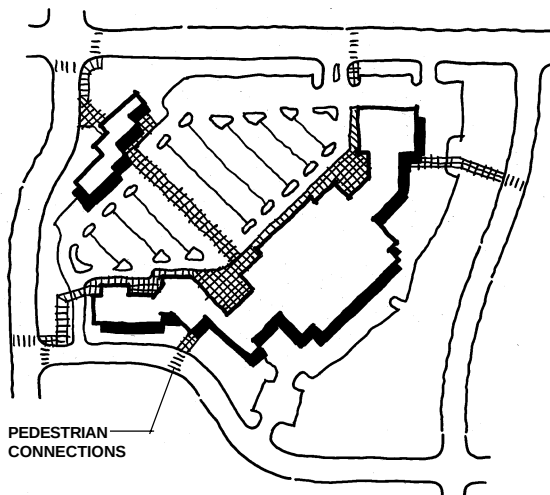
Projects with multiple building sites or parcels should include a hierarchy of internal roadways such as: 1) Internal Collector 2) Internal Drives and Parking Aisles; and 3) Service Drives. This hierarchy should be implemented by engineering and landscape treatments. The street, access and parking network shall provide for the smooth, safe, convenient and functional movement of all modes of transportation, including vehicles, public transit, bikes and pedestrians, with priority to the pedestrians.

Standards and Guidelines:

- A. Link developments with surrounding areas and uses by extending streets, drives and sidewalks directly into and across the development, and across property lines, thereby providing convenient, direct pedestrian, bicycle, and vehicular access to adjoining development. (G)
- B. Provide separate vehicular and pedestrian circulation systems with a strong emphasis on pedestrian linkages between uses. (S)
- C. Separate parking aisles from vehicle circulation routes and entry drives. (G)
- D. Avoid conflicts between adjacent parking lots by maintaining similar directions of travel and parking designs. (G)
- E. Design drive-thru lanes to allow for a vehicle stacking distance that accommodates anticipated demand without impairing traffic circulation. (S) For drive-thru restaurants, the vehicle staking distance must anticipate and accommodate periods of peak demand. (S)
- F. Drive-thru facilities and lanes shall be separated from parcel access points. (G)
- G. Drive-thru facilities and stacking lanes shall not be located within the front yard setbacks, and when located adjacent to public right-of-ways, residential zone districts, or pedestrian gathering areas shall be adequately screened from view. (S)
- H. One-way access ways require a minimum 12 foot wide (FL to FL) driveways, a minimum 15 foot radius intersection, and a maximum 100 foot length. (S)



2.1.2 A LINK DEVELOPMENTS WITH SURROUNDING AREAS.



2.1.2 B PROVIDE SEPARATE VEHICULAR AND PEDESTRIAN CIRCULATION SYSTEMS WITH A STRONG EMPHASIS ON PEDESTRIAN LINKAGES.

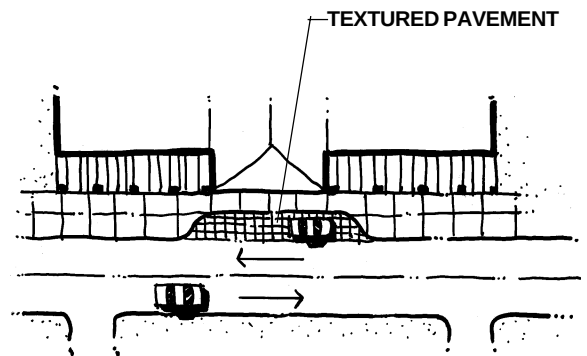
2.1.3 Passenger Drop-Off Areas

Policy:

Passenger drop-off areas should provide for safe and convenient access to building entries.

Standards and Guidelines:

- A. Passenger drop-off areas should be incorporated into all projects. (G)
- B. All schools and child care facilities having a capacity greater than 25 students shall incorporate drop-off areas. (S)
- C. Provide a clear separation of vehicular traffic between drop-off zones and accesses to either parking lots or parking structures. (S)
- D. Design drop-off lanes so as not to obstruct traffic flow when motorists are stopped to discharge passengers. (S)
- E. Use a textured paving material that is distinguishable from the travel lane at the drop-off. (G)
- F. Use signs to indicate "drop-off zone" or "passenger loading only". (S)



2.1.3 D & E DESIGN DROP-OFF LANES SO AS TO NOT OBSTRUCT TRAFFIC FLOW AND USE TEXTURED PAVEMENT TO DELINEATE THIS ZONE.

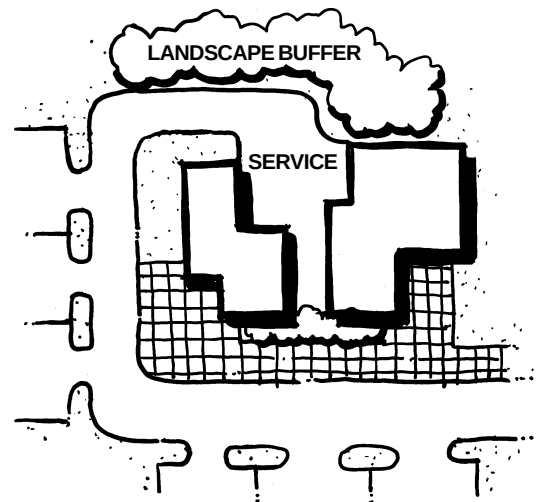
2.1.4 Service/Delivery, Emergency and Utility Access

Policy:

Routes for service, emergency and utility access should be clearly marked. Service circulation within a development should be designed to provide safe movements for all anticipated vehicles. The design of individual parcels to accommodate truck access shall meet all regulatory requirements for turning radii without sacrificing other important goals and policies of the CDDSG.

Standards and Guidelines:

- A. Meet all Louisville Fire Protection District regulations in the design and provision of emergency access to buildings for fire suppression, police, ambulance and other emergency vehicles. (S)
- B. Avoid the creation of "blind areas" that cannot be patrolled by police or security staff. (G)
- C. Provide shared service and delivery access ways between adjacent parcels and/or buildings. (G)

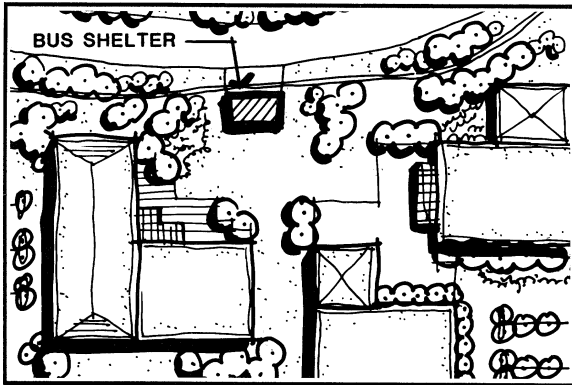


2.1.4 C PROVIDE SHARED SERVICE AREAS BETWEEN BUILDINGS OR PARCELS.

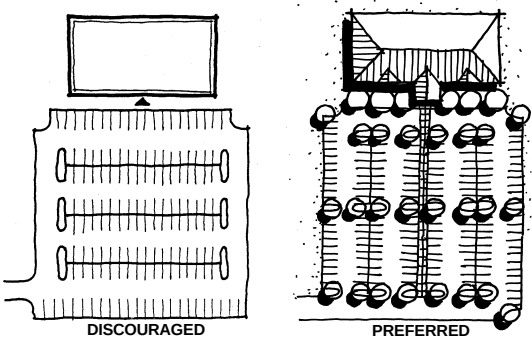
2.1.5 Mass Transit Facilities

Policy:

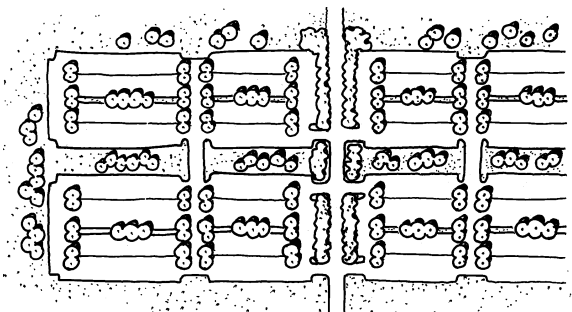
Mass transit facilities should be accommodated within all major commercial developments that could generate high volumes of transit use. Transit routes, access points and shelter locations should be addressed along major roadways within and on the perimeter of such projects. Transit facilities shall be provided in a manner to make transit an attractive mode of travel for both employees and patrons.



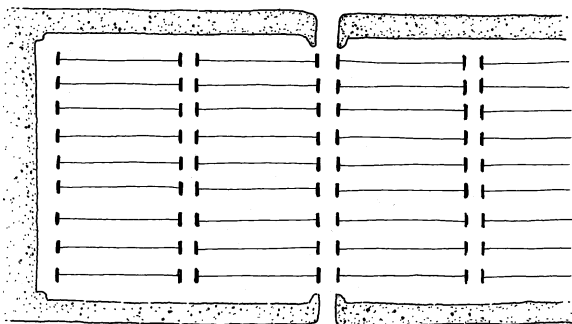
2.1.5 A LOCATE BUS SHELTERS CLOSE TO SIGNIFICANT CLUSTERS OF BUILDINGS.



2.2.1 E ORIENT PARKING AISLES PERPENDICULAR TO BUILDING ENTRANCES SO PEDESTRIANS WALK PARALLEL TO MOVING CARS.



DO THIS...



..NOT THIS

2.2.1 G DIVIDE LARGE PARKING AREAS INTO A SERIES OF SMALLER, CONNECTED LOTS.

Standards and Guidelines:

- A. Locate bus shelters close to significant clusters of buildings. Provide a concrete pad in front of bus shelters. Provide protection for bus shelters from the prevailing winds. Consider incorporating passive solar heating features. (G)
- B. Coordinate any shelter design and locations with RTD. (S)

2.2 Parking Lots and Structures

This section provides standards and guidelines for the siting and layout of parking lots and structures. Specific landscape standards for parking areas are included in Section 5.3, Parking Lot Landscaping.

2.2.1 Surface Parking Lots

Policy:

Vehicle parking should be provided to meet the location and quantity requirements of specific uses without undermining the function of other modes of transportation or detracting from the creation of attractive pedestrian environments.

Standards and Guidelines:

- A. Design parking lots to avoid dead-end aisles. (G)
- B. Where a dead-end aisle is authorized, adequate space for unimpeded turn-around must be provided. (S)
- C. Separate parking areas from buildings by either a raised concrete walkway, pedestrian plaza or landscaped strip. (S)
- D. Avoid head in parking, except handicap parking, which causes hazardous backing movements into major drive aisles. (G)
- E. Orient parking aisles perpendicular to buildings so pedestrians walk parallel to moving cars. Minimize the need for pedestrians to cross multiple parking aisles and landscape areas. (G)
- F. Design parking areas that incorporate pedestrian walkways in a manner that links buildings to the street sidewalk system. (S)
- G. Divide parking areas which accommodate more than 125 vehicles into a series of smaller, connected lots. (S)
- H. Landscape and offset portions of the lot to reduce the visual impact of large parking areas. (G)
- I. Avoid aligning all travel lanes in parking lots in long straight configurations. (G)
- J. Provide cross-access easements between adjacent lots to facilitate the flow of traffic between complementary users. (G)

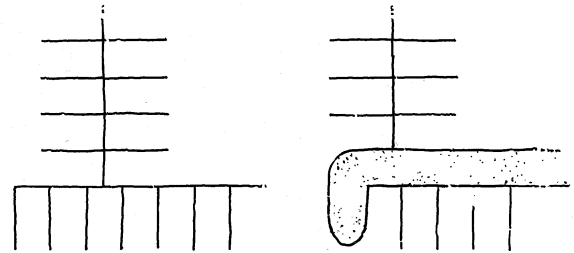
K. Minimum Parking Ratios:

Except for uses in the area designated as *Downtown Louisville*, the minimum number of parking spaces required per parcel/ use is based on the following ratios (# Parking Spaces/Floor Area as defined in Section 17.08.165) (S):

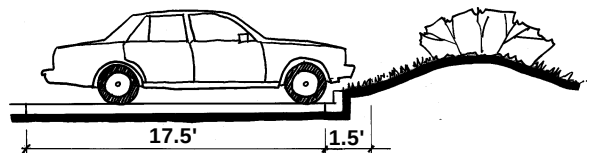
• Retail Uses	4.5 spaces/1000 SF
• Restaurants	15 spaces / 1000 SF
• Theaters	1 spaces / 3 seats
• Professional Offices	4 spaces/1000 SF
• Medical/Dental Offices	6 spaces/1000 SF
• Warehouse	1 / 1000 SF
• Showroom	4.5 / 1000 SF
• Hotel/Motel/Extended Stay Lodging/ Bed & Breakfast plus	1space/guest room 1 space/2 employees

The minimum number of parking spaces required for any construction, expansion or modification in Downtown Louisville that creates additional floor area is one space per 400 square feet of new floor area, rounded to the nearest 400 square feet. See Section 17.20.025 of the Louisville Municipal Code for additional requirements regarding parking in Downtown Louisville.

- L. Locate special parking spaces for van pool and car pool parking close to building entrances. (G)
- M. When opportunities exist for shared parking between different uses with staggered peak parking demand, make every effort to take advantage of this opportunity to reduce the total number of parking spaces within the development, especially in multi-tenant and mixed-use commercial centers. (G)
- N. Use curbed landscaped islands to designate a change in direction of parking stalls and aisles. (S)
- O. Provide landscaped islands at the ends of all rows of parking. (S) (See Section 5 for required sizes.)
- P. Parking bumpers in surface lots are prohibited. (S)
- Q. Where parking spaces abut landscaped islands, medians, or perimeter curbs or sidewalks, the length of spaces may be shortened by 1.5 feet to account for the car overhang, and the width of the sidewalk or landscape strip increased by that same amount. (G)



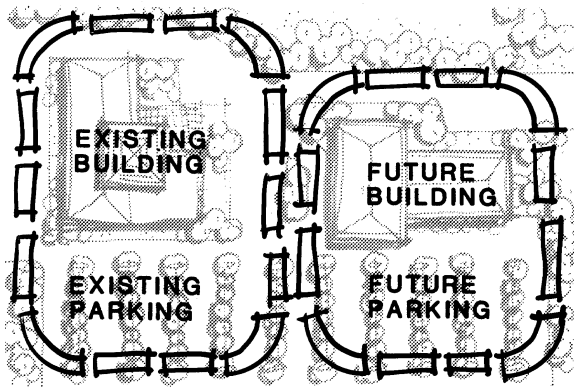
2.2.1 N USE CURBED LANDSCAPED ISLANDS TO DESIGNATE A CHANGE IN DIRECTION OF PARKING STALLS AND AISLES.



2.2.1 Q PARKING SPACES MAY BE SHORTENED BY 1.5' WHERE THEY ABUT LANDSCAPED ISLANDS.



2.2.2 D THE GROUND LEVEL OF PARKING STRUCTURES SHOULD BE INTERESTING TO THE PEDESTRIAN.



2.2.3 WHERE EXPANSION OF A BUILDING IS PLANNED, RESERVE APPROPRIATE AMOUNTS OF LAND FOR THAT PURPOSE.

2.2.2 Parking Structures and Parking Beneath Buildings

Policy:

The appearance of parking structures, whether free-standing or attached, should relate to the buildings they serve, and contribute to the character of the development. The incorporation of parking structures in a commercial development is encouraged in order to minimize site coverage.

Standards and Guidelines:

- A. The general architectural criteria shall apply to all parking structures. (S) (See Section 4 Architectural Design Criteria)
- B. Provide convenient pedestrian connections between parking structures and main buildings. (S)
- C. Separate vehicular access to parking structures from access to general surface parking lots, and clearly identify the access with signs. (G)
- D. Where the ground level of the parking structure fronts a public way, provide decorative screens, murals, or plant materials to create interest for pedestrians. (S)

2.2.3 Provisions for Future Parking Lots and Structures

Policy:

Many large projects which are expected to be developed in phases should anticipate and accommodate such phasing in the parking lot design. Provision should be made for increased parking demands related to anticipated expansions, and for possible changes in use of a building or complex of buildings.

Standards and Guidelines:

- A. Where expansion of a building is planned, appropriate amounts of unimproved land for additional parking should be reserved at the outset. (G)

2.2.4 Motorcycle Parking

Policy:

Motorcycle parking should be designed and sited in such a way that it is clearly distinguishable from automobile parking. Parking stalls should be identified to encourage orderly positioning of parked motorcycles. Adequate security for parked motorcycles and visibility of motorcyclists by automobile drivers is also a concern.

Standards and Guidelines:

- A. Locate motorcycle parking bays separately from automobiles. (G)
- B. Use concrete paving in these parking areas to support kickstand pressure. (S)
- C. Provide 1 motorcycle space/40 vehicle parking spaces up to a total of 10 spaces. (G)



3. PEDESTRIAN AND BICYCLE CIRCULATION

Goal:

Pedestrian and bicycle systems should be incorporated into all developments and designed to be safe and invite walking and bicycling throughout the project. Individual parcels and sites (within larger projects) should be integrated with adjacent properties design to form a comprehensive system and to provide convenient access to the adjacent neighborhoods as well as the regional systems.

3.1 Overall Pedestrian and Bicycle Circulation

Policy:

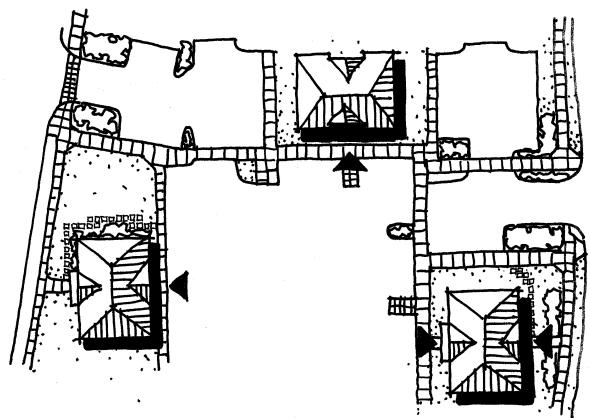
Pedestrian spaces and routes should be designed to invite walking throughout and around each commercial development. Routes should be integrated to form a comprehensive circulation system providing convenient, safe and visually attractive access to all destinations on the site. Ease of maintenance should be considered.

Standards and Guidelines:

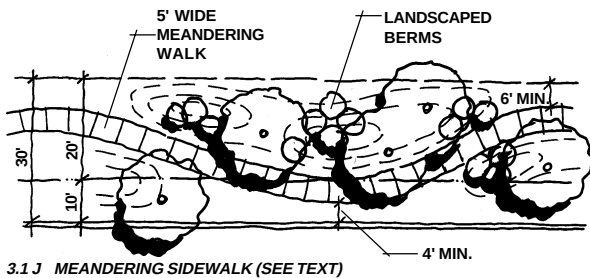
- A. Locate buildings and design on-site circulation to minimize pedestrian/vehicle conflicts. (S)
- B. Separate pedestrian and vehicle movements with the use of landscaping, barriers or other appropriate design solutions. (G) (See also Section 3.4)
- C. Differentiate areas of pedestrian and bicycle/vehicle interface with accent pavement and signage to alert drivers to potential conflicts. (S)
- D. Where a driveway crosses a walkway, make the walkway continuous in grade without a ramp down to the road bed. (G)
- E. Provide well-identified connections from the primary pedestrian and bicycle paths within the development to the perimeter sidewalks and bikepaths. (S)
- F. Align walkways directly and continuously to connect pedestrian destinations. (S) Avoid following the outline of parking lots that do not provide direct pedestrian access. (G)
- G. Locate pedestrian access and walkways away from the north sides of buildings. (G)
- H. Sidewalks shall be at least 5 feet wide and detached from all arterial, collector and local public streets by a minimum 6 foot wide landscaped parkway, except at intersections where acceleration & deceleration lanes are provided. (S)
- I. Sidewalks should be aligned parallel to the adjacent street. (G)



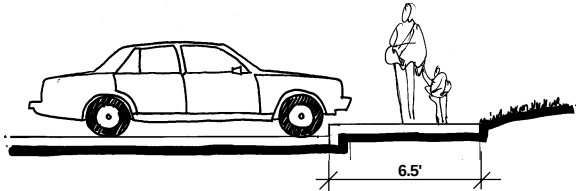
3.1 B SEPARATE PEDESTRIAN AND VEHICULAR MOVEMENTS WITH LANDSCAPING, BARRIERS, OR OTHER APPROPRIATE DESIGN SOLUTIONS.



3.1 F ALIGN WALKWAYS DIRECTLY AND CONTINUOUSLY TO PEDESTRIAN DESTINATIONS.



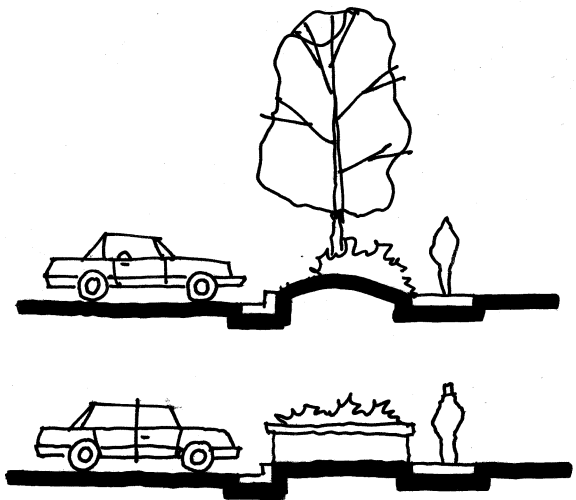
3.1 J MEANDERING SIDEWALK (SEE TEXT)



3.1 L WALKWAYS SHOULD BE 6.5' WIDE WHERE ATTACHED TO END OF HEAD-IN PARKING STALLS.



3.2 PROVIDE CLEARLY DEFINED PEDESTRIAN PATHWAYS THROUGH PARKING LOTS TO BUILDINGS.



3.3 USE ATTRACTIVE BARRIERS TO SEPARATE PEDESTRIAN AND VEHICULAR TRAFFIC.

- J. In cases where a meandering sidewalk is desired along an arterial street, provide adequate width within which to accommodate berming and landscaping that enhances the meander and defines the walkways. (G) If the appropriate width is not provided within the public right of way to meet this guideline, a sidewalk easement will be required. (G)
- K. Attached sidewalks are permitted only adjacent to acceleration and deceleration lanes, internal drives, the front of parking stalls and designated drop-off areas outside of the traffic flows. (S)
- L. Attached sidewalks shall be a minimum of 5 feet wide, except those sidewalks attached to head in parking stalls shall be 6.5 feet in width. (S)

3.2 Pedestrian Connections through Parking Lots

Policy:

Bikeways and pedestrian walkways should be separated and buffered from external and internal automobile circulation within parking lots. Walkways should lead pedestrians from parking areas to building entrances to facilitate convenient movement and to minimize conflicts with cars. Pedestrians should feel comfortable that they are in a clearly defined pathway to the building.

Standards and Guidelines:

- A. Internal pedestrian walkways should be designed to avoid the crossing of drive through lanes, and service drives. (S)

3.3 Site Barriers

Policy:

Barriers are intended to separate vehicular and pedestrian traffic for safety purposes, or to restrict access for security reasons. Barriers should be designed as visual assets to the development, and where barriers are used, the following standards and guidelines apply:

Standards and Guidelines:

- A. Barriers may include fences, walls, gates, curbs, bollards, low shrubbery, and berms. (G)
- B. Barrier materials shall be consistent with site furniture and building materials. (S)
- C. Steel post, chain, cable and wire barriers are prohibited. (S)
- D. These alternatives to conventional barriers may also be considered (G) :
 - 1) Change the level between a walkway and the surrounding area as an effective means to keep pedestrians on walks.

- 2) Install benches, seating walls, bike racks, or raised planters along the edge of a designated route to discourage cross-cutting.
- E. The use of movable vehicle barriers such as gates, barricades, and mechanical devices that fold down or recess into the pavement is discouraged.

3.4 Bicycle Parking

Policy:

Functional and attractive bike parking shall be provided in convenient locations and in adequate numbers for both customers and employees.

Standards and Guidelines:

- A. Locate bicycle parking spaces near both customer and employee building entrances. (S)
- B. Provide sufficient lighting levels to facilitate evening bicycle use. (S)
- C. Do not position racks where they will obstruct building entrances or the flow of pedestrian traffic. (S)
- D. Provide bicycle parking spaces at bus shelter locations. (S)
- E. Provide bicycle parking spaces in the following minimum ratio:
One (1) bicycle space for every ten (10) required off-street automobile parking spaces up to a total of 20 bicycle parking spaces. (S)
- F. Providing protection from the elements for bicycle parking is encouraged. (G) Consider the use of shelters. (G) Coordinate the design of the bicycle shelter with adjacent buildings or other street furniture designs. (G)
- G. Use bicycle racks that accommodate a range of bicycle types and a variety of security devices. (G)



3.4 A LOCATE BICYCLE PARKING CLOSE TO BUILDING ENTRANCES.



3.4 G PROVIDE RACKS THAT ACCOMMODATE A VARIETY OF BICYCLE TYPES.



4. ARCHITECTURAL DESIGN

Goal:

Architectural design should seek to blend in rather than stand out from adjacent structures. All elements including the scale and mass of buildings, materials, colors, roof styles, door and window openings, and details should be responsive to existing architectural design. New buildings should add to community character without rigid uniformity of design.

All buildings should be energy efficient to conserve natural resources.

Building masses should respond to “human scale” with materials and details that are proportionate to human height and provide visual interest at the street and sidewalk level. Buildings should be reduced in apparent mass or articulated to avoid large monolithic, box-like shapes.

Strongly thematic architectural styles associated with some chain restaurants and service stores are strongly discouraged and if utilized must be modified to be compatible with nearby structures and uses.

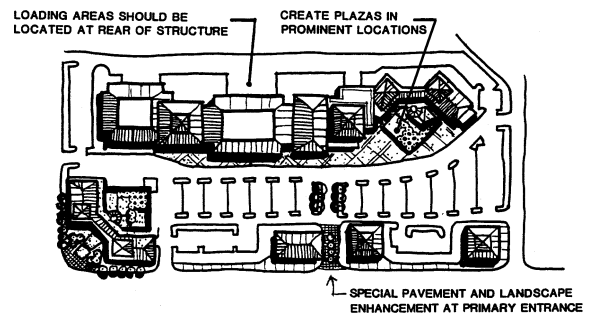
4.1 Building Relationships and Compatibility

Policy:

All buildings within a proposed development should be visually and physically compatible with one another, and with existing buildings on adjacent sites.

Standards and Guidelines:

- A. Locate buildings so they will not obscure desired views from existing or proposed buildings nearby. (G)
- B. Locate the building(s) to create pedestrian plazas and gathering places. (G) (See Sec 1.1.A)

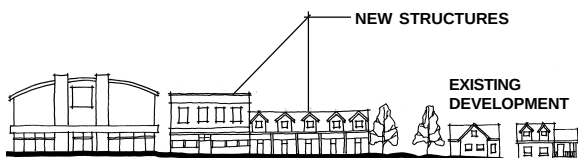


4.1 B LOCATE AND ORIENT BUILDINGS TO CREATE COMFORTABLE PEDESTRIAN PLAZAS AND GATHERING PLACES.

4.2 Building Heights

Policy:

Building heights should be minimized and should not be out of scale with existing or planned development. Buildings should appear “anchored” closely to the ground, although building heights are expected to vary, especially along the perimeter edges, adjacent to the major roadways.



4.2 B TRANSITION THE HEIGHT OF NEW BUILDINGS TO BE COMPATIBLE WITH ADJACENT DEVELOPMENT.

Standards and Guidelines:

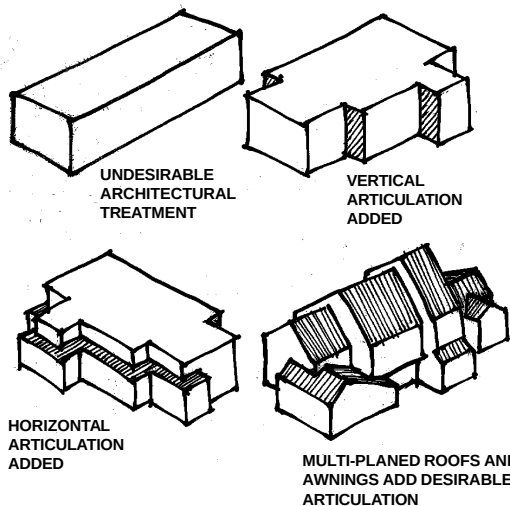
- A. Relate building heights to adjacent open spaces to allow maximum sun and ventilation and to provide protection from prevailing winds. (G)
- B. The height of new development should be compatible with and transition from the height of adjacent development. (G)
- C. The maximum height of all commercial buildings (as measured pursuant to the Louisville Municipal Code) is 35.0', and 42.0' to the top of the rooftop mechanical screen. (S)
- D. Architectural elements such as domes, spires, towers, etc. may exceed the 42.0' height limit up to 50.0', when authorized through the PUD process. (S)

4.3 Building Massing, Forms, and Pedestrian Scale

Policy:

Buildings should relate to the terrain and each other in their massing and forms. Square "box-like" structures with large, blank, unarticulated wall surfaces are not an acceptable form.

Facades with a high level of visual interest from auto and pedestrian views are encouraged. The exterior character of buildings should respond to pedestrian scale in the immediate vicinities. Buildings should have features and patterns that provide visual interest at the scale of the pedestrian, that reduce apparent mass, and that relate to local architectural character.



4.3 B & C BREAK LARGE BUILDINGS INTO MODULES OR SUB-PARTS TO REDUCE PERCEIVED SCALE.



4.3 B & C USE A VARIATION IN FACADE ELEMENTS TO REDUCE PERCEIVED SCALE.

Standards and Guidelines:

- A. In cases of facades more than 50 feet in length, incorporate significant architectural features and treatments to diminish the building mass. (S)
- B. Additional techniques shall be used to reduce scale and apparent massing of buildings. (S) Utilization of the techniques set forth in the following guidelines C thru I, as well as other techniques proposed by the applicant, will be used in determining compliance with this standard.
- C. Variations in facade elements can reduce perceived scale and mass. For example:
 - 1) Variations in color and/or texture should be used. (G)
 - 2) Step downs and step backs should follow the terrain and be tiered and reinforced by landscape elements. (G)
 - 3) Variation in roof forms and height of roof elements should be used. (G)
- D. Compositions that emphasize floor lines or that express rhythms and patterns of windows, columns, and other architectural features are encouraged. (G)
- E. Express the position of each floor in the external skin design:
 - 1) Consider terracing, articulated structural elements, or a change in materials as methods of defining floors. (G)

- 2) Consider using belt courses or other horizontal trimbands of contrasting color and materials to define floor lines. (G)
- F. Avoid blank walls at ground-floor levels. Use windows, trellises, wall articulation, arcades, material changes, awnings or other features. (G)
- G. Use materials manufactured in units and measurable in human proportions such as brick, tile, and modular stone. Other appropriate materials include: stucco, glass, and decorative tiles. (G)
- H. Architectural features such as columns, pilasters, canopies, porticos, awnings, brackets or arches should be included. (G)
- I. Windows that can reveal indoor amenities and activities and displays are encouraged. (G)



4.3 G USE BUILDING MATERIAL THAT CAN VISUALLY BE MEASURED TO GAIN A SENSE OF HUMAN SCALE.

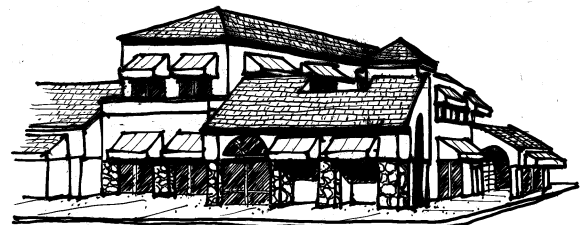
4.4 Roof Forms and Materials

Policy:

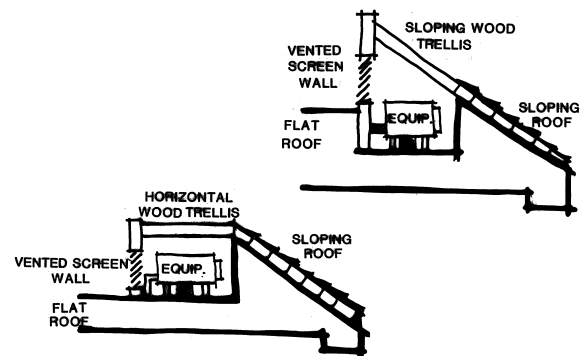
Rooftops should contribute to the unified appearance of each development and should be considered as seen from: higher areas, ground level, other buildings, and roadways.

Standards and Guidelines:

- A. Avoid roof lines running in continuous planes of more than fifty (50) feet. (G)
- B. Flat roofs are not encouraged. (G)
- C. Roof materials should be high quality, durable and consistent with local architectural themes. (S) Concrete tile, asphalt shingles, and standing-seam metal are examples of appropriate roof materials. (G)
- D. Screen roof top mechanical units from view with architecturally integrated screening units, roof parapets, or sloped roof forms. (S)
- E. Design roof forms to correspond to and denote building elements and functions such as entrances, arcades, and porches. (S)
- F. Roof forms should relate to adjacent buildings or developments. (G)



4.4 MIX ROOF FORMS TO CREATE VARIETY IN THE "ROOFSCAPE".



4.4 D SCREEN ALL ROOF EQUIPMENT WITH MATERIAL CONSISTENT WITH THE MAIN STRUCTURE.

4.5 Building Materials and Colors

Policy:

Exterior materials and colors should be aesthetically pleasing, of a high quality and compatible with materials and colors of nearby structures. Compatibility of building materials is desired throughout a development project consisting of multiple buildings.



4.5.1 F USE HEAVIER MATERIALS AT LOWER PORTIONS OF BUILDINGS.

4.5.1 Building Materials

Standards and Guidelines:

- A. Exterior wall materials must be muted. (S) As such:
 - 1) Matte textures are encouraged. (G)
 - 2) Masonry, brick, stone and stucco, are strongly preferred. (G)
 - 3) Textured concrete may also be considered. (G)
 - 4) Wood is also appropriate in the context of similar adjacent development. (G)
- B. Utilize materials in their natural texture and color. (G)
- C. Use the same materials and colors on all elevations of a building. (S)
- D. Highly reflective materials such as bright aluminum and glass are not permitted as the primary building material, especially at the pedestrian level. (S)
- E. Combine building materials in patterns that create a sense of human scale. (G)
 - 1) Cast or scored concrete that gives a sense of proportion may be appropriate as well as conventional modular materials such as brick or stone. (G)
 - 2) Avoid large blank featureless or uniform surfaces. (G)
- F. Use heavier materials such as natural stone and masonry materials on the lower 3 to 4 feet of buildings to help visually anchor them to the ground. (G)
- G. High quality, low-maintenance materials are encouraged. Select durable building materials that will age well. (G)
- H. Painted metal, painted concrete, plain unfinished concrete block or large expanses of unarticulate stucco are not acceptable materials. (S)
- I. Do not use plexiglass, glossy metal and backlit vinyl awnings. (S)

4.5.2 Building Colors

- A. Do not use paints or other covering materials with unproven durability. (S) Do not use bright colors, (including bright white) that may streak, fade or generate glare. (S) While subdued or muted colors generally work best as a dominant, overall color, a bright or primary color can also be appropriate for accent elements, such as door and window frames, and architectural details. (G)
- B. Choose color palettes for new buildings that are compatible with the colors of adjacent structures. (S)
- C. Minimize the number of colors appearing on a structure's exterior. (G)
- D. Paint architectural detailing to complement the facade and coordinate with adjacent buildings. (S)
- E. Roof colors shall be muted and compatible with the dominant building color. (S)

4.6 Building Entrances

Policy:

Primary building entrances should be easily identifiable and relate to human scale.

Standards and Guidelines:

- A. Locate main entrances to be clearly identifiable from primary driveways and drop-offs. (S)
For example:
 - 1) Design building entrances to contrast with the surrounding wall plane. (G)
 - 2) Consider tinted glass, painted doors, or recessed features that will create a shaded effect. (G)
 - 3) Create a frame around doorways, by changing materials from the primary facade material. (G)
 - 4) Design primary entrances to be accessible to handicapped users without complex ramp systems. (G)
- B. All building entrances shall be well-lit. (S) (See Chapter 8)
- C. Consider using building entrance ways as a transition from the building to the ground. Incorporate walls, terraces, grading and plant materials to accomplish this transition. (G)
- D. Consider using terraces or porticos to define entrances. (G)



4.6 A LOCATE AND DESIGN MAIN ENTRANCES TO BE CLEARLY IDENTIFIABLE.

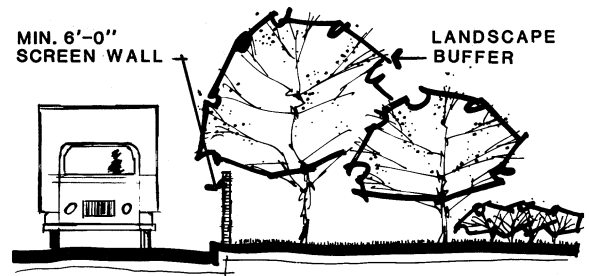
4.7 Service Entrances and Loading Areas

Policy:

Service areas should be visually unobtrusive and integrated with the project site design and architecture.

Standards and Guidelines:

- A. Orient service entrances, loading docks, waste disposal areas and other similar uses toward service roads and away from arterial and collector streets and residential areas, unless adequately screened. (S)
- B. Screen service entrances and trash dumpsters from public streets, pedestrian gathering areas and primary entrances with fencing, walls and/or landscaping. (S) Use the same materials as employed elsewhere on the building or site. (S)
- C. Coordinate the location of service areas with adjacent developments, so that shared service drives may be feasible. (G)
- D. Do not place service areas where they will be readily visible from adjacent buildings or where they will negatively impact important/identified view corridors. (S)



4.7 B SCREEN SERVICE ENTRANCES AND TRASH DUMPSTERS WITH FENCING, WALLS, AND/OR LANDSCAPING.

4.8 Energy Conservation Measures

Policy:

Local climate conditions afford the opportunity to take significant advantage of passive and active solar energy applications. Buildings should be designed and sited to maximize the use of solar gain for energy savings, and respect the solar access requirements of adjacent (existing and proposed) buildings.

Standards and Guidelines:

- A. Applicants are encouraged to consider energy conserving design concepts, including but are not limited to the following: (G)
 - 1) Proper orientation and clustering of buildings to take advantage of the prevailing summer winds and to buffer against adverse winter wind conditions.
 - 2) Types of material and their insulation characteristics.
 - 3) The arrangement and design of windows and doors.
 - 4) Direct solar or photovoltaic energy.
 - 5) Daylighting concepts.
 - 6) Earth sheltering with creative land forming.
 - 7) Natural ventilation of outdoor, indoor and attic spaces.



5. LANDSCAPE DESIGN ¹

Goals:

Landscaping for commercial areas is provided within each building site to: 1) enhance the aesthetics of commercial developments, 2) create a pedestrian friendly environment, 3) break up the mass of buildings, 4) soften architectural materials, 5) provide screening of service structures, 6) enhance the streetscape/parkway environment, 7) define building and parking area entrances, 8) provide shade and climate control, 9) control airborne particulates and 10) provide buffers between incompatible land uses or site areas. Drought tolerant plant species that are native to the region or suitable to this climate should be used.

This chapter addresses 4 distinct zones corresponding to the 4 major design influences on each commercial site:

- 1) Perimeter Landscaping Adjacent to Public and Private Roads
- 2) Perimeter Landscaping Adjacent to Abutting Property
- 3) Parking Lot Landscaping
- 4) Individual Building Landscaping

On smaller sites, there may be overlap between the four (4) planting zones that could result in over planting. Please consult with Planning Division staff to determine whether the requirements of one zone may take precedence over those of another zone.

The City shall strive to:

- Inspect all plant material prior to planting
- Inspect all irrigation designs and implementations
- Inspect installation at one and five year intervals

5.1 Perimeter Landscaping Adjacent to Public and Private Roads

Policy:

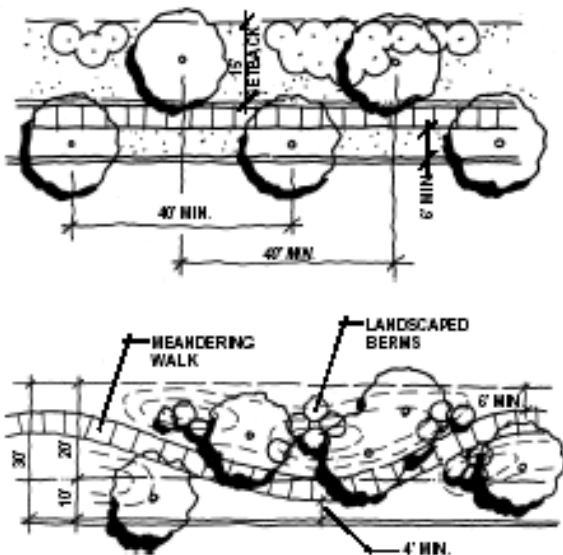
The corridors along perimeter arterial streets and internal collectors should provide a visually cohesive open space system. Similar landscape treatments should be used at all entrances and intersections. Plant materials, massing, spacing, and height characteristics should reinforce the hierarchy of roadways. Planting and grading should work together to create a variety of experiences along these roadways and to call attention to open space amenities. Perimeter edge treatments should establish identity for the project and convey a high-quality image.



5.1.A INCLUDE A COMBINATION OF MANICURED AND ENHANCED NATURAL LANDSCAPE AREAS.



5.1.D CREATE LANDSCAPE POCKETS IN LONG EXPANSES OF FENCES AND WALLS.

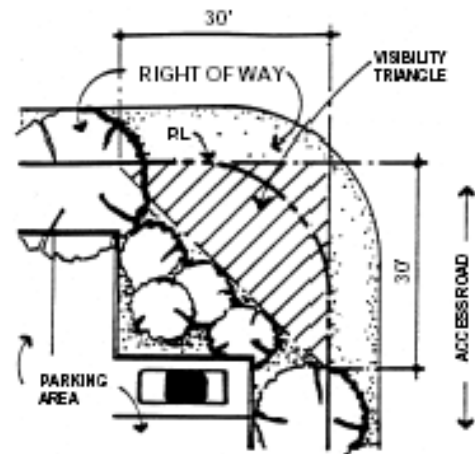


5.1.E2 & E4 LANDSCAPE REQUIREMENT DIAGRAMS

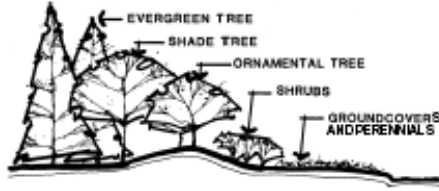
Standards and Guidelines:

- A. Include a combination of manicured and enhanced natural landscape areas. (G)
- B. Place annual and perennial gardens at entries. (S)
- C. Place project identification markers along the perimeter edge of all commercial developments. (G)
- D. Design long expanses of fence and wall surfaces to create landscape pockets. In cases of walls or fences over 50 feet in length, provide structural offsets, insets or landscape pockets to break monotony, provide visual interest and reduce heating effects. (S)
- E. Parkway and Median Plantings:
 - 1) Vary street tree planting species in medians and parkways. (S) However, maintain the desired rhythm of plantings by selecting street trees with similar characteristics (i.e., height and branching patterns). (S)
 - 2) Where detached walks parallel to the street are proposed:
 - a. Provide a minimum of 1 tree per 40 lineal feet of public and private street frontage between the sidewalk and curb in a minimum 8-foot width strip (S) Also in this area, provide durable, low growing shrubs at a minimum ratio of 1 shrub per 5 lineal feet, durable ground covers or a combination of the two. Irrigated ~~turf~~ grass that is native to Colorado or hybridized for arid conditions may also be placed in these areas. However, if the width of the area between sidewalk and curb is less than 10 feet, it would require subsurface irrigation. (S)
 - b. Provide an additional 1 tree per 40 lineal feet of street frontage within 10 feet outside the sidewalk, internal to the development. (S)
 - c. Provide a minimum of 1 shrub per 5 lineal feet plus ground cover or ~~turf~~ grass that is native to Colorado or hybridized for arid conditions outside the sidewalk, internal to the development. ~~Turf~~ Native or hybridized grass should be limited in this area and when used should be planned in a manner that can be efficiently irrigated. Low water using ~~turf~~ species should be chosen, provided they will typically provide a green appearance. (S)
 - 3) Where attached sidewalks are proposed:
 - a. Provide a minimum of 1 tree per 20 lineal feet of public and private street frontage within 15 feet of the edge of the sidewalk. Tree spacing should be evaluated relative to the mature canopy size, as provided in the Recommended Plant Materials List maintained by the

- City and on file with the Planning Division. (S)
- b. Provide a minimum of 5 shrubs per 20 lineal feet plus perennial flowerbeds, ground cover or grass that is native to Colorado or hybridized for arid conditions ~~lawn~~ within 20 feet of the edge of curb. ~~Lawn~~ grass areas that are less than 10 feet wide in any one dimension and bordered by impervious (or paved) surfaces, may ~~not~~ be turf, ~~unless~~ irrigated with a subsurface (no pop up or spray heads) system. (S)
- 4) Where meandering sidewalks are proposed:
 - 1) Provide a minimum of 1 tree per 20 lineal feet of public and private street frontage. Tree spacing should be evaluated relative to the mature canopy size, as provided in the Recommended Plant Materials List maintained by the City and on file with the Planning Division. (S)
 - 2) Accompany the trees with a variety of shrubs and ground covers. Terracing of landscape area may also be appropriate in this area; however, berming should be avoided, as it tends to lead to inefficient irrigation and water waste. (G)
 - 3) Provide a minimum of 8 shrubs per 20 lineal feet plus perennial flowerbeds, ground cover or grass that is native to Colorado or hybridized for arid conditions ~~lawn~~. Grass ~~Lawn~~ areas that are less than 10 feet wide in any one dimension and bordered by impervious (or paved) surfaces, may ~~not~~ be turf, ~~unless~~ irrigated with a subsurface (no pop up or spray heads) system. (S)
 - 5) To prevent interference with motorist visibility, plant parkway trees a minimum of 3 feet from the back of curb and choose shrubs that do not exceed 24" mature height. (S)
- F. Visually buffer all parking lots adjacent to perimeter roadways with adequate screening within a planting strip between the public right of way and the edge of the parking lot pavement. (S) Provide adequate shrub plantings to create a dense visual buffer between parking lots and perimeter roadways. (S) When using Juniper shrubs to create said buffer, a variety of species should be used to avoid the appearance of a single mass. (S) A maximum ratio of 1 Juniper per 3 deciduous shrubs is suggested. (G) Raised planters and screen walls are also encouraged to provide parking lot screening. Bermed turf areas should be avoided due to their tendency to waste irrigation water. (G)
- G. Sight-lines at Intersections and within Medians
- 1) Provide adequate sight lines for an effective 30-foot sight triangle measured from the right



5.1.G TYPICAL SIGHT LINES AT INTERSECTIONS



5.1.H.1 PROVIDE A MINIMUM OF 3 LEVELS OF LANDSCAPE SCALE AT ENTRY DRIVES

of way. (S) Plants and signage are allowed within the sight triangle if:

- a. plants do not exceed 30" in height at full maturity; and
- b. signs do not exceed 30" in height (measured from top of curb height) unless they are more than 80 percent open. (S)

H. Provide a diversity of landscaping materials at entry drives to development parcels. (S) Therefore:

- 1) Provide a minimum of 3 levels of scale, including shade, evergreen, and/or ornamental trees, shrubs, annual and perennial flowers, and ground covers. (S)
- 2) Plant clusters that appear as a cohesive visual element, and that complement the overall landscape theme and palette. (G)
- 3) Integrate the plant design with the entry sign. Plantings should frame or provide a visual base for the signs. (S)

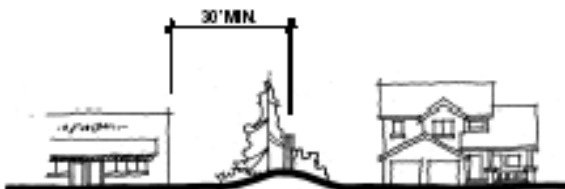
5.2 Perimeter Landscaping Adjacent to Abutting Property

Policy:

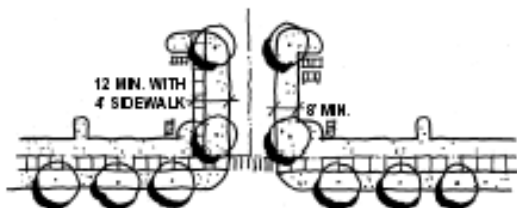
Visual buffers should be provided between similar land uses to accomplish transitions and to mitigate potential conflicts between dissimilar uses.

Standards and Guidelines:

- A. Between similar uses (i.e., where the adjoining uses are each permitted in the underlying zone district): Provide a minimum 10 foot wide buffer planting strip next to a perimeter or internal property line containing 1 tree for every 40 lineal feet of property line and appropriate shrubs, ground cover and/or native or hybridized grass turf areas. (S) This may not apply to internal property boundaries within a multiple-lot development to the extent the lots are developed under a single Planned Unit Development Plan and achieve other site design policies of these guidelines.
- B. Between dissimilar uses (i.e., where the adjoining uses are not both permitted as a use by right in the underlying zone district(s)): Provide a minimum 30-foot wide buffer planting strip containing a minimum of 1 tree for every 20 lineal feet of property line and a screen hedge incorporating both deciduous and evergreen shrubs a minimum of 3 feet in height (at maturity) along a minimum of 50% of this perimeter area. (S)
- C. Common/Shared Access Drives:
 - 1) Provide a minimum 8-foot wide buffer strip along both sides of a shared access drive when no sidewalk is included. (S)



5.2.B PROVIDE A 30' WIDE PLANTING STRIP BETWEEN DISSIMILAR USES.



5.2.C COMMON/SHARED ACCESS DRIVES.

- 2) Provide a minimum 12-foot wide buffer strip along both sides of a shared access drive where a sidewalk is included. (S)

5.3 Parking Lot Landscaping

Policy:

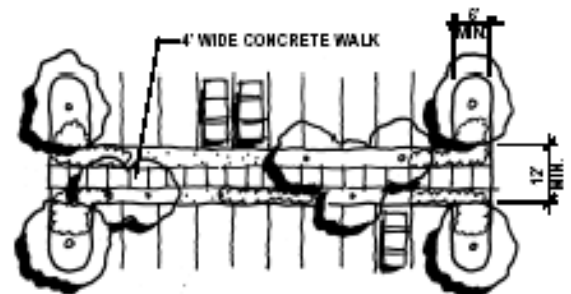
Parking lots are necessary features of building sites that can, if not designed properly, visually detract from the overall development character. Parking lots should be designed to blend with each building site's character using landscape plantings and grading.

Standards and Guidelines:

- A. Use low, opaque walls and/or flowering plants combined with raised planters to create a dense visual buffer of parking areas from peripheral streets or frontages. (S)
- B. Lower the grades of parking lots below existing street elevations to aid in obscuring views of automobiles, while promoting views of architectural elements of the structures beyond. (G)
- C. A minimum of 1 canopy shade tree per 8 parking spaces is required in all parking lots, to be planted in islands, medians, and perimeter areas adjacent to lots (excluding streetscape tree plantings). (S)
- D. Physical shade structures that incorporate live planting may also be an appropriate means of shading parking lot areas. (G)
- E. No Evergreen Tree with a mature width greater than 20 feet, as noted in the Recommended Plant Materials List, should be planted within 15 feet of a hardscaped area. (S)
- F. Utilize landscaped islands and medians to improve the definition of circulation patterns, provide shading for paved areas and break up continuous rows of parking. (G)
- G. No landscaped area within a parking lot shall be less than 100 square feet. (S)
- H. Landscaped Islands
 - 1) Provide a minimum 6-foot wide landscaped island at the end of every row of parking, equal in length to the length of the parking space(s). (S)
 - 2) Provide a minimum of 2 canopy shade trees in each island with a minimum mature canopy of 20 feet. (S)
 - 3) In addition to the trees, plant each island with either a minimum of 8 shrubs, not exceeding 3 feet in height at maturity or a durable and hardy ground cover. (S)
- I. Landscaped Medians
 - 1) Place landscape medians between every other parking bay in lots for more than 100 cars. (S)
 - 2) Landscape medians should be 12 feet wide, including a 4-foot concrete sidewalk. (S)



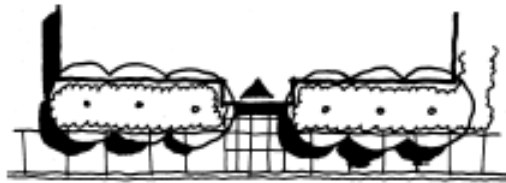
5.3.A USE LOW WALLS AND LANDSCAPING TO SCREEN PARKING



5.3.H & I LANDSCAPE MEDIAN AND ISLAND (SEE TEXT)



5.4.B EMPHASIZE AND INTENSIFY LANDSCAPE AT BUILDING ENTRANCES INCLUDING FLOWER BEDS WITH A VARIETY OF PERENNIALS, ANNUALS, GROUND COVERS AND ORNAMENTAL GRASSES.



5.4.C PROVIDE LANDSCAPING AROUND BASES OF BUILDINGS (SEE TEXT)



5.4.D PROTECT LANDSCAPING FROM PEDESTRIAN AND VEHICULAR TRAFFIC WITH ATTRACTIVE BARRIERS.



5.4.E USE CONTAINERS WITH FLOWERING PLANTS TO ENHANCE SIDEWALK SHOPS, PLAZAS AND COURTYARDS.

Where walkways in medians will not be utilized, the medians may be reduced to a width of 8 feet. (G)

- 3) Provide a minimum of 1 canopy shade tree for each 30 lineal feet of median. (S) In addition to trees, plant each island with either a minimum of 8 shrubs per 30 lineal feet or a durable and hardy ground cover. (S)
- 4) The use of landscape medians is encouraged as a transition slope between parking bays on hillside parking lots (maximum slope of 4:1). (G)
- J. Where head-in parking occurs, locate all shrubs a minimum of 3 feet from the edge of the parking lot curb. (S)

5.4 Building Site Landscaping

Policy:

The coordination of landscape design for individual building sites and larger, multi-parcel projects is essential for creating a consistent, high-quality character. A coordinated design unifies the various buildings and strengthens the cohesiveness of the development. Individual landscape treatments for building sites should compliment the roadway landscapes, create distinctive settings for buildings, reinforce the design of the open space systems, and provide amenities for pedestrians.

Standards and Guidelines:

- A. Use landscaping that is of appropriate scale relative to the proposed adjacent structures.
- B. Intensify landscaping at building entrances. (G)
- C. Provide a minimum planting width of 6 feet adjacent to the building and plant no less than 25% of the building perimeter with multi-stemmed ornamental trees, shrubs, perennial flowers, and ground cover. (S) Emphasis should be given to landscaping along the front building elevation. (G) Provide additional landscaping around the perimeter of buildings to soften the edge between sidewalks/parking lots and structures. (G) To promote irrigation efficiency, no single landscaped area shall be less than 100 square feet, with the exception of deciduous trees planted in grates. (S)
- D. Protect landscaping from vehicular and pedestrian encroachments with raised planting surfaces, depressed walks, and/or curbs. (G)
- E. Use high quality, durable planters with flowering annual and perennial plants to enhance sidewalk shops, plazas and courtyards. (G)
- F. Minimum Landscape Area required within each building site and within the entire development shall be 30% including hardscaped plazas and walkways within open space areas. (S) Hardscape plazas and walkways can account for

a maximum of one-third of the minimum landscape area requirement. (S)

G. Landscaping within Public Easements

- 1) Landscaping within public easements is limited to shrubs, ground covers, and small ornamental trees. (G) No canopy/shade trees may be planted within such easements. (S)
- 2) Berming is generally acceptable within public easements in conjunction with plant material. (G) Berming is not to be used instead of plant material. (S)

5.5 Landscape Irrigation / Water Conservation

Policy:

A significant percentage of the City's treated water supply is used to irrigate plant materials and grasses. Every effort should be made to conserve water by utilizing alternative means for maintaining a suitable landscape environment.

Standards and Guidelines:

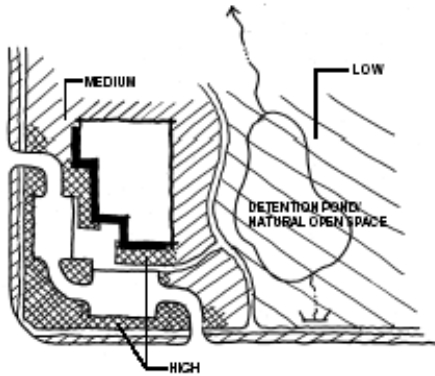
- A. Incorporate Xeriscape Concepts into the landscape design of each commercial development without compromising the intent to establish significant visual amenities through landscaping. Utilize a combination of the following principles to achieve this requirement. (S)

For Example:

- 1) Incorporate a "zoned planting scheme" to reduce water demand by grouping similar varieties of plants that are drought and disease tolerant. (S) The use of water conserving landscapes is encouraged by minimizing manicured grassy areas. (G) The PUD landscape plan should depict what are proposed as low, medium and high water zones. (S) The building permit irrigation plan should calculate GPM/zone. (S)
- 2) Use drought tolerant plant species suitable to this climate that have minimum watering and pruning requirements. (G)
- 3) For all irrigated areas, potential runoff should be avoided through a combination of locating such areas away from hard surfaces and the proper selection of irrigation devices. (G)
- 4) Incorporate heavily mulched planting beds to aid in retaining moisture and to make planting areas easier to maintain. For all grassy areas, soils shall be improved with 3 to 6 yards of organic materials per 1,000 square feet to a depth of 6 to 8 inches. (S)
- 5) Incorporate advanced irrigation measures and scheduling. Install an efficient automatic irrigation system that will incorporate water conservation measures. Spray heads are

recommended for lawn and ground cover areas, with drip irrigation for shrubs and trees. (G)

- B. The developer is encouraged to investigate alternative sources of irrigation water for all landscaped areas. (G) Alternative sources shall be owned and maintained by the developer or an organization formed for such purpose, unless the City otherwise agrees.



5.6.A LANDSCAPE MAINTENANCE ZONES

5.6 Landscape Standards and Plant Material Selections

Policy:

- A. Landscape zones:
Depending on the size and magnitude of an individual parcel, the project's landscape areas should be divided into one or more of the following basic zones (G):
 - 6) High Maintenance Zone (located at site and building entrances and pedestrian areas.) This zone may include:
 - a. Manicured grass that is native to Colorado or hybridized for arid conditions ~~lawns which require weekly mowing and regular watering (including blue grass sod or fescue grasses)~~
 - b. Formal plantings of trees and shrubs
 - c. Planters, with annuals and perennials
 - 7) Medium Maintenance Zone (located along perimeter roadways.) This zone may include:
 - a. Drought tolerant native or hybridized grasses, which require less water and maintenance (but still provide a manicured green look during the growing season – including fescue-type grasses)
 - b. Large shrubs
 - c. Large specimen trees
 - 8) Low Maintenance Zone (located in environmentally sensitive areas, along waterways and the balance of the site.) These may include:
 - a. Natural areas and native grasses (which require very low water and maintenance)
 - b. Existing vegetation
 - c. Drought resistant plant species
 - d. Meadow-like, open fields
 - e. Wetlands areas
- B. The City Manager shall by written order adopt a Recommended Plant Materials List for development subject to the CDDSG, which List may be updated periodically by subsequent written order of the City Manager. Prior to adopting any such order, the City Manager may obtain the input of HFAB, the Planning Department, and any other persons regarding such List, and may notice and hold any public

meetings the Manager deems advisable to assist in formulating any such order or List. The Recommended Plant Materials List shall be maintained on file in the Planning Department. All applicants for development subject to the CDDSG shall be advised as to the existence of the Recommended Plant Materials List and a copy thereof shall be made available to such applicants. Selection of plant materials is preferred from the Recommended Plant Materials List (G), and in light of the following standards and guidelines:

- 1) Select plant materials on the basis of suitability to climate, setting, long-season of visual appeal (multi-season plants, good architectural appeal, long bloom time, branching structure or ornamental grasses, for instance), and compatibility with other development plantings, character and functions. (G)
 - 2) Select plant materials that are free of disease and harmful insect problems. (S)
 - 3) To avoid the spread of disease, avoid planting more than 20 percent of a site with any single plant species. On small sites (less than 2 acres), some flexibility may be granted to achieve specific design objectives, subject to review and approval of the City Forester. (G)
 - 4) The quality of plant material selected will follow the guidelines of the "American Standard for Nursing Stock" by the American Association of Nurserymen. (S)
 - 5) Proper drainage is required for all major plantings to ensure the establishment of a good root system and healthy growth. (S)
 - 6) The installation of all landscaping shall be done by an established landscape contractor who follows the procedures set forth by the American Association of Landscape Contractors and its local agencies. (S)
 - 7) All landscaping and landscape material shall be backed by a warranty of the owner and the Contractor for a minimum of one year, as detailed in the development agreement. (S)
 - 8) A performance guarantee is required to ensure completion of landscaping. (S)
 - 9) Artificial plants of any type, size or color are not allowed as exterior landscaping within any development parcel. (S)
- C. Grasses should provide an immediate cover ~~and sod is recommended~~. In less irrigated/non-irrigated areas, plant drought-tolerant plants. A temporary irrigation system should be maintained for a minimum of one year. (G)
- D. Choose plant materials that provide variety and year-round color and screening. Select materials, which highlight each season (G).
- 1) Spring: Flowering Plants
 - 2) Summer: Shade
 - 3) Fall: Leaf color
 - 4) Winter: Branch form and texture



5.6.E PLANT FLOWER BEDS IN VISIBLE AREAS

- E. Edging is required to separate grass areas from shrubs, ground cover and mulch. (S)
- F. Utilize porous paving materials for paths, plazas, etc., such as patio bricks, inter-locking pavers, concrete stepping stones and/or sandstone. (G)
- G. Plant annual and perennial flower beds in visible areas such as pedestrian plazas, building entries. (S)
- H. Mulching:
 - 1) All planting beds should be mulched with wood or decorative rock to stabilize soils, control erosion, and conserve water use. (S)
 - 2) Use organic mulch materials that are best suited and adapted for the local area. (S)
 - 3) Decorative rock may not constitute more than 50% of the total mulched area. (S)
 - 4) In parking lot landscape islands, rock mulch may be used as an edger to protect the organic mulch, which should be the primary mulch material. (S)
- I. Use landscape or weed barrier fabric within all shrub beds and mulched areas to control weeds. (G)
- J. All Landscape Plans should be prepared by a qualified Landscape Architect or landscape designer. (G)

5.7 Planting Size Standards

Policy:

An immediate landscape impact is desired within all commercial developments, and to facilitate this, minimum plant size standards are required. Larger sizes are encouraged for shrubs and perennials.

Standards and Guidelines:

- A. Provide landscaping according to the following minimum sizes: (S)
 - 1) Deciduous shade/canopy trees: 2.0" caliper*
 - 2) Ornamental trees: 2.0" caliper*, however, 1.5" caliper ornamental trees may be sufficient in some cases.
 - 3) Evergreen trees: 6'-8' height (with a minimum of 25% 8' in height)
 - 4) Multi-stem Ornamentals: 8'-10' height
 - 5) Shrubs: 5 gallon container
 - 6) Ground Cover/Perennials: 2¼" pots*
 - 7) Vines: 1 gallon container

*Measured by ANSI standard Z60.1.

5.8 Landscape Maintenance and Replacement

Policy:

The property owner is responsible for providing, protecting and maintaining all landscaping in a healthy and growing condition.

Standards and Guidelines:

- A. The property owner will remove and replace dead plant materials immediately with the same type, size and quantity of plant material as originally installed. If material is diseased or insect-infected, replacement with same species is not advisable unless solution has been found for disease or infestation. Replacement may not be identical, yet should provide same form and function, subject to City Staff review and approval. (S)
- B. Avoid replacing landscape materials during the dry winter months between December and February and in midsummer. (G)
- C. Contact the Planning Division for specific time requirements for landscape material replacement. (G)



5.8.A REMOVE AND REPLACE DEAD OR DISEASED PLANT MATERIALS IMMEDIATELY.

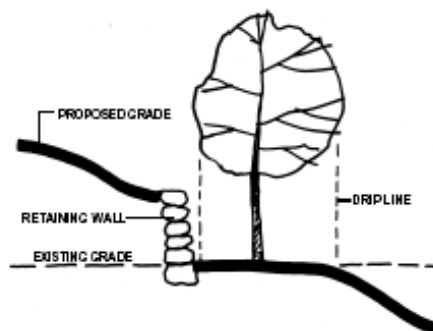
5.9 Existing Vegetation

Policy:

Special attention should be paid to preserving within each commercial development those natural features and vegetation which are significant because of their unique character, history, size, variety, or growth habits. This includes all mature trees greater than 3 inches in diameter and significant understory plants and shrubs.

Standards and Guidelines:

- A. Provide an inventory of all existing trees and significant woody vegetation that identifies size, health, and species and trees to be retained and removed. (S) The inventory is to be prepared by a botanist, licensed arborist or landscape architect. (S)
- B. Locate site and building improvements to preserve significant natural vegetation. (G)
- C. Preserve and incorporate into the landscape plan, any existing health tree 6" caliper or larger, and located more than 20 feet from any proposed building location. (S) Preserve all trees over 24" caliper unless deemed unhealthy or unsuitable for preservation. (S)
- D. During construction of site improvements, erect suitable protective barriers (generally located beyond the drip line) around trees to be preserved, making sure trunks, branches and root structures are not damaged by construction equipment. (S)
- E. Incorporate tree wells or retaining walls as necessary in the landscape plan to protect existing trees. (G) Maintain historic drip lines. (G)



5.9.E USE TREE WELLS OR RETAINING WALLS TO MAINTAIN GRADE AROUND EXISTING TREES



5.10.A PROVIDE ATTRACTIVE, FUNCTIONAL OUTDOOR SEATING



5.10.C PROVIDE ATTRACTIVE, HEAVY DUTY TREE GRATES IN PLAZA AREAS.



5.10.D ENCLOSE AND LANDSCAPE AROUND ALL TRASH DUMPSTERS.

5.10 Site Furniture and Features

Policy:

Site furnishings include benches, waste receptacles, planters, railings and bollards. Visual consistency of these elements is desired throughout each development. All components of outdoor site furniture should be low maintenance, highly durable and resistant to vandalism, graffiti, and theft.

Standards and Guidelines:

- A. Outdoor Seating
 - 1) Use outdoor seating that is comfortable, attractive, durable and easy to maintain. (S)
 - 2) Locate benches at major building entryways, drop-off areas, transit stops, pedestrian courtyards and plazas. (S)
 - 3) Locate benches in areas that receive direct sunlight in the winter, are sheltered from winds and shaded in the summer. (G)
 - 4) Where seating is fixed, provide a variety of arrangements (both linear and grouped), which accommodate two (2) to six (6) persons. (G)
- B. Planters and Waste Receptacles
 - 1) Design planters and waste receptacles to coordinate with other furniture. (G)
 - 2) Use materials and colors similar to those used for benches. (G)
- C. Tree Grates
 - 1) Use of tree grates is discouraged unless used in conjunction with structural soils. If necessary, use tree grates to prevent excessive soil compaction and to give added interest to the pavement. (G)
 - 2) Choose tree grates that are fabricated of a strong, durable material. (S) In areas which receive heavy use, tree guards may be appropriate to give added protection to young trees. (G)
- D. Trash dumpsters
 - 1) Provide a concrete pad a minimum of 8 feet wide to provide truck access to dumpster locations. (S)
 - 2) Enclose and landscape around all trash dumpsters. (S) (See also Section 4.7, Service Entrances and Loading Areas and Section 6.0, Screen Walls and Fences.)

¹ Revised: Ordinance 1422, Series 2003.



6. SCREEN WALLS AND FENCES

Goal:

Fences and walls should be decorative and contribute to the visual quality of the project and the overall development. Walls, fences, and landscape materials shall be used to screen service areas, loading areas, and outdoor storage or sales areas. When not required for security, screening, or grade transitions, the size of walls and fences should be minimized. When required, however, fencing should be as inconspicuous as possible, and walls should be low.

6.1 Wall and Fence Design and Materials

Policy:

Fencing and walls shall be constructed of materials that are compatible with the adjacent building architecture and their appearance softened with landscape materials.

Standards and Guidelines:

- A. Avoid using retaining walls in excess of 30 inches in height (G). Where taller retaining walls are required, provide safety protection in the form of railings, fences or hedges, or create a terrace with two (2) shorter walls. (S)
- B. Incorporate architectural treatment on both sides of perimeter walls. (S)
- C. Provide landscaping in combination with walls and fences to soften their appearances. (G)
- D. Chain-link fencing with or without wood slatting is not an acceptable screen material. (S)
- E. Break up long expanses of fences or walls, with periodic columns, insets or change in materials. (S)
- F. Construct walls and fences from durable materials such as stone, brick, or metal with dark finishes (wrought iron or similar), or a combination of these materials. (G) Wood is not an acceptable fence/screening material. (S)
- G. Concrete walls are permitted if faced with masonry or stone, or if the surface is scored or textured. (G)



6.1 A AVOID USING RETAINING WALLS IN EXCESS OF 30 INCHES IN HEIGHT.



STAGGERED WALL



WALL AND PLANTERS



WALL WITH BREAKS

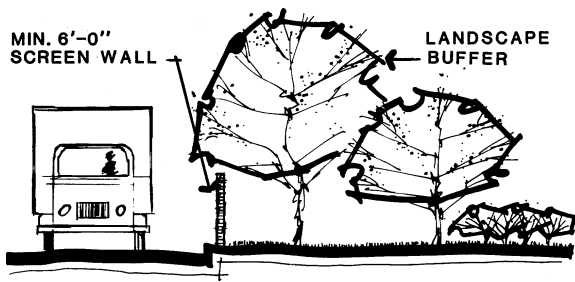
6.1 E BREAK UP LONG EXPANSES OF FENCES OR WALLS WITH COLUMNS, INSETS OR CHANGES IN MATERIAL

6.2 Screening Requirements

Policy:

A project must include adequate screening of meters, transformers, and loading and service areas.

Standards and Guidelines:



**6.2 A MAKE SCREENING FOR LOADING DOCKS AND SERVICE AREAS
A MINIMUM OF 6 FEET HIGH.**

- A. Make screening for loading docks and service areas a minimum of 6 feet high and constructed of the same materials and finishes as the main building. (S)
- B. All authorized outside storage shall be screened. (S)
 - 1) Screen from view all outdoor areas used for the display, storage, or sale of seasonal inventory. (S)
Use fencing, walls, and/or landscaping. (S)
- C. Screen all utility equipment, meters and transformers from view with fencing, walls, and/or landscaping. (S)



**6.2 B & C ALL AUTHORIZED OUTSIDE STORAGE, UTILITY EQUIPMENT,
METERS, AND TRANSFORMERS SHALL BE SCREENED.**



8. EXTERIOR SITE LIGHTING

Goal:

Exterior lighting should be used to provide illumination for the security and safety of entry drives, parking, service and loading areas, pathways, courtyards and plazas, without intruding on adjacent properties. Site lighting shall be architecturally compatible and consistent in design between sites.

8.1 Fixture Design and Illumination Level

Policy:

Exterior light fixtures should be compatible and relate to the architectural character of the buildings on a site. Site lighting should be provided at the minimum level to accommodate safe pedestrian and vehicle movements, without causing any off-site glare.

Standards and Guidelines:

- A. Poles and fixtures should be designed to be architecturally compatible with structures and lighting on adjacent properties. (G)
- B. Poles and fixtures shall be compatible with all other fixtures on site. (S)
- C. Illuminate all intersections with perimeter public roads with similar poles and fixtures used internal to the development. (G)
- D. Select and locate all lighting fixtures to shield or confine light spread within a site's boundaries. (S)
- E. To facilitate security, specify lighting levels that are adequate for visibility, but not overly bright. All building entrances should be well-lighted. (G)
- F. Use metal halide or other white light fixtures. High pressure sodium is not allowed in any application. (S)
- G. Maximum height of all poles within landscaped and plaza areas is 20 feet, measured from grade. Poles within these areas may be set on pedestals no more than 8 inches in height. (S)



8.1 LIGHT FIXTURES SHOULD BE COMPATIBLE AND RELATE TO THE ARCHITECTURAL CHARACTER OF THE BUILDINGS.

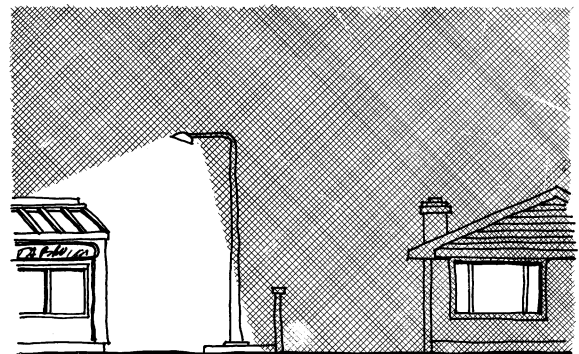


8.1 A POLES AND FIXTURES SHOULD BE COMPATIBLE WITH ADJACENT STRUCTURES AND LIGHTING.

8.2 Decorative Architectural Lighting

Policy:

Special lighting that accents building features and creates visual interest is permitted in commercial developments, provided that design continuity is maintained among buildings.



8.1 D SELECT AND LOCATE LIGHT FIXTURES TO CONFINE LIGHT SPREAD.

Standards and Guidelines:

- A. Lighting fixtures mounted directly on structures may be allowed when utilized to enhance specific architectural elements or to help establish scale or provide visual interest. (G)
- B. "Wall paks" are permitted only in loading and service areas, and should be down-lit and shielded from view. (S)
- C. Neon tubing is not acceptable as a building accent or to accentuate the building's form. (S)
- D. Integrate illuminators or fixtures used to light building mounted signage, building facades, or pedestrian arcades into a building's architectural design. (G)
- E. Consider highlighting entrances, art, terraces, and special landscape features. (G)

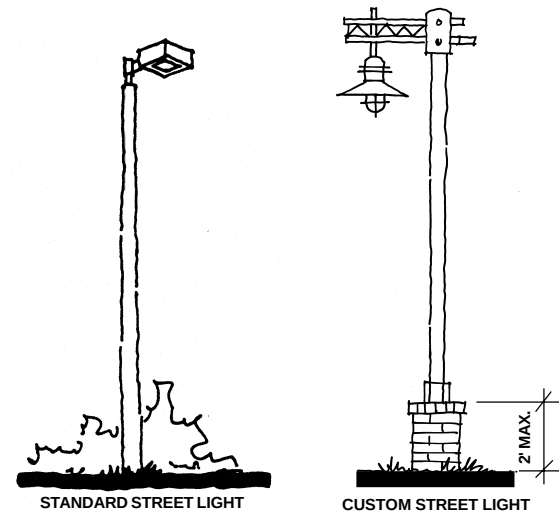
8.3 Parking Lot Lighting

Policy:

Parking lot lighting should be unobtrusive and provide safe light for orderly functions.

Standards and Guidelines:

- A. Make all parking lot light fixtures similar in design for all surface parking areas. (S)
- B. Select metal halide lighting with a concealed light source of the "cut-off" variety to prevent glare and "light trespass" onto adjacent buildings and sites. (S)
- C. Provide separate, pedestrian scale lighting for all pedestrian ways through parking lots. (G)
- D. Maximum height of parking lot poles is 24 feet measured from finished grade. (S)
- E. Locate poles in medians wherever possible with a maximum base height of two (2) feet. (G)



8.3 PARKING LOT LIGHT FIXTURES (SEE TEXT).

8.4 Pedestrian Area Lighting

Policy:

Walkway lighting should be scaled to the pedestrian and should provide for safe use of pathways and pedestrian areas. Walks should be lighted for the safe passage of pedestrians as should areas which are dangerous if unlit, such as stairs, ramps, intersections, and underpasses.

Standards and Guidelines:

- A. Use of lighted bollards or other low level fixtures is encouraged to identify pedestrian walkways and drop-off areas at entrances to buildings. (G)
- B. Emphasize pedestrian-to-vehicle intersections with low level decorative street lights. (G)
- C. Illuminate all primary walkways, steps or ramps along pedestrian routes. (G)



8.4 A USE LIGHTED BOLLARDS TO IDENTIFY PEDESTRIAN AREAS.

- D. Incandescent or metal halide lamps are strongly encouraged. (G)
- E. Use building mounted fixtures for walkways or plazas near buildings. (G)

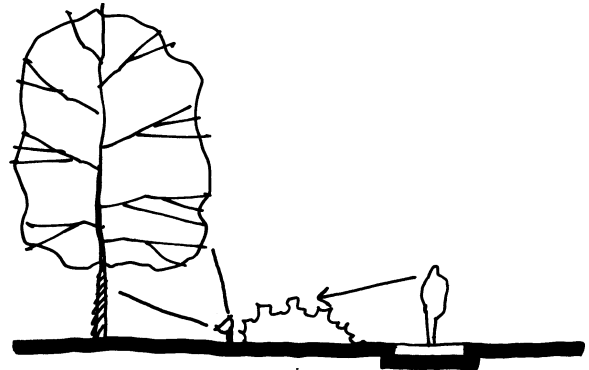
8.5 Landscape Lighting

Policy:

Landscape lighting should enhance and complement, not overpower, the landscape materials.

Standards and Guidelines:

- A. Design the landscape lighting to work for all seasons of the year and through the life of the landscape. (G)
- B. Conceal fixtures where possible (ie. in trees, by landscape, behind rocks), control glare, and avoid extreme bright spots on the surrounding landscape. (G)



8.5 B CONCEAL LIGHT FIXTURES WHERE POSSIBLE.

8.6 Site Security Lighting

Policy:

Security lighting is anticipated in some sites, but it should not negatively impact the site and building architecture as well as adjacent parcels.

Standards and Guidelines:

- A. No light source (bulb) shall be directly visible from adjacent parcels. (S)
- B. Provide only as much light/illumination as necessary to provide safety and security of the area. (G)

8.7 Light Intensity

Policy:

The light intensity levels within all areas should correspond to use and potential hazards.

Standards and Guidelines:

- A. A photometric lighting plan is required for all proposed commercial developments to ensure adequate and appropriate light levels are provided for each site condition. (S)

B. The following levels of illumination should be maintained for each of the specific locations*: (G)

1) Building Entrances	5.0 footcandles
2) Sidewalks	2.0 footcandles
3) Bikeways	1.0 footcandles
4) Courts/Plazas/Terraces	1.5 footcandles
5) Ramps	5.0 footcandles
6) Stairways	5.0 footcandles
7) Underpasses	5.0 footcandles
8) Waiting Areas	1.0 footcandles
9) Parking Lots	1.0 footcandles
10) Roadways	1.5 footcandles

* Values given area in minimum average maintained horizontal, footcandles which are measured at the average point of illumination between brightest and darkest areas, 4'-5' above the ground surface. (Source: IES Lighting Handbook - 4th Edition).

C. Site lighting should provide consistent levels of illumination, avoiding pockets of very high or low levels of illumination. (G)



9. SPECIAL DESIGN GUIDELINES FOR LARGE RETAIL ESTABLISHMENTS

Goal:

Large retail establishments, such as “superstores” containing more than 30,000 square feet allocated to a single user, depend on high visibility from major public streets. Correspondingly, the design of these buildings will shape much of the character and attractiveness of the major streetscapes in the commercial areas of Louisville. It is important that these large individual developments contribute to and integrate with the city in a positive way. The following policies, standards and guidelines are meant to provide a means to address the community-wide and regional impacts of large retail store developments and are in addition to the preceding standards and guidelines in this document.

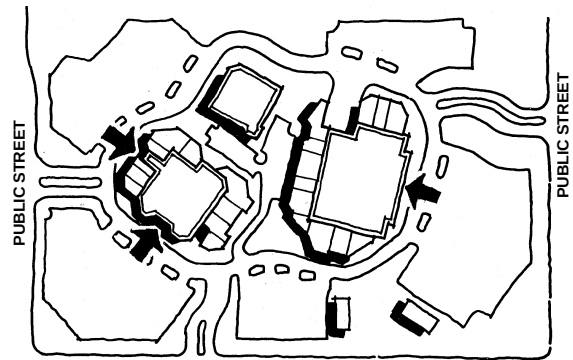
9.1 Parking Lot Orientation

Policy:

Parking should be distributed around large buildings in order to shorten the distance to the buildings and public sidewalks.

Standards and Guidelines:

Locate no more than 75% of the off-street parking area for the entire property between the front facade of the principal building(s) and the primary abutting street. (G)



9.1 DISTRIBUTE PARKING TO MINIMIZE WALKING DISTANCES.

9.2 Rear of Buildings

Policy:

The rear or sides of buildings should be attractive. Architectural and landscape screening techniques should be employed to mitigate the aesthetic impacts of blank walls, loading areas, storage areas, HVAC units and garbage receptacles.

Standards and Guidelines:

- A. Provide a minimum 35 foot building setback from the nearest property line along the rear and sides of buildings. (S)
- B. Where the parcel is adjacent to a residential use, plant evergreen trees at 15 foot intervals, or in clusters that accommodate mature tree diameter and provides appropriate screening. (S)

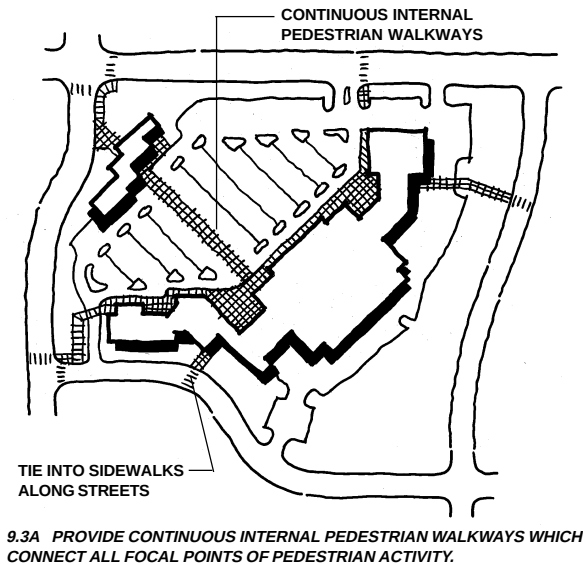
9.3 Pedestrian Accessibility

Policy:

Pedestrian accessibility provides linkages with surrounding areas and uses and opens auto-oriented developments to the neighborhood, thereby reducing traffic impacts and enabling the development to project a friendlier, more inviting image.

Standards and Guidelines:

- A. Provide continuous internal pedestrian walkways, a minimum of 8 feet wide, from the public sidewalk or right-of-way to the principal customer entrance of all principal buildings on the site. (S) Such walkway can include crosswalks. (G)
- B. Provide sidewalks, not less than 8 feet wide along any facade that contains a customer entrance, is adjacent to a parking area, or which would provide functional pedestrian connections. (S)
- C. Except where features such as arcades and entry ways are part of the facade, provide a 6 foot wide planting bed between the facade of the building and the adjacent sidewalk. (S)
- D. Distinguish all internal pedestrian walkways from driving surfaces with durable, low maintenance surface materials such as concrete or brick pavers. (S)
- E. Provide weather protection features such as awnings or arcades within 30 feet of all customer entrances. (G)



9.4 Central Features and Community Spaces

Policy:

Large retail establishments should offer attractive and inviting pedestrian scale features, spaces, and amenities within the overall development area.

Standards and Guidelines:

- A. Configure entrances and parking lots to be functional and inviting with walkways conveniently tied to logical destinations. (G)
- B. Incorporate bus stops and drop-off/pick-up points as integral parts of the development. (G)
- C. Anchor pedestrian ways with special design features such as arcades, porticos, pedestrian-scale light fixtures, bollards, planter walls, towers and other architectural elements that define circulation ways and outdoor spaces. (G)
- D. Each large retail establishment within a larger commercial development must contribute to the establishment or enhancement of community and public spaces by providing at least 2 of the following amenities within its site or elsewhere within the overall development: 1) patio/seating area, 2) pedestrian plaza with benches, 3) transit center, 4) bus shelter, 5) window shopping walkway, 6) outdoor playground area, 7) kiosk area, 8) water feature, 9) clock tower, or 10) other such appropriate amenities. (S)

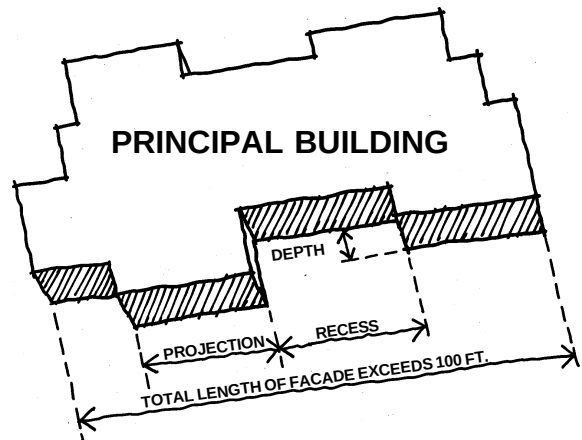
9.5 Facades and Exterior Walls

Policy:

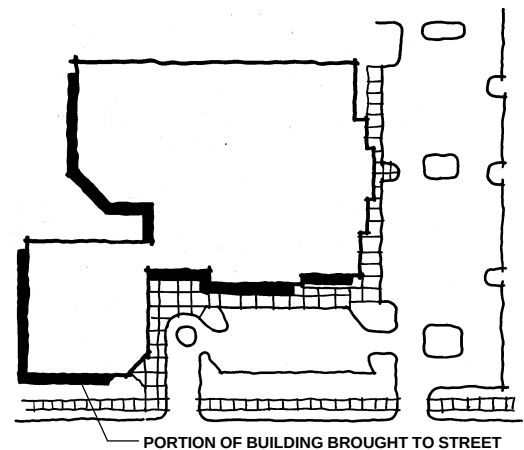
Articulate facades to reduce the massive scale and the uniform impersonal appearances of large retail buildings and provide visual interest that is consistent with Louisville's desired identity, character and scale.

Standards and Guidelines:

- A. In cases of facades more than 100 feet in length, incorporate significant architectural features and treatments to diminish the building mass. (S)
- B. Incorporate arcades, display windows, entry areas, or other such features along at least 60% of the horizontal length of all the ground floor facade with the primary pedestrian entrance. (S)
- C. Incorporate design features that are similar to the front facade in all rear and side facades visible from adjoining properties and/or public streets. (S)
- D. In cases of large buildings for employment, storage or auto related uses that have little relationship to pedestrians, or have a need to limit ground floor windows, bring a part of the building to the street. (G) A setback modification may be authorized for such purpose. (G)



9.5A FACADES MORE THAN 100 FEET IN LENGTH SHALL INCORPORATE SIGNIFICANT ARCHITECTURAL FEATURES AND TREATMENTS.



9.5D IN CASES OF LARGE BUILDINGS BRING A PART OF THE BUILDING TO THE STREET.

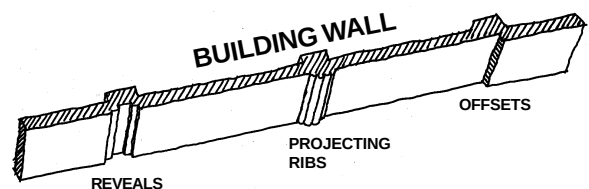
9.6 Detail Features

Policy:

All buildings should incorporate architectural features and patterns that create visual interest, are of a pedestrian scale, and recognize Louisville's desired identity character, and scale.

Standards and Guidelines:

- A. Incorporate a repeating pattern in all building facades, to include the following elements: 1) color change, 2) texture change and 3) material module change. (G) Repeat these elements at intervals of no more than 30 horizontal feet. (G)
- B. Express architectural or structural bays through a change in plane of at least 12 inches in width, such as an offset, reveal, or projecting rib. (G)



9.6B EXPRESS ARCHITECTURAL OR STRUCTURAL BAYS THROUGH A CHANGE IN PLANE.

9.7 Roofs

Policy:

Variations in roof lines should be used to add interest to, and reduce the massive scale of large retail buildings. Roof features should complement the character of adjoining neighborhoods.



9.7A INCORPORATE A VARIETY OF ROOF FEATURES IN LARGE RETAIL BUILDINGS.

Standards and Guidelines:

- A. Incorporate the following features into the roofs of large retail buildings:
For flat roofs:
 - 1) Parapets on all building elevations that conceal flat roofs and rooftop equipment. (S)
If sloping roofs are used, the standards in 2 and 3 below must be applied on all building elevations. (S)
 For sloping roofs:
 - 2) Overhanging eaves that extend no less than 3 feet past the supporting walls. (S)
 - 3) Three or more roof slope planes. (S)
- B. Design roof slopes within the maximum to minimum range of 1:1 to 3:1. (S)

9.8 Materials and Colors

Policy:

Exterior building materials and colors comprise a significant part of the visual impact of a building. Therefore, they should be aesthetically pleasing and compatible with materials and colors used in adjoining neighborhoods and commercial parcels.

Standards and Guidelines:

- A. Incorporate high quality exterior building materials in the design and construction of large retail buildings such as brick, wood, sandstone or other native stone and tinted, textured, concrete masonry units. (G)
- B. Avoid using the following exterior building materials: smooth-faced concrete block, tilt-up concrete panels and pre-fabricated steel panels. (G)

9.9 Building Entryways

Policy:

Entryway design elements should give orientation and aesthetically pleasing character to a building.

Standards and Guidelines:

- A. Incorporate clearly defined, highly visible customer entrances for each principal building on a site. (S)
- B. Enhance each entrance with at least 3 of the following features: 1) canopies or porticos, 2) overhangs, 3) recesses/projections, 4) arcades, 5) raised corniced parapets over the door, 6) peaked roof forms, 7) arches, 8) outdoor patios, 9) display windows, 10) architectural details such as tile work and moldings which are integrated into the building structure and design and 11) integral planters or wing walls that incorporate landscaped areas and/or places for sitting. (S)
- C. Provide at least 1 exterior customer entrance for each additional store located within a principal building (such as a pharmacy or bank located within a supermarket). (G)



9.9 A INCORPORATE CLEARLY DEFINED, HIGHLY VISIBLE CUSTOMER ENTRANCES FOR EACH PRINCIPAL BUILDING.

APPENDIX A

RECOMMENDED PLANT MATERIALS LIST

DECIDUOUS TREES

Common Name	Botanical Name	Height ³	Width ³	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Western Hackberry	Celtis occidentalis	60'	40'	M-L	L	Yes	Great bird attractant; CO native
Kentucky Coffeetree	Gymnocladus dioica	60'	50'	L	L	Yes	Males have flowers but no seeds; slow growth but superior drought tolerance
Norway Maple	Acer platanoides (2)	50-60'	40-45'	M	L	Yes	Good fall color yellow
Black Walnut	Juglans nigra	50-60'	50-60'	M-L	L	No	Stains sidewalks, streets and cars
American Linden	Tilia americana	50-60'	30-35'	M	L	Yes	
Redmond Linden	Tilia euchlora 'Redmond'	50-60'	30-35'	M	L	Yes	
Horsechestnut	Aesculus hippocastanum	50'	40'	M-L	L		
Western Catalpa	Catalpa speciosa	50'	30'	M-L	M		Fruits can be messy
Swamp White Oak	Quercus bicolor	50'	40'	M-L	L	Yes	
Bur Oak	Quercus macrocarpa	50'	40'	L	L	Yes	Tolerates tough conditions
Northern Red Oak	Quercus rubra borealis	50'	30'	M	L	Yes	
Shumard Oak	Quercus shumardii	50'	40'	M	L	Yes	Red fall color; not fussy; tolerant of high pH
English Oak	Quercus robur	45'	35'	M-L	L	Yes	Good fall color; needs shelter
Red Maple very few	Acer rubrum	40-50'	30-40'	M	L	Yes	Good yellow to red fall color
Texas Shumard Oak	Quercus buckleyi	40'	30'	M-L	L	Yes	More drought tolerant
Honeylocust	Gleditsia triacanthos inermis (2)	36'	25'	L	L	Yes	Shademaster, Imperial & Skyline
Little Leaf Linden	Tilia cordata	35-40'	25-30'	M	L	Yes	
Chinese Catalpa	Catalpa ovata	35'	30'	M-L	M	No	
Turkish Hazel	Corylus colurna	30-40'	20-25'	M-L	L	Yes	Tolerates pollution
Amur Corktree	Phellodendron amurense	30-40'	35-45'	M-L	L	Yes	
Japanese Pagoda Tree	Sophora japonica	30-40'	15-20'	M-L	L	Yes	
Ohio Buckeye	Aesculus glabra	30-35'	26'	M-L	L	Yes	Poisonous seeds, good fall color
Yellow	Aesculus flava	30'	25'	M	L	Yes	Yellow flowers,

Buckeye							smooth fruit
Bigtooth Maple	Acer grandidentatum	20-25'	12-15'	L	L	No	Small tree or large shrub; tolerant of dry & alkaline soils; Ft. Collins selection is cherry-red in fall
Western Soapberry	Sapindus drummondii	20-25'	20-25'	L	M		Native to Baca County, poor soil; watch for co-dominant limbs; small tree
American Hornbeam	Carpinus caroliniana	20'	20-25'	M	L	No	Needs some shade; sensitive to salts; gorgeous winter look
Gambel Oak small tree	Quercus gambelli	15-20'	15-20'	L	L	No	Yellow to orange or red in fall

ORNAMENTAL TREES							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Globe and Purple Robe Locust	Robinia pseudoacacia 'Globe' & 'Purple Robe'	50'	30'	L	L	NA	
Colorado Paper Birch	Betula x andrewsii	40'	20'	M	L	NA	Native of Boulder Cnty., hybrid; white peeling bark
Glen's Form Callery Pear Aristocrat Pear Chanticleer Pear Stone Hill Pear	Pyrus calleryana (2)	35' 35' 30'	25' 15' 12-15'	M-L	M	NA	Narrower & more cold hardy than Bradford; fruit unimportant; clay ok
Downy Hawthorn	Crataegus mollis	30'	30'	L	L	NA	
White Shield Osage Orange	Maclura pomifera	30'	30'	M	L	NA	No thorns; leathery leaves; fruitless
Mayday Tree	Prunus padus	30'	20'	M-L	L	NA	
Shantung Maple	Acer truncatum	25-30'	20-25'	M-L	L	NA	Replacement candidate for Amur Maple; orange-yellow in fall
Cockspur Hawthorn	Crataegus crus-galli	25'	20'	L	L	NA	Thorns, good fall color orange to red
Des Fontanes Cherry	Prunus x fontanesiana	25'	20'	M	M	NA	Cheyenne USDA Research Station intro. – Ft. Collins Nursery
Thornless Cockspur Hawthorn	Crataegus crus-galli inermis	20-30'	25-35'	L	L	NA	Thornless, good fall color orange to red
Washington Hawthorn	Crataegus phaenopyrum	20-30'	15-20'	M-L	L	NA	Good fall color, red
Amur Maackia	Maackia amurensis	20-30'	25-30'	M	L	NA	Wider than tall; nitrogen fixing; tolerate dry,

							alkaline soils
Peking Lilac	Syringa pекinesis	20-30'	15-25'	M-L	L	NA	Showy flowers
Tatarian Maple 'Hot Wings'	Acer tataricum 'Hot Wings'	20-25'	15-20'	M-L	L	NA	June-pink/brilliant red seeds, fall yellow to orange-red; Fort Collins Nursery introduction 2003
Shadblow Serviceberry	Amelanchier canadensis	20-25'	10-15'	M-L	L	NA	Nice fall color yellow to red
Shubert Chokecherry or Canada Red Cherry	Prunus virginiana 'Shubert'	20-25'	15-20'	M-L	L	NA	Red-purple foliage
Eastern Redbud	Cercis canadensis	20'	15'	M - H	L	NA	Showy flowers
Russian Hawthorn	Crataegus ambigua	20'	20'	M-L	M-L	NA	Some thorns, some suckering, fruit persists through winter; flowers in June
English Hawthorn	Crataegus laevigata	15-25'	15-25'	M-L	L		Tough, good for islands, buffers
Flowering Crab	Malus varieties (2)	15-25'	15-25'	L - M	M	NA	
Amur Maple	Acer ginnala	15-20'	15-20'	M-L	L	NA	Good fall color orange to red
Cornelian Dogwood	Cornus mas	15'	12-15'	M	L	NA	Showy flowers
Gray Dogwood	Cornus racemosa	15'	15'	M-L	L	NA	Very attractive
American Smoketree	Cotinus obovatus	15'	12'	M	L	NA	Plume-like flowers
Wafer Ash or Hoptree	Ptelea trifoliata	15'	15'	M-L	L	NA	Elm-like wafers in late summer; fall-yellow; drought tolerant
Japanese Tree Lilac	Syringa reticulata	15'	12'	M-L	L	NA	Showy flowers, good fall color yellow
American Plum	Prunus americana	10-12'	8-12'	L	M	NA	Suckers

DECIDUOUS SHRUBS							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Thin Leaf Alder	Alnus tenuifolia	15-30'	15-20'	M	L	NA	Nice fall color yellow
Seneca Viburnum	Viburnum sieboldii 'Seneca'	15-20'	10-15'	M-L	L	NA	Hedge, buffer strips, specimen
Yellow-fruited Chokecherry	Prunus virginiana xanthocarpa	12-18'	12'	L	M	NA	Nice flower panicles
Staghorn Sumac	Rhus typhina	10-25'	10-15'	L	M	NA	
Curleaf Mountain Mahogany	Cercocarpus ledifolius	10-20'	8-12'	L	M	NA	
Wavy Leaf Oak	Quercus undulata	10-20'	8-16'	L	L	NA	
Siberian Peashrub	Caragana arborescens	10-15'	8-12'	L	L	NA	Good windbreak; soil tolerant; many varieties
Beautybush	Kolkwitzia amabilis	10-15'	12-15'	L		NA	
Burning Bush	Euonymus alata (2)	10-12'	8-12'	M	M	NA	Nice fall color red
American Plum	Prunus americana	10-12'	10-12'	L	L	NA	Very fragrant flowers; suckering; good for wildlife
Native	Prunus virginiana	8-20'	8-12'	L - M	M	NA	

Chokecherry	melanocarpa						
Scrub Oak	Quercus gambelii	8-20'	6-12'	L	L	NA	
New Mexico Privet	Forestiera neomexicana	8-15'	8-12'	L	M	NA	Fall: yellow; makes excellent hedge
Smooth Sumac	Rhus glabra	8-15'	8-10'	L	M	NA	Nice fall color orange to red; cismontana is native form
Buffaloberry	Shepherdia sp.	8-15'	6-12'	L	M	NA	Silver, Russet and Round-leaf are best
Hairy Mountain Mahogany	Cercocarpus breviflorus	8-12'	8-12'	L	L	NA	Stays evergreen in protected sites
Tallhedge Buckthorn	Rhamnus frangula columnaris	8-12'	3-4'	M	M	NA	
Siberian Weeping Peashrub	Caragana arborescens 'Pendula'	8-10'	8-10'	L	L	NA	Yellow flowers; poor soil and wind tolerant
Thimbleberry or Boulder Raspberry	Rubus deliciosus	8'	6'	L	M	NA	Native, prune out older canes every few years
Silver Fountain Butterflybush	Buddleia alternifolia 'Argentea'	6-8'	6-8'	L	M	NA	Plant Select Winner
Szechwan Fire Cotoneaster	Cotoneaster ignavus	6-8'	4-6'	L	L	NA	Cheyenne USDA Experimental Station intro.; very tough
Forsythia	Forsythia intermedia	6-8'	6-8'	M	M	NA	Showy flowers
Cistena Plum	Prunus cistena	6-8'	4-6'	M	M	NA	
Manchurian Viburnum	Viburnum burejaticum	6-8'	5-7'	M-L	L	NA	Similar to V. lantana in appearance; Cheyenne USDA Station introduction
Singleleaf Ash	Fraxinus anomala	6-20'	6-20'	L	L	NA	Tolerates dry conditions
Saskatoon Serviceberry	Amelanchier alnifolia	6-12'	6-12'	L	L	NA	Nice fall color
Utah Serviceberry	Amelanchier utahensis	6-12'	6-12'	L	L	NA	Native to Western Slope
Butterfly Bush	Buddleia sp. (2)	6-12'	4-8'	M-L	M	NA	

DECIDUOUS SHRUBS							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Hedge Cotoneaster	Cotoneaster lucidus	6-12'	4-6'	M-L	L	NA	
Silverberry	Eleagnus commutata	6-12'	6-12'	M	M	NA	
Smith's Buckthorn	Rhamnus smithii	6-12'	6-8'	L	L	NA	Tolerates dry; Plant Select Winner
Peking Cotoneaster	Cotoneaster acutifolia	6-10'	6-10'	M-L	L	NA	
Nanking Cherry	Prunus tormentosa	6-10'	6-12'	M-L	L	NA	
Mentor Barberry	Berberis mentorensis	5-7'	5-7'	M-L	M	NA	Thorns, good fall color yellow to red
Western Sandcherry	Prunus besseyi	5-6'	5-6'	L	M	NA	'Pawnee Buttes' is very low, wide spreading
Mountain Mahogany	Cercocarpus montanus	4-9'	4-6'	L	M	NA	
Cliffrose	Cowania mexicana	4-8'	4-8'	L	L	NA	
Honeysuckle	Lonicera (2)	4-8'	3-12'	M	M	NA	Honeyrose, Blue

							Velvet, Arnold Red, Clavey's Dwarf & Miniglobe native
Yucca sp., Soaptree,	Yucca elata,	4-8'	3-7'	M-L	M	NA	
Redleaf Japanese Barberry	Berberis thunbergii (2)	4-6'	4-6'	M-L	M	NA	Thorns
Quince	Chaenomeles spp.	4-6'	4-6'	M-L	M	NA	Showy flowers
Spreading Cotoneaster	Cotoneaster divaricata	4-6'	6-8'	M-L	M	NA	
Cliff Fendler Bush	Fendlera rupicola	4-6'	4-6'	L	L	NA	Native, heat & drought tolerant
Privet	Ligustrum (2)	4-6'	3-4'	L	M	NA	Regal, Cheyenne, 'Densiflorum' & 'Lodense'
Mockorange	Philadelphus (2)	4-6'	4-6'	M-L	M	NA	
Golden Currant	Ribes aureum	4-6'	4-6'	L	M	NA	
Crandall Clove Currant	Ribes odoratum 'Crandall'	4-6'	4-6'	M-L	L	NA	Native; can smell cloves 10-15' away; orange fall color
Emerald Carousel Barberry	Berberis x 'Tara'	4-5'	4-5'	M-L	M	NA	Yellow flowers; very adaptable, cold hardy; persistent red fruit
Privet	Ligustrum vulgare (2)	4-15'	4-15'	M	M	NA	
Viburnum	Viburnum (2)	4-12'	4-15'	M-L	M	NA	Nice fall color varies
Antelope Brush	Purshia tridentata	4'	5'	L		NA	
Gooseberry	Ribes sp. (2)	4'	4'	M-L	M	NA	
Four Wing Saltbush	Atriplex canescens	3-6'	2-4'	L	M	NA	
Apache Plume	Fallugia paradoxa	3-6'	3-6'	L	L	NA	Native, silver-pink seed heads all summer
Rock Spirea	Holodiscus dumosus	3-6'	3-6'	M-L	L	NA	Good ornamental winter look
Waxflower	Jamesia americana	3-6'	3-6'	L	L	NA	Prefers good drainage
Threeleaf Sumac	Rhus trilobata	3-6'	3-6'	L	M	NA	Nice fall color orange to red

DECIDUOUS SHRUBS							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Alpine Currant	Ribes alpinum	3-6'	3-6'	L – M	M	NA	
Wood's Rose	Rosa woodsii	3-6'	3-6'	L		NA	
Siberian Spirea	Sibiraea laevigata	3-6'	5-10'	M-L	M	NA	
Littleleaf Mountain Mahogany	Cercocarpus intricatus	3-5'	3-5'	L	L	NA	Very drought tolerant, slow growing, evergreen
Fernbush	Chamaebatiaria millefolium	3-5'	3-6'	L	M	NA	Blooms throughout summer into late fall
Carol Mackie Daphne	Daphne x burkwoodii 'Carol Mackie'	3-5'	3-5'	M-L	L	NA	Part shade; needs good drainage
Fremont's Desert Holly	Mahonia fremontii	3-5'	3-6'	L	L	NA	Very xeric broadleaf evergreen, blue holly foliage
Russian Sage	Perovskia atriplicifolia	3-5'	3-5'	L	M	NA	Must be cut nearly to ground

							in late winter
Blue Mist Spirea	Caryopteris x clandonensis	3-4'	2-3'	L	L	NA	
Blue Stem Joint Fir	Ephedra equisetina	3-4'	5-6'		L	NA	3-4'; red berries against blue foliage
Mountain Ninebark	Physocarpus monogynus	3-4'	3-4'	M-L	M	NA	Orange to red fall color
Aromatic Sumac	Rhus aromatica	3-4'	6-8'	L	L	NA	Non-suckering form; good year-round architecture; 'Gro-low' is low, wide-spreading
Red Lake Currant	Ribes 'Red Lake'	3-4'	3-4'	M-L	M	NA	
Snowberry	Symphoricarpos albus	3-4'	3-5'	M	M	NA	
Lilac	Syringa patula, hyacinthiflora, prestoniae & vulgaris (2)	3-12'	3-12'	M-L	M	NA	All cultivars are drought tolerant
Snowfall Common Ninebark	Physocarpus opulifolius 'Snowfall'	3'	4'	L	L	NA	More compact; larger white-pinkish flowers; fall: yellowish-bronze
Rabbit Brush	Chrysothamnus nauseosus	2-6'	2-6'	L	M	NA	Blue and green varieties
Corallberry	Symphoricarpos sp. (2)	2-6'	3-6'	M-L	L	NA	
Potentilla	Potentilla fruticosa (2)	2-5'	2-5'	M-L	M	NA	Showy flowers
Dwarf Russian Almond	Prunus tenella	2-5'	2-4'	L	L	NA	
Leadplant	Amorpha canescens	2-4'	2-4'	L	M	NA	One of most showy western plants
Broom, Moonlight or Spanish Gold	Cytisus 'Moonlight' & Cytisus purgans 'Spanish Gold'	2-4'	4-6'	L	L	NA	
Wax Currant	Ribes cereum	2-4'	2-4'	L	M	NA	
Rose	Rosa 3	2-4'	2-4'	L – M	M	NA	
Spiraea	Spiraea 3	2-4'	2-4'	M-L	M	NA	
Ponchita Manzanita	Arctostaphylos nevadensis 'Ponchito'	2-3'	3-5'	M-L	L	NA	2-3'; Native, drought tolerant; pink-white flowers Apr-May

DECIDUOUS SHRUBS							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Rock Cotoneaster	Cotoneaster horizontalis	2-3'	3-6'	M-L	M	NA	
Royal Gold Woadwaxen	Genista tinctoria 'Royal Gold'	2-3'	2-3'	L	L	NA	Great planted in swaths, blooms twice; bright yellow; holds green leaves into winter
St. Johnswort, Sunburst and Hidcote	Hypericum sp.	2-3'	2-3'	L	L	NA	
Soapweed	Yucca glauca	2.5-3'	3-4'	M-L	M	NA	native
Sagebrush	Artemisia (2)	1-6'	2-3'	L	L	NA	
Winterfat	Ceratoides lanata	1-4'	2-4'	L	L	NA	Needs good drainage
Cascade Manzanita	Arctostaphylos nevadensis 'Cascade'	1-2'	3-5'	M-L	L	NA	1-2' high, Ft. Collins introduction; cascading habit;

Mock-Bearberry Manzanita	Arctostaphylos x coloradoensis	1-2'	3-5'	M-L	L	NA	FS-PS 1-2' high; Ft. Collins introduction; red berries; FS-PS
Coral Beauty Cotoneaster	Cotoneaster dammeri 'Coral Beauty'	1-2'	4-6'	M-L	M	NA	
Creeping Oregon Grape Holly	Mahonia haematocarpa	1-1.5'	3-4'	M-L	L	NA	Red fall color
Cranberry Cotoneaster	Cotoneaster apiculata	1.5-2'	4-6'	M-L	M	NA	
Harriman's	Yucca harrimaniae	.75-1'	1-1.5'	M-L	M	NA	native

EVERGREEN TREES (1)							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Southwestern White Pine	Pinus strobiformus	80'	40'	M-L	L	No	
Douglas Fir	Pseudotsuga menziesii 'Taxifolia'	75-100'	40'	M	L	No	
Swiss Mountain Pine	Pinus mugo	6-8'	12-15'	L - M	L	No	
Colorado Green Spruce	Picea pungens	60'	30'	M-L	L	No	
Colorado Blue Spruce	Picea pungens 'Glauca'	60'	30'	M-L	L	No	
Serbian Spruce	Picea omorika	50-60'	20-25'	M	L	No	Narrow pyramidal growth; uniform; blue
Austrian Pine	Pinus nigra	50'	20'	M-L	L	No	
Scotch Pine	Pinus sylvestris	50'	30'	M-L	L	No	
Red Cedar	Juniperus virginiana 'Varieties'	40-50'	8-20'	M	L	No	
Ponderosa Pine	Pinus ponderosa	40'	25'	L	L	No	
Rocky Mountain Juniper	Juniperus scopulorum 'Varieties'	30-60'	15'	L - M	L	No	
Bristlecone Pine	Pinus aristata	30'	15'	L	L	No	
Limber Pine	Pinus flexilis	30'	15'	L	L	No	
Pinon Pine	Pinus edulis	25-30'	10-15'	L	L	No	
Smooth Arizona Cypress	Cupressus arizonica var. glabra	20-40'	8-15'	L	L		Blue color
Oneseed Juniper	Juniperus monosperma	10-30'	6-12'	L	L	No	

EVERGREEN SHRUBS							
Common Name	Botanical Name	Height	Width	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Yew	Taxus x media 'Hicksii'	8-12'	3-4'	M-L	M	NA	High drought tolerance
Firethorn	Pyracantha coccinea (2)	8'	8'	M	M	NA	
Oregongrape	Mahonia aquifolium	6'	3'	M	M	NA	Nice fall colors red to purple
Euonymus Manhattan	Euonymus kiautschovicus 'Manhattan'	5'	4'	M	M	NA	
Euonymus Sarcocoe	Euonymus fortunei 'Sarcocoe'	4-6'	4-6'	M	M	NA	
Bigleaf Wintercreeper	Euonymus fortunei vegeta	4-5'	4-5'	M	M	NA	
Gnome Firethorn	Pyracantha angustifolia 'Gnome'	4'	4'	M	M	NA	
Juniper	Juniperus sp. (2)	1-30'	4-15'	L	L	NA	Many species; something for any size
Creeping Hollygrape	Mahonia repens	1'	1'	M	M	NA	Nice fall/winter colors red to purple

PERENNIALS, GROUND COVERS, AND ORNAMENTAL GRASSES

Due to the large quantity, variety, and changing availability of these plants, please consult your local nursery preferably a C.N.A. Member.

Height, color, texture, moisture, light requirement, and heartiness need to be considered when specifying these plants.

Most local nurseries provide a yearly catalog of available plants and their descriptions.

Notes:

1. Mature size of all evergreen trees must be considered when determining location for planting. They are not recommended within 8' of any roadway, walkway, entrance, or window as they will eventually obstruct passage or view. Evergreen trees shall not be placed within roadway site triangles. During winter, icy conditions often occur on the north side of evergreen trees. This must be considered for their placement.

2. These plants have numerous different species, varieties and/or cultivars. Consult a local nursery for current availability and proper selection.

3. Heights and widths are anticipated sizes, but will vary due to environmental issues.

Exhibit C
Industrial Development Design Standards and Guidelines



Industrial Development Design Standards & Guidelines
(IDDSG)

Adopted by Ordinance No. 1322, Series 1999
18 January 2000

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INTRODUCTION

A. Purpose

The *Industrial Development Design Standards and Guidelines* ("IDDSG") establish design criteria and minimum standards for industrial developments within the City of Louisville. The purpose of the IDDSG is to:

1. Enhance and protect Louisville's quality of life and community image through clearly articulated industrial development design goals and policies, design guidelines and minimum design standards; and
2. Protect and promote Louisville's long-term economic vitality through industrial design standards which encourage and reward high quality development, while discouraging less attractive and less enduring alternatives; and
3. Minimize adverse impacts of vehicular circulation to existing neighborhoods and to the surrounding physical environment; and
4. Enhance and protect the security and health, safety and welfare of all residents of the City of Louisville; and
5. Facilitate an understanding of the City's expectations and to assist developers in compiling a complete and efficient application.

B. Applicability

The provisions of the IDDSG shall apply to all industrial development within the City, except industrial development for which there exists a vested property right to develop under other approved design guidelines and/or development standards.

The IDDSG provide general design guidelines, as well as mandatory minimum development standards. The IDDSG will be utilized by staff, Planning Commission, and City Council to review *Industrial* development applications submitted under the City's PUD Development Plan review process. All industrial areas must be developed as PUD-I district, including site specific development

plans.

The goals and policies set forth in this document are expected to be met through compliance with all mandatory design standards and consideration of design guidelines. Modifications to or waivers from mandatory design standards may be recommended by the Planning Commission and authorized by City Council as part of the PUD Development Plan Review process.

Industrial development applications seeking modifications or waivers to these requirements should anticipate additional review time and must demonstrate a clear benefit to the City in relaxing one or more of these requirements.

C. Who Uses the IDDSG

The IDDSG is to be used by property owners/ applicants and their design consultants in the planning of industrial development projects within the City of Louisville. The IDDSG will also be utilized by staff, Planning Commission, and City Council as part of the PUD Development Plan process in their reviews of industrial projects to which the IDDSG apply.

D. Desirable Elements of Industrial Project Design

The City considers the following design features to be desirable elements of industrial development, and the standards and guidelines set forth in following chapters are intended to facilitate the incorporation of these features into an *Industrial* project:

1. Prominent access driveways with clear visibility of entrances.
2. Multi-modal transportation.
3. Controlled site access.
4. Landscaped and screened parking, and loading and service areas.
5. Service areas located at the rear of buildings.
6. Quality exterior building materials, surfaces, and textures.
7. Significant landscape, streetscape and hardscape elements.
8. Placement of structures that creates

opportunities for plazas, courtyards, or gardens/patio areas which can be utilized as pedestrian gathering places and common employee gathering areas with appropriate site furniture and lighting.

9. A variety of architectural design treatments, including articulated building footprints to reduce massing and to promote architectural definition and interest.
10. Preservation of natural site features.
11. Enhancement of view corridors to open areas and mountain vistas.
12. Support services to industrial development, such as child care accessory to a large corporate campus, may be appropriate in accordance with currently adopted codes and ordinances.
13. Site design and improvements should anticipate the potential re-use of the building for other purposes.
14. Quality architectural designs and building materials should be incorporated into industrial projects.
15. The appearance of both the building and the site landscaping should have a strong emphasis toward public street views, incorporating a concept that emphasizes the 'public zone'.

E. Undesirable Elements of Industrial Project Design

The City considers the following design features to be undesirable elements of industrial development:

1. Poorly defined site access points.
2. Disjointed parking areas, or confusing or unsafe circulation pattern.
3. Square, 'box-like' structures with large, blank, unarticulated wall surfaces.
4. Highly reflective surfaces or repetitious and continuous glazing patterns.
5. Metal siding used as a primary exterior facade treatment.
6. Visible outdoor storage, loading, and equipment areas.
7. Signage which is redundant or out of scale with building architecture.

F. Relation of the IDDSG to Other City Regulations, Ordinances and Private Development Covenants

The IDDSG is a supplement to the City of Louisville's Zoning and Subdivision Regulations, PUD Ordinance, *City of Louisville Department of Public Works Engineering Division Design and Construction Standards*, and *City of Louisville Storm Drainage Design and Technical Criteria*.

Where a mandatory standard in this document is in conflict with any provision of the City of Louisville municipal code, the most restrictive requirement shall take precedence and shall apply. Building and life safety codes, *the City of Louisville Department of Public Works Engineering Division Design and Construction Standards/ and the City of Louisville Storm Drainage Design and Technical Criteria* take precedence over the standards in this document in cases where the standards in this document require action that is in conflict with those codes.

All industrial development within the City of Louisville shall meet the requirements of the Americans with Disabilities Act (ADA).

G. How to Use the IDDSG

The IDDSG is generally organized in a descending order of scale, from overall site planning concerns, to circulation issues, to buildings, site details, and then signs and exterior lighting. When first developing overall planning concepts for a parcel, the earlier chapters will be most relevant. At advanced stages of design, when architectural details and specific landscaping ideas are being developed, chapters appearing later in the document will be most relevant.

Each chapter has four basic components:

1. A goal statement, which sets forth the City's overall design goal to be achieved in the PUD Industrial Planned Unit Development Plan review process with regard to the subject matter of the chapter.
2. A policy statement, which establishes a

- more specific design goal with regard to a more specific subject matter.
3. The statements of **standards**, indicated with an **{S}**, and **guidelines**, indicated with a **{G}**, which establish the specific design standards with which compliance is mandatory, and the design guidelines with which compliance is strongly encouraged. **A failure to meet a mandatory standard may be the basis for denial of an application.**
 4. Illustrations showing one or more suggested design solutions that would be appropriate or inappropriate with respect to the standards and guidelines. These may be photographs or sketches. In the event of conflict between an illustration and the text of the IDDSG, the text shall control.

H. Definitions

For purposes of this document, the following terms shall have the following meanings:

nIndustrial Development" Any land development activity in the city, including but not limited to non-offensive types of industry, processing and manufacturing activities, but not including development activity intended solely for residential, retail and or office use. Industrial development also includes any addition, remodeling, relocation or construction requiring an amendment to an approved, Final Industrial Planned Unit Development Plan. Specifically, industrial uses as enumerated in Louisville Municipal Code § 17.12.030 and/or in an established Planned Community Zone District-Industrial Plan (PCZD-I).

nFlex Space or Flex Building" A building designed for occupancy by single or multiple, undefined tenants in spaces designed to suit their varied needs. The tenants need significant amounts of fully finished interior space and have employee densities that are higher than the traditional industrial tenant, though the tenant must still have some industrial component, such as warehousing, distribution, assembly, or manufacturing. The building will have more of an office/commercial appearance on some or all

building elevations.

"Landscape Coverage" Land that is undeveloped or developed that can support plant materials; or has decorative landscape treatment; or that may be used by customers for recreation, circulation, or may be viewed by them. Paved parking lot areas used for auto circulation or parking do not qualify as landscape coverage.

nParcel" A parcel is the minimum amount of real property that a single user may occupy. In many cases, more than one lot will be combined into a single parcel for development of a single building or cluster of buildings to be used by a single user.

nPedestrian Scale/Human Scale" The relationship between the dimensions of a building, street, outdoor space, or streetscape element to the average dimensions of the human body as well as space and the built environment as perceived by the senses of a human being.

nPublic Zone" Building and other associated site improvements located on a development parcel which are within 300-feet of a public right-of-way or within the front half of the parcel (as measured from the front property line to the midpoint of the lot depth) whichever is less.

nNon-Public Zone" Building and other associated site improvements located on a development parcel that is located outside the Public Zone.

nEffective Landscaping" An area is considered landscaped to the extent it provides sufficient quantity and quality of plant materials to screen parking, building, or hardscaped areas of a project and provides color and viewing interest.



1. SITE PLANNING

Goal:

Locate buildings so as to maximize the presentation of streetscaping and primary building entries to major roadways/ to provide clear orientation and access for both vehicles and pedestrians and to facilitate internal pedestrian circulation. Place structures in consideration of the existing built context/ the location of adjoining uses/ and the location of major roads. Create pedestrian courtyards and common employee gathering areas.

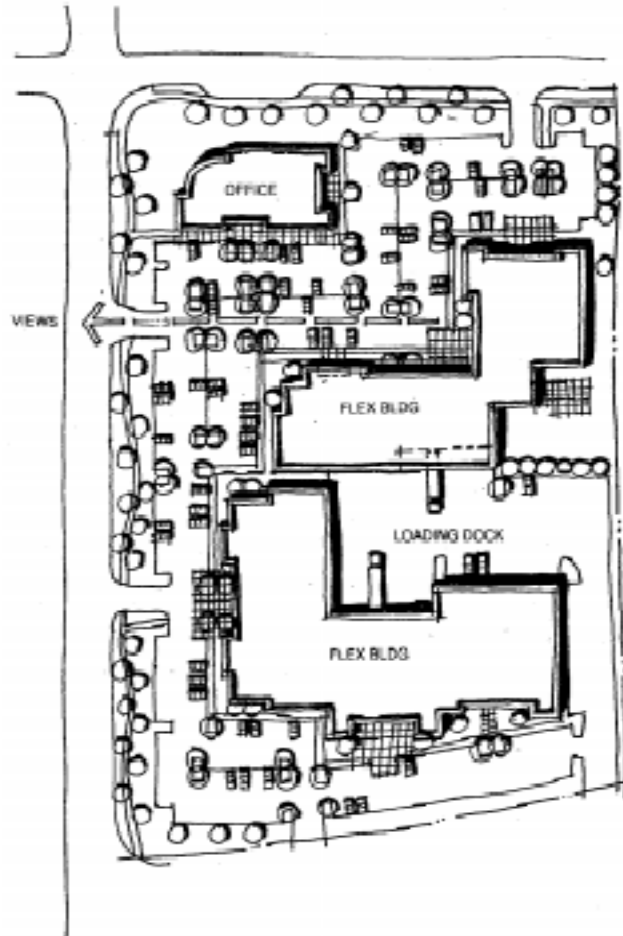
1.1 Building Siting and Orientation

Policy:

Buildings should be sited so that the character of existing landforms and site features is enhanced; the relationships between buildings are strengthened; and pedestrian and vehicular circulation is facilitated.

Standards and Guidelines:

- A. Provide pedestrian connections from building entries and required exits to public walkways to buffer pedestrians from vehicle circulation areas. (S)
- B. Provide plazas at primary building entrances as a means of distinguishing primary entries from secondary and service entries. (S)
- C. Provide employee-gathering places in areas that are of a sufficient size and scale and buffered from traffic and circulation areas. (S) Employee gathering areas shall not be located in proximity to primary public entrances. (S) Appropriately screened break areas may be considered in proximity to public entrances. (G)
- D. Orient buildings to promote views of the mountains through the development. (G)
- E. Position entries to buildings so they are easily identifiable from adjoining public right-of-ways and primary access drives. (G)



1.1 POLICY - OVERALL CONCEPT

1.2 Building and Parking Setbacks

Policy:

Provide a well-landscaped image along major streets, which promotes a formal streetscape appearance. To attain this objective, all buildings and parking should be set back from perimeter and interior streets a sufficient distance to create a distinct landscape zone between buildings, parking, and adjacent roadways. Varying building setbacks to enhance visual interest along the streetscape is strongly encouraged. Parking setbacks from all streets should allow for adequate visual buffering or screening.

Standards and Guidelines:

A. Minimum Building Setbacks: (S)

Front, side or rear yards from arterial streets	60-feet
Front yard at a local public street	30-feet
Side yard from a local public street	30-feet
Side yard interior (abutting a similar zoning district)	10-feet
Side yard interior (abutting residential and agricultural zoning districts, or public open space)	25-feet
Rear yard (abutting a similar zoning district)	15-feet
Rear yard (abutting residential and agricultural zoning districts or public open space)	25-feet
Northwest Parkway or other limited access highways	200-feet

B. Minimum Parking Setbacks: (S)

Front, side or rear yards from arterial streets	30-feet
Front yard at a local public street	20-feet
Side yard from a local public street	20-feet
Side yard interior (abutting a similar zoning district)	10-feet
Side yard interior (abutting residential and agricultural zoning districts, or public open space)	10-feet

- C. Only architectural projections that do not include floor area, such as roof eaves or other architectural enhancements, may encroach into the above setbacks not more than 3-feet. (S)
- D. For multi-building proposals, building setbacks should be varied to enhance visual interest along the streetscape. (S)
- E. Building setbacks shall not encroach into platted landscape, drainage and or railroad easements. (S)
- F. No portion of any building may encroach or project into any easement. (S)

1.3 Pedestrian Amenities

Policy:

Plazas, courtyards or similar visitor and employee amenities should be incorporated into both overall and individual site development plans. These areas should be easily accessible and comfortable for a substantial part of the year.

Standards and Guidelines:

- A. Furnish spaces with pedestrian amenities such as benches, landscaping, and/or recreational areas. These outdoor spaces shall be functional and shall not appear as 'left-over' spaces. (S)
- B. Provide seating that is useable year-round. Position seating such that it is buffered from exposed areas and takes advantage of sunny locations. (S)
- C. All common amenities within industrial developments shall be owned and maintained by the developer or by an organization established for such purposes. (S)
- D. Where feasible, create a sense of enclosure for outdoor seating areas. (G)

1.4 Site Coverage Requirements

Policy:

Open space and landscaped areas are valued amenities. Building, parking, and driveway site coverage within each parcel should be limited.

Standards and Guidelines:

- A. The maximum building, parking, walkway and driveway coverage within each parcel and for the entire development is 75%. (S)
- B. The minimum amount of landscape coverage provided within an industrial development is 25%. (S) This landscape coverage area is in addition to any required public land dedication. (S)
- C. Detention ponds may be included in landscape coverage if located fully within the building lot, and when those areas can be effectively landscaped. Detention ponds that are off-site, but contiguous to the building lot, and that can be effectively landscaped may be credited up to, but not

exceeding one-third of the total required landscape coverage requirement. (G)

1.5 Utilities, Mechanical, and Telecommunications Equipment

Policy:

The visual and noise impacts of utilities, mechanical equipment, data transmission dishes, towers, and similar antennas and equipment should be mitigated.

Standards and Guidelines:

- A. Install all permanent utility lines underground. (S)
- B. Temporary overhead power and telephone facilities are permitted during construction only. (S)
- C. Locate transformers away from major pedestrian routes and outdoor seating areas. (G)
- D. Buffer all transformers, telecommunications devices, equipment switching boxes and other utility cabinets from street and pedestrian areas with landscaping or architectural screens. (S) Do not leave meters exposed where visible to the public. (S) (See also Chapter 6: Screen Walls and Fencing). (S)
- E. The location of exterior mechanical equipment associated with industrial processing or manufacturing operations shall be such that it minimizes visual and auditory impacts from adjacent property and public streets and shall be mitigated with structural or landscape screening and buffering. (G)



1.5.D - SCREEN THESE AREAS FROM PUBLIC VIEW

1.6 Service, Delivery and Storage Areas

Policy:

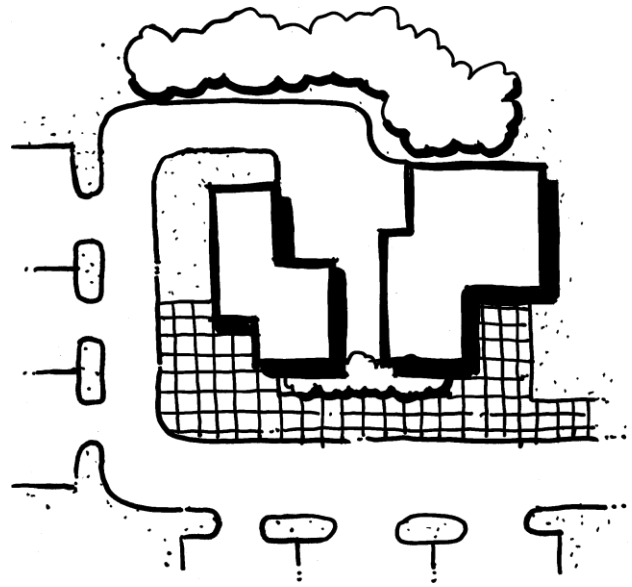
Service, delivery and storage areas should not be visually obtrusive. The visual impact of service and delivery areas should be minimized; especially views of such areas from public ways and along designated view corridors.

Standards and Guidelines:

- A. Locate loading docks, outside storage, and service areas in areas of low visibility such

as at the side or at the rear (non-street side) of buildings. (S) Outside storage of any kind in public street rights of way, building setbacks or easement areas is not permitted. (S)

- B. With the exception of outside storage areas, when it is not possible to locate loading facilities and service areas on a non-street side of a building, loading docks and doors shall not dominate the building frontage and must be screened from all adjoining public rights of way. Loading and service facilities shall be offset from driveway openings. (S) In no case may outside storage areas be located in the front of a building. (S)
- C. Combine loading docks and service areas between multiple sites. (G) Screen from public view with fencing, walls, other structures and/or landscaping. (S)
- D. Clearly identify service entrances with signs to discourage the use of main entrances for deliveries. (G)
- E. Service and refuse areas shall not encroach into the parking setback. (S) Such areas shall be screened with a minimum six-foot wall height enclosure (as measured from finished grade). (S) Service and refuse areas shall be paved with an impervious surface of asphalt or concrete. (S)
- F. Service and outside storage enclosures shall be constructed of materials to match or compliment the building material. No enclosure shall be made of any form of chain link or wood fencing. Gates and/or access doors may be constructed of materials different from the actual enclosure material to facilitate operation of the gates or access doors. (S) Trash enclosures shall enclose an area large enough to accommodate the peak needs of varied potential industrial users of the building. (S)
- G. Outside storage areas shall not exceed 10% of the floor area of the principal structure and when authorized must be typically associated with the specific industrial operation proposed for the building. (S)
- H. Outside storage areas shall be fully screened by screen wall enclosures. (S) Screen walls shall have a minimum height of 6-feet, and a maximum height of 10-feet. Stored materials may not be stacked or be visible above the enclosure height. (S)



1.6.C - WELL SCREENED SHARED SERVICE COURTYARD



1.6.H - THIS IS NOT PERMITTED - OUTSIDE STORAGE MUST BE FULLY SCREENED

- I. Storage areas shall be paved with an impervious surface of asphalt or concrete and designed in accordance with required fire access, and fire lane requirements. (S)
- J. Trash compaction and recycling are strongly encouraged and should be accommodated in industrial project design. (G)
- K. Sites shall not be designed to accommodate ongoing storage of truck trailers or other cargo storage trailers. (S)

1.7 Water Quality Control and Drainage

Policy:

Storm water and snowmelt from rooftops, paved areas, and lawns carry plant debris, soil particles, and dissolved chemicals into the City's storm drainage system. Site development plans should employ management and engineering practices to protect stormwater from these undesirable elements, before releasing water into the City's storm drainage system.

Site drainage should be designed to minimize water collection near building foundations, entrances and service ramps. In addition to the City of Louisville's Storm Drainage and Technical Criteria, the following standards and guidelines apply:

Standards and Guidelines:

- A. Storm water shall not drain directly into the public storm drainage system without first going through a natural, landscaped detention pond and/or a grassy swale. (S)
- B. Design and maintain all grassy swales and other drainage channels in accordance with City of Louisville Storm Drainage Design and Technical Criteria. (S)
- C. Avoid hard concrete-lined channel designs, unless recommended by the City's Public Works Department. If a hard channel design is required use a more natural approach that incorporates river rock or natural rock channel lining when possible. (G)
- D. Utilize accepted design criteria and recommendations of the Urban Drainage and Flood Control District (UD & FCD) and the City of Louisville for detention pond design to enhance water quality. (S)



1.6.K - ONGOING PARKING OR STORAGE OF TRUCK TRAILERS IS DETRIMENTAL TO GOOD URBAN DESIGN



1.7.C - AVOID HARD CHANNELS SUCH AS THIS



1.7.A - GOOD EXAMPLE OF NATURAL GRASSY SWALE

- E. The use of consolidated detention pond facilities is encouraged on multi-lot developments. (G)
- F. Avoid design of landscape berms that would shed irrigation and stormwater directly onto adjacent paved surfaces. (G)
- G. To more effectively implement Best Management Practices (BMPs), detention ponds shall be consolidated on individual developments so there is no more than one pond per five acres, unless otherwise approved by Public Works. (G)
- H. Functional detention pond BMPs shall be incorporated to the extent practical, in accordance with Volume III of the Urban Drainage manual, latest edition, and approved by Public Works, or be incorporated in accordance with a comparable design, approved by Public Works. Said BMPs shall be implemented on developments where the surface area tributary to the detention pond is five acres or greater (including the detention pond surface area.) (G) For detention ponds having tributary areas between two and five acres (including the detention pond surface area) grass or cobble lined swales shall be incorporated. Other proposed BMPs shall be reviewed and approved on an individual basis by Public Works. (G)
- I. Parking lot detention shall not be permitted, with the exception of development sites smaller than two acres, regardless of the tributary basin size to the detention pond. (G)
- J. For developments smaller than two acres, detention up to the 10-year storm event shall be contained completely within a grass lined area of a detention pond. The remainder of the storm water detention volume, between the 10 and 100-year events, may extend into paved areas. The ponding depth may not exceed 8 inches within paved areas. (S)
- K. Detention pond landscape materials and planting densities shall be incorporated into the landscape plan in a manner that will minimize the potential for clogging at the outlet structure. Landscaping in and around detention ponds shall not be designed in a manner that would potentially reduce the functionality of the pond. (G) The developer's engineer shall certify in the

drainage report that they have reviewed the landscape plan and that it is consistent in preserving the functionality of the storm water detention system. The proposed landscaping in and around detention ponds shall be subject to Public Works review and approval. (S) Property owner obligations pertaining to detention pond maintenance shall be contained in the final approved drainage report associated with the PUD. (S)

1.8 Site Grading, Excavation and Erosion Control

Policy:

The design of site improvements should minimize cut-and-fill in order to preserve each site's natural terrain to the maximum extent possible. Site grading designs should be executed in such a manner to avoid drainage impacts (such as erosion and road damage), both on-site and downstream.

Standards and Guidelines:

- A. Preserve the natural setting with grading designs that are sensitive to existing land-forms and topography. (G)
- B. In developing sites, limit slopes to 4:1 or less. (G) Slopes in excess of 4:1 may be allowed when engineering or site constraints dictate a steeper slope, and when appropriate erosion control measures are incorporated. (G)
- C. In general, transition grades between old and new elevations should be rolling rather than one continuous straight slope. (G)
- D. Avoid grade changes within the drip-line of existing trees that are to be maintained. (G)
- E. Preserve existing significant site vegetation, to the extent possible, during over-lot grading and construction activities. (G) Replant all disturbed soil and slopes with an approved grass mixture or ground cover. (S) Prepare the soil prior to seeding. (S)
- F. Terracing of the finished floor elevations in relation to natural grades on a site should be considered on larger buildings, when appropriate, particularly on multi-tenant flex buildings. (G)



1.8.F - TERRACE BUILDINGS WITH SLOPES

2. VEHICULAR CIRCULATION & PARKING

Goal:

The on-site vehicular circulation and parking system is a critical factor in the safety and success of an industrial development. The parking/access/circulation system should provide for the safe, efficient, convenient, and functional movement of multiple modes of transportation both on and off the site where pedestrian/bicycle/vehicle conflicts are minimized. The site planning process should make provision for alternate modes of transportation, including public transit, bicycles and pedestrians.

2.1 Site Access and Vehicular Circulation

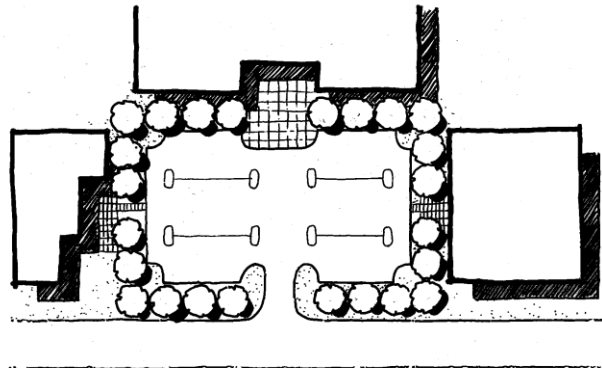
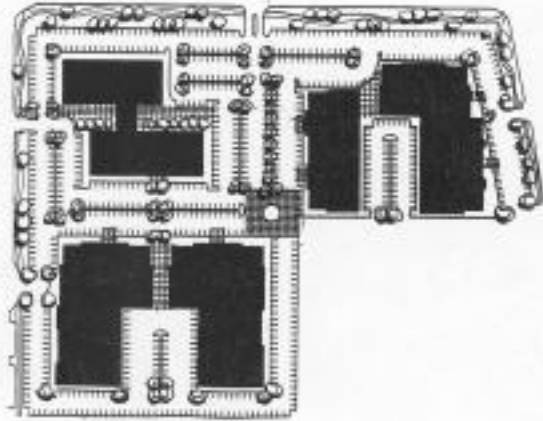
2.1.1 Vehicular Access

Policy:

Promote the safety and mobility of through traffic by minimizing the number of access points to private property from public streets.

Standards and Guidelines:

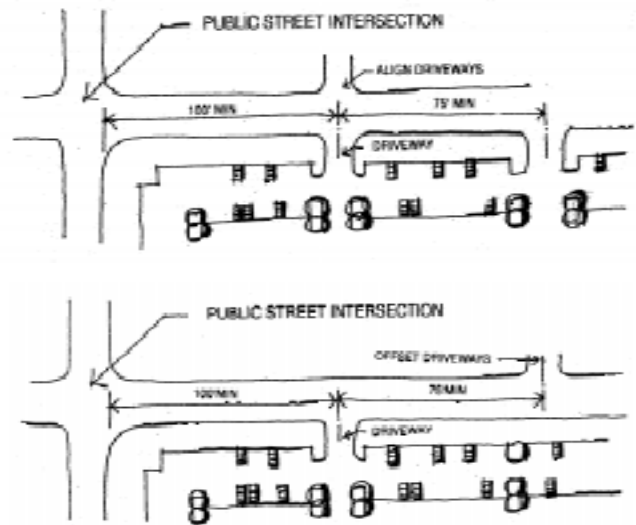
- A. Enhance the intersections of entrance drives with arterial and collector streets by incorporating signs, accent paving, special landscaping and lighting. (S)
- B. Materials used for entry features shall be consistent with other materials used in the development. (S)
- C. Two-way access drives shall have a minimum width of 28-feet. (S) One way access drives shall have a minimum width of 18-feet. (S)
- D. The number of driveways per street frontage to any building site is determined by the size of building site. Building sites less than two acres shall be permitted **one** driveway, two acres to five acres shall be allowed **two** driveways and greater than five acres shall be permitted **three** driveways. (G)
- E. Driveways shall be separated from street intersections by a minimum of 100-feet or by maintaining similar directions of travel and



2.1.1 - VEHICULAR ACCESS POLICY

as required by the Public Works Department. (S)

- F. Driveways serving building sites on either side of a public street shall either be aligned or offset to provide a minimum separation of 75-feet when not located adjacent to a public street intersection. (S)
- G. Driveways on the same side of a public street shall be separated by a minimum 75-foot distance when not located adjacent to a public street intersection. (S)
- H. When possible, shared driveways located on the property line of two building sites are encouraged. (G) If incorporated into the improvements, the City will require evidence that an access easement is in place providing for joint use of the shared driveway. (S)
- I. Entrances that lead directly into head-in parking are not allowed. (S)
- J. Accent pavement materials located within the public right-of-way must meet City of Louisville Public Works Department criteria. (S).
- K. AASHTO site visibility triangles should be considered on parcels located on the inside of horizontal street curves. (G)



2.1.1.E,F,G

2.1.2 Vehicular Circulation

Policy:

Projects with multiple building sites or parcels should include a hierarchy of internal roadways, including the following: 1) internal collector, 2) internal private drives serving multiple buildings and parcels, 3) parking aisles, and 4) service drives and truck routes. This hierarchy should be implemented by engineering and landscape treatments. The street, access and parking network shall provide for the smooth, safe, convenient and functional movement of all modes of transportation, including vehicles, public transit, bikes and pedestrians, with priority to the pedestrians.

Standards and Guidelines:

- A. Provide separate and safe vehicular and pedestrian circulation systems. (G)
- B. For large parking lots, separate parking aisles from truck circulation routes and entry drives. (G)
- C. Avoid conflicts between adjacent parking lots



2.1.1.K

parking designs. (G)

- D. Truck and vehicle backing from a public street onto the site for loading or any other purpose is prohibited. (S)
- E. Vehicle circulation routes requiring movement onto a public street in order to move from one area to another on the same building site is prohibited. (S)

2.1.3 Service/Delivery, Emergency and Utility Access

Policy:

Routes for service, emergency and utility access should be clearly marked. Service circulation within a development shall be designed to provide safe movements for all anticipated vehicles. The design of individual parcels to accommodate truck access shall meet all regulatory requirements for turning radii without sacrificing other important goals and policies of the IDDSG.

Standards and Guidelines:

- A. Meet all Louisville Fire Protection District regulations in the design and provision of emergency access to buildings for fire suppression, police, ambulance and other emergency vehicles. (S)
- B. Avoid the creation of 'blind areas' that cannot be patrolled by police or security staff. (G)
- C. Provide shared service and delivery access ways between adjacent parcels and/or buildings. (G)

2.1.4 Transit Facilities

Policy:

Transit facilities should be accommodated within all major employment centers that could generate high volumes of transit use. Transit routes, access points and shelter locations should be addressed along major roadways within and on the perimeter of such projects. Transit facilities shall be provided in a manner to make transit an attractive mode of travel for both employees and patrons.

Standards and Guidelines:

- A. Locate bus shelters close to significant clusters of buildings. Provide a concrete pad in front of bus shelters. Provide protection for bus shelters from the prevailing winds. Consider incorporating passive solar heating features. (G)
- B. Coordinate any shelter design and locations with RTD. (S)
- C. Identify locations and define easements for future shelters. (G)

2.2 Parking Lot Design

This Chapter provides standards and guidelines for the siting and layout of parking lots. Specific landscape standards for parking areas are included in Section 5.3, Parking Lot Landscaping.

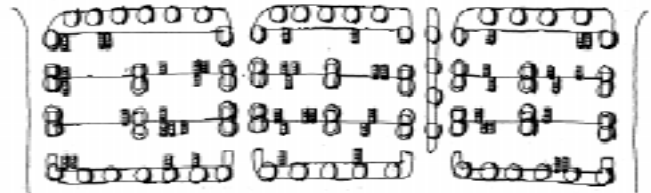
2.2.1 Surface Parking Lots

Policy:

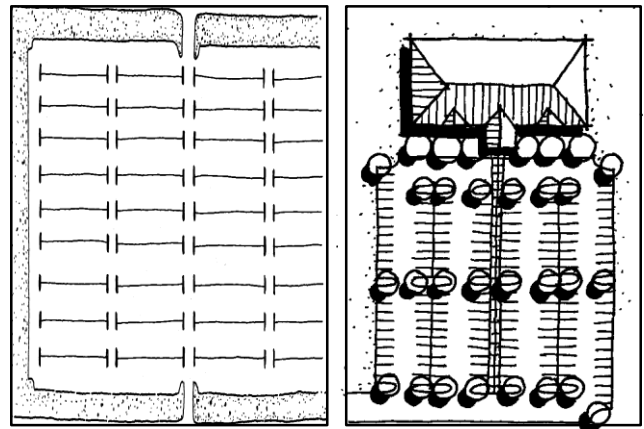
Vehicle parking should be provided to meet the location and quantity requirements of specific uses without requiring overflow parking within a public right-of-way, or undermining the function of other modes of transportation.

Standards and Guidelines:

- A. Design parking lots to avoid dead-end aisles. (G)
- B. Where a dead-end aisle is authorized, adequate space for unimpeded turn-around must be provided. (S)
- C. Avoid parking that creates hazardous backing movements into major drive aisles. (G)
- D. Design parking areas that incorporate pedestrian walkways in a manner that links buildings to the street sidewalk system. (S)
- E. Divide parking areas that accommodate more than 125 vehicles into a series of smaller, connected lots. (S)
- F. Landscape and offset portions of the lot to reduce the visual impact of large parking areas. (G)
- G. Avoid aligning all travel lanes in parking lots in long straight configurations. (G)
- H. Provide cross-access easements between adjacent lots to facilitate the flow of traffic between complementary users. (G)



2.2.1.E - PARKING LOTS WITH 125 SPACES OR MORE MUST BE BROKEN UP INTO SMALLER LOTS WITH NO MORE THAN 125 CARS TOTAL

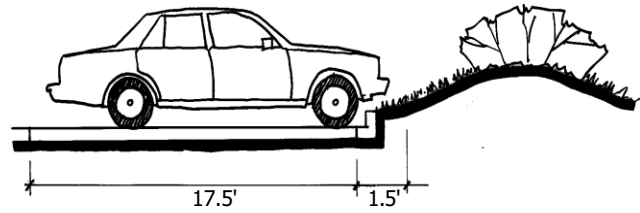


NO

YES!

2.2.1.F

- I. Each standard parking space located perpendicular to the access drive shall have a minimum width of 9-feet and a minimum depth of 19-feet. A 1.5-foot overhang is permitted for parking spaces adjacent to landscaped areas provided additional width is provided in the sidewalk or landscape area.



2.2.1.I

- J. An appropriate number of handicap spaces shall be provided on the building site as required by applicable code and regulations. Handicap parking shall be located in close proximity to building entrances as permitted by the overall design of the improvements. (S)
- K. No compact parking spaces are allowed. (S)
- L. Minimum Parking Ratios: The minimum number of parking spaces required per parcel is based on the following ratios (# Parking Spaces/Gross Building Floor Area) (S):

Office space	4 spaces/1000 SF (1:250)
Manufacturing and Research and Development space	2 spaces/1000 SF (1:500)
Warehouse space	1 space/1000 SF (1:1000)
Showroom space	4.5 spaces/1000 SF (1:225)

- M. 'Flex' buildings shall plan for total parking at a ratio ranging between 4 and 5 spaces/1000 SF and will be authorized for any permitted Industrial building occupancy. (S) For sites/buildings with parking ratios lower than 4:1000, minimum parking requirements will be reviewed on a tenant finish building permit basis, relative to the average parking ratio provided on the site. All sites shall provide a minimum parking ratio of 2.0 spaces/1000 SF, except that some parking may be deferred when the total parking demand of the intended occupant falls below that ratio. (S)
- N. Public on-street parking may not be used to satisfy all or part of a building's required off-street parking. (S)
- O. For specific users, additional off-street parking may be necessary to satisfy unusual occupant requirements exceeding the above noted criteria. (G)
- P. Locate special parking spaces for vanpool and car pool parking close to building entrances. (G)

- Q. Use curbed landscaped islands to designate a change in direction of parking stalls and aisles. (S)
- R. Provide landscaped islands at the ends of all rows of parking. (S)
- S. Parking bumpers in surface lots are prohibited. (S)

3. PEDESTRIAN & BICYCLE CIRCULATION

Goal:

Pedestrian and bicycle systems should be incorporated into all developments and designed to be safe and invite walking and bicycling throughout the project. Individual parcels and sites {within larger projects} should be integrated with adjacent properties designed to form a comprehensive system and to provide convenient access to transit stops/ as well as to regional trail systems.

3.1 Overall Pedestrian and Bicycle Circulation

Policy:

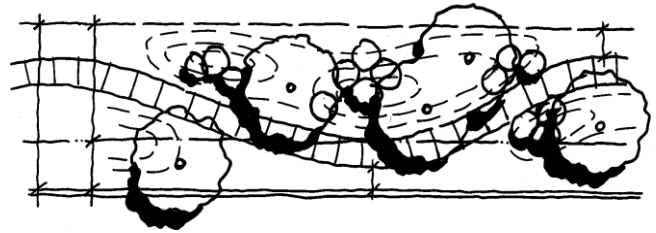
Pedestrian spaces and routes should be designed to invite walking throughout and around each development. Routes should be integrated to form a comprehensive circulation system providing convenient, safe and visually attractive access to all destinations on the site. Ease of maintenance should be considered.

Standards and Guidelines:

- A. Locate buildings and design on-site circulation to minimize pedestrian/vehicle conflicts. (G)
- B. Separate pedestrian and vehicle movements with the use of landscaping, barriers or other appropriate design solutions. (G)
- C. Differentiate areas of pedestrian and bicycle/vehicle interface with accent pavement and signage to alert drivers to potential conflicts. (S)
- D. Provide well-identified connections from the primary pedestrian and bicycle paths within the development to the perimeter sidewalks and bike paths. (S)
- E. Locate pedestrian access and walkways away from the north sides of buildings. (G)
- F. Sidewalks within the Colorado Technological Center, The Business Center at CTC, and The Park at CTC shall be constructed in accordance with the master sidewalk plan. (S)
- G. Sidewalks shall be at least 5-feet wide and detached from all arterial, collector and local

public streets by a minimum 6-foot wide landscaped parkway, except at intersections where acceleration & deceleration lanes are provided. (S)

- H. In cases where a meandering sidewalk is desired along an arterial street, provide adequate width within which to accommodate berming and landscaping that enhances the meander and defines the walkways. (G)
If the appropriate width is not provided within the public right of way to meet this guideline, a sidewalk easement will be required. (S)



3.1.H

3.2 Bicycle Parking

Policy:

Functional and attractive bike parking shall be provided in convenient locations and in adequate numbers for employees.

Standards and Guidelines:

- A. Locate bicycle parking spaces near employee building entrances. (S)
- B. Do not position racks where they will obstruct building entrances or the flow of pedestrian traffic. (S)
- C. Provide bicycle parking spaces in the following minimum ratio: One (1) bicycle space for every 20 required off-street automobile parking spaces up to a total maximum requirement of 21 bicycle parking spaces. (S) A minimum of 3 bicycle parking spaces shall be provided per parcel or building, regardless of building size. (S)
- D. Providing protection from the elements for bicycle parking is encouraged. (G) Consider the use of shelters. (G) Coordinate the design of the bicycle shelter with adjacent buildings or other street furniture designs. (G)
- E. Use bicycle racks that accommodate a range of bicycle types and a variety of security devices. (G)

4. ARCHITECTURAL DESIGN

Goal:

Simple rectangular box-type structures, typically of masonry, or concrete 'tilt-up' materials characterize conventional industrial architecture. These relatively low profile, simple shapes comprise a strong element of continuity throughout a light industrial district such as the Colorado Technological Center in Louisville. Given this premise, it is the variations and fenestration details that provide the needed variety.

Architectural design should seek to add to community character, while providing flexibility to avoid rigid uniformity of design. While a wide variety of design techniques may be utilized, a basic harmony of architecture shall be developed to promote the quality and attractiveness of the business environment. All elements including the scale and mass of buildings, materials, colors, roof styles, door and window openings, and details should be responsive to functional architectural design and promote a cohesive design statement.

All buildings should be energy efficient to conserve natural resources.

Building masses should respond to a 'human scale' with materials and details that are proportionate to human height and provide visual interest at the street and sidewalk level. Buildings should be reduced in apparent mass or articulated to avoid large monolithic, box-like shapes.

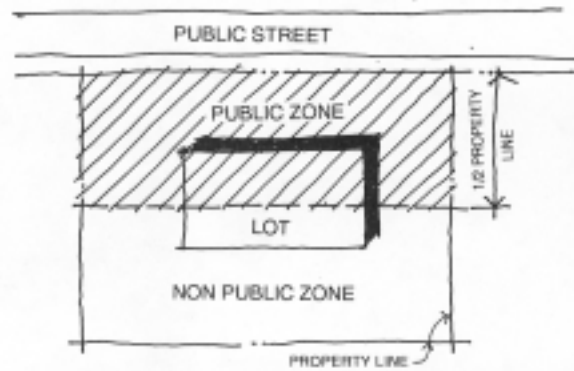
4.1 Building Relationships and Compatibility

Policy:

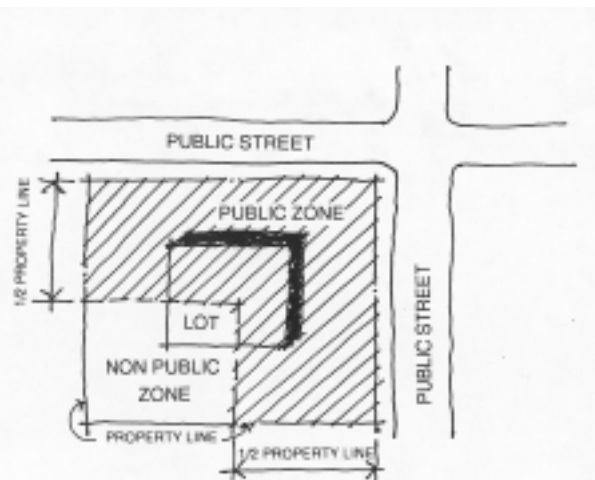
Building or portions of buildings within the 'Public Zone' should be oriented on a site to create a strong relationship to adjacent structures, providing visual continuity, and compatibility within the overall development.

Standards and Guidelines:

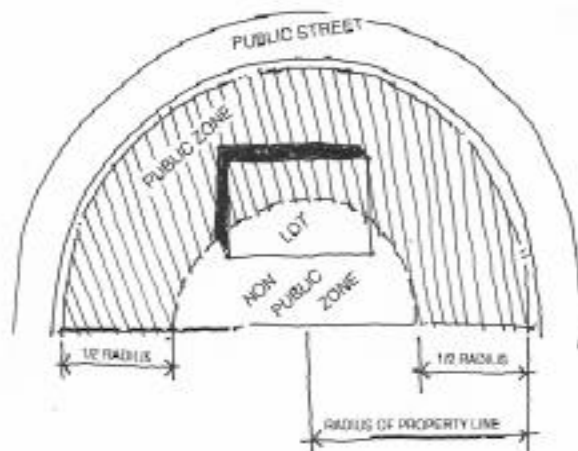
- A. Building orientation to the site shall maximize from the adjoining public right-of-way identity of building user, primary building character.



4.1 - PUBLIC ZONE



4.1 - PUBLIC ZONE



4.1 - PUBLIC ZONE

- entries and plaza areas and formal landscaped areas. (S)
- B. Building location should optimize internal efficiencies, especially in multi-building developments, in screening service and loading areas from adjoining public streets, designation of regional facilities for stormwater detention, implementing cross access easements, and providing for common /functional employee recreational areas. (G)
- C. Building location shall act to minimize from all adjoining public streets, view of truck parking and loading areas, outside storage areas, ground mounted mechanical equipment, as well as trash and service enclosures. (S)

4.2 Building Height

Policy:

Building heights should be not be out of scale with existing or planned development.

Standards and Guidelines:

- A. The height of new development should be compatible with and transition from the height of adjacent development. (G)
- B. The maximum building height is 40.0-feet to the top of the building parapet and 50.0-feet for architectural projections. (S)
- C. Building height may exceed the 40.0-foot height limit up to 50.0-feet, when authorized through the PUD process for buildings/users that require specialized equipment. (G)

4.3 Building Massing, Forms, and Pedestrian Scale

Policy:

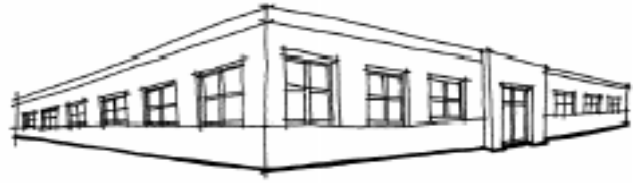
Buildings should relate to the terrain and each other in their massing and forms. Square 'box-like' structures with large, blank, unarticulated wall surfaces are not an acceptable form.

Buildings should respond to pedestrian scale in the immediate vicinities. Buildings should have features and patterns that provide visual interest at the scale of the pedestrian, which reduces apparent mass and that relate to local architectural character.

4.3.1 Public Zone

Standards and Guidelines:

- A. Any wall within a Public Zone shall incorporate significant architectural features and treatments to diminish the building mass. (S) Use a combination of the techniques listed in the following sections 1-3 or other appropriate techniques to be reviewed through the PUD process. (S)
1. Variations in facade elements can reduce perceived mass and scale. For example:
 - i. Variations in color and/or texture should be used.
 - ii. Step downs and step backs should follow the terrain and be tiered and reinforced by landscape elements.
 - iii. Compositions that express rhythms and patterns of windows, columns, and other architectural features are encouraged.
 2. Avoid blank walls at ground-floor levels. (S) Use windows, trellises, wall articulation, arcades, material changes, awnings, canopies, clerestory, or other features. (G)
 3. Architectural features such as columns, pilasters, canopies, porticos, awnings, brackets or arches should be included. (G)



4.3.1.A - NOT DESIRABLE

4.3.2 Non-Public Zones

Standards and Guidelines:

- A. All building materials shall comply with accepted materials under these standards and guidelines. (S)

4.4 Roof Forms and Materials

Policy:

Rooftops should contribute to the unified appearance of each development and should be considered as seen from: higher areas, ground level, other buildings and roadways.

Standards and Guidelines:

- A. Avoid roof/parapet lines running in continuous planes absent variations in the building footprint. Building architecture may incorporate variation in parapet heights. (G)
- B. All mechanical, electrical, optical and electronic equipment attached to or mounted on the building roof shall be set a minimum of a 20-feet from the building parapet. (S)
- C. All roof-mounted equipment as described in section 4.4.B, shall be either (1) painted a color compatible with the dominant building color, if the equipment is self contained without exposed ductwork or process piping. (S) or (2) shall be screened if the equipment does not meet the criteria specified in C.1. Screen material shall be compatible with materials and colors utilized on the building and shall be specified with a detail on the PUD plans. (S)
- D. Design roof forms to correspond to and denote building elements and functions such as entrances, arcades, and porches. (S)



4.4.A



4.4.A

4.5 Building Materials and Colors

Policy:

Exterior materials and colors should be aesthetically pleasing, of a high quality and compatible with materials and colors of nearby structures. Compatibility of building materials is desired throughout a development project consisting of multiple buildings.

4.5.1 Building Materials

Standards and Guidelines:

- A. Building exterior materials shall be factory finished, stained, integrally colored, or otherwise suitably treated. (S) Materials may include:
 1. split face or fluted concrete masonry unites (CMU)
 2. factory glazed concrete masonry units (CMU)
 3. face brick
 4. stone veneer,
 5. insulated glazing and framing systems



4.4.C - RTU's NOT PROPERLY SET BACK FROM BUILDING EDGE



4.4.D

6. architectural pre-cast concrete
 7. painted or stained site-cast concrete
 8. architectural concrete
 9. factory finished, standing seam metal roofing (for application to pitched roof systems only)
 10. EIFS
 11. architectural metal as building accent only
- B. Highly reflective materials such as bright aluminum or metal are not permitted as the primary building material. (S)
- C. Do not use glossy metal. (S)



4.5.1A - ACCEPTABLE MATERIAL

4.5.2 Building Colors

- A. Do not use paints or other covering materials with unproven durability. (S) Do not use bright colors, (including bright white) that may streak, fade or generate glare. (S) While subdued or muted colors generally work best as a dominant, overall color, a brighter color can also be appropriate for accent elements, such as door and window frames, and architectural details. (G)
- B. Choose color palettes for new buildings that are compatible with the colors of adjacent structures. (S)
- C. Minimize the number of colors appearing on a structure's exterior. (G)
- D. Paint architectural detailing to complement the facade and coordinate with adjacent buildings. (S)
- E. Roof colors shall be muted and compatible with the dominant building color. (S)



4.5.1A - ACCEPTABLE MATERIAL

4.6 Building Entrances

Policy:

Primary building entrances should be easily identifiable and relate to human scale.

Standards and Guidelines:

- A. Locate main entrances to be clearly identifiable from primary driveways and drop-offs. (S) For example:
1. Design building entrances to contrast with the surrounding wall plane. (G)
 2. Consider tinted glass, painted doors, or



4.6.A

recessed features that will create a shaded effect. (G)

3. Create a frame around doorways, by changing materials from the primary facade material. (G)
 4. Design primary entrances to be accessible to handicapped users without complex ramp systems. (G)
- B. All building entrances shall be well-lit. (S) (see also Chapter 8: Exterior Site Lighting.)
- C. Consider using building entranceways as a transition from the building to the ground. Incorporate walls, terraces, grading and plant materials to accomplish this transition. (G)

4.7 Energy Conservation Measures

Policy:

Buildings should be designed and sited to maximize the use of solar gain for energy savings, and respect the solar access requirements of adjacent (existing and proposed) buildings.

Standards and Guidelines:

- A. Applicants are encouraged to consider energy conserving design concepts, including, but not limited to the following: (G)
1. Proper orientation and clustering of buildings to take advantage of the prevailing summer winds and to buffer against adverse winter wind conditions.
 2. Types of material and their insulation characteristics.
 3. The arrangement and design of windows and doors.
 4. Direct solar or photovoltaic energy.
 5. Day-lighting concepts.
 6. Earth sheltering with creative land forming.
 7. Natural ventilation of outdoor, indoor and attic spaces.



4.6.A



4.6.A



4.6.A

PUBLIC ZONE DESIGNS



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE



4.3.1 - PUBLIC ZONE

NON-PUBLIC ZONE DESIGNS



4.3.2 - NON-PUBLIC ZONE



4.3.2 - NON-PUBLIC ZONE



4.3.2 - NON-PUBLIC ZONE



4.3.2 - NON-PUBLIC ZONE

5. LANDSCAPE DESIGN

Goal:

Landscaping for industrial areas is provided within each building site to: 1) enhance the aesthetics of industrial developments; 2) create a pedestrian friendly environment; 3) break up the mass of industrial buildings; 4) soften architectural materials; 5) provide screening of service structures and loading areas; 6) enhance the streetscape/parkway environment; 7) define building and parking area entrances; 8) provide shade and climate control; 9) control airborne particulates; 10) provide buffers between incompatible land uses or site areas; 11) filter drainage and stormwater runoff from parking areas and streets.

Drought tolerant plant species that are native to the region or suitable to this climate should be used.

This chapter addresses 4 distinct zones corresponding to the 4 major design influences on each industrial site:

1. *Perimeter Landscaping Adjacent to Public and Private Roads*
2. *Perimeter Landscaping Adjacent to Abutting Property*
3. *Parking Lot Landscaping*
4. *Individual Building and Loading and Service Area Landscaping*

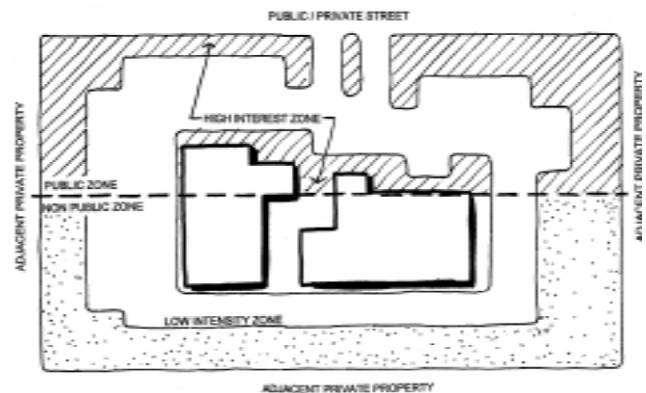
Policy:

Water conservation concepts should be considered in all zones. Generally, the highest intensity of materials, including variety, concentration, and interest, is located along a public or private street and the front or entrance to a building, while the rear of a property not abutting a public or private street would be in a less intensive zone.

5.1 Perimeter Landscaping Adjacent to Public and Private Roads

Policy:

The corridors along perimeter arterial streets and internal collectors should provide a visually cohesive open space system. Similar landscape treat-



LANDSCAPE ZONES POLICY

ments should be used at all entrances and intersections. Plant materials, massing, spacing, and height characteristics should reinforce the hierarchy of roadways. Planting and grading should work together to create a variety of experiences along these roadways and to call attention to open space amenities. Perimeter edge treatments should establish identity for the project and convey a high-quality image while seeking to conserve water through appropriate Xeriscape planting selections.

Standards and Guidelines:

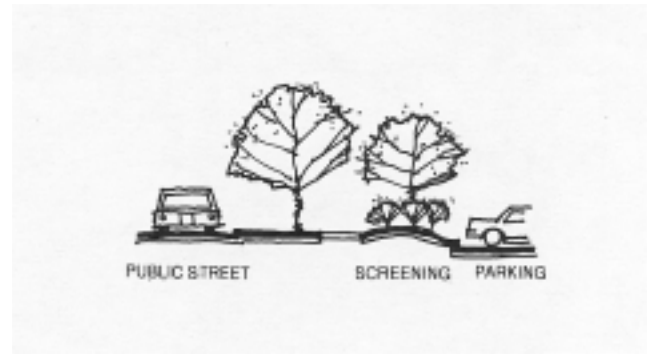
- A. Include a combination of manicured and enhanced natural landscape areas. (G)
- B. Place perennial flower beds at entries. (S)
- C. Utility appurtenances should be softened with landscape materials, to the extent practicable. (G)
- D. Streetscape Plantings:
 1. Vary street tree planting species in medians and parkways. (S) However, maintain the desired rhythm of plantings by selecting street trees with similar characteristics (i.e., height and branching patterns). (S)
 2. Provide a minimum quantity of 1 tree per 20 linear feet of street frontage within the streetscape landscape setback area. (S)
 - i. In the street right of way, deciduous shade trees shall be provided at regular 40-foot intervals, along with fully irrigated ~~sof~~ grass that is native to Colorado or hybridized for arid conditions or other approved ground cover. (S) (These trees count toward the minimum quantity noted in E.2.)
 3. Shrub beds within the streetscape area are limited to 20% of the total area. (G)
 4. Provide a minimum of 6 shrubs per tree plus perennial flower beds, ground cover or ~~grass-lawn~~ grass that is native to Colorado or hybridized for arid conditions within the streetscape landscape setback area. (S)
 5. Berming shall be incorporated into the streetscape landscape design. (S)
 6. Placement of plant materials in the right-of-way and in public utility easements



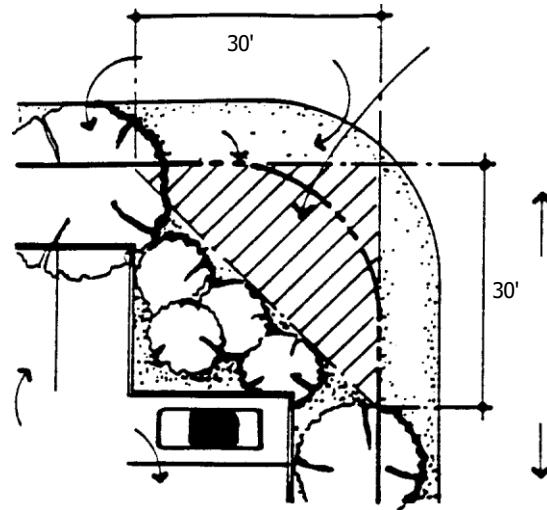
5.1.D - TYPICAL STREETSCAPE

adjacent to the right-of-way shall be subject to review and approval by the City. However, in the event of conflicts, minimum planting requirements shall still be maintained. (S)

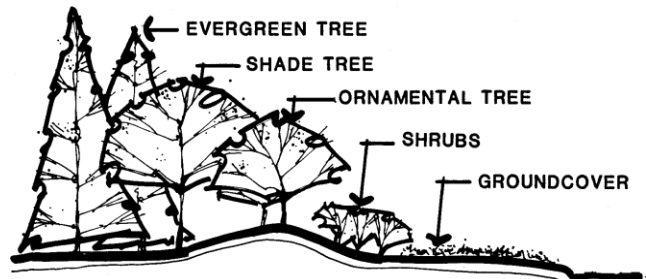
7. To prevent interference with motorist visibility, plant shrubs a minimum of 3-feet from the back of curb and choose shrubs that do not exceed 24-inches mature height. (S)
 8. Street trees shall have their branches pruned up to a height of 8-feet to avoid conflict with motorist visibility. (S)
- E. Visually buffer all parking lots adjacent to perimeter roadways with adequate screening within a planting strip between the public right of way and the edge of the parking lot pavement. (S) Provide adequate shrub plantings with a variety of seasonal colors to create a dense visual buffer between parking lots and perimeter roadways. (S) Whenever practical, incorporate berming with a maximum 4:1 slope within this planting strip. (G)
- F. Sight Lines at Public Street Intersections and within Medians
1. Provide adequate sight lines for an effective 30-foot sight triangle measured from the right of way. (S) Plants and signage are allowed within the sight triangle if: 1) plants do not exceed 30-inches in height at full maturity and 2) signs do not exceed 30-inches in height (measured from top of curb height) unless they are more than 80 percent open. (S)
- G. Provide a diversity of landscaping materials at entry drives to development parcels. (S) Therefore:
1. Provide a minimum of 3 levels of scale, including shade, evergreen, and/or ornamental trees, shrubs, annual and perennial flowers, and ground covers. (S)
 2. Plant clusters that appear as a cohesive visual element, and that complement the overall landscape theme and palette (G)
 3. Integrate the plant design with the entry sign. Plantings shall frame or provide a visual base for the signs. (S)
- H. Deciduous trees shall be planted a minimum of 5-feet and evergreen trees a minimum of



5.1.E - PARKING LOT SCREENING



5.1.F - SITE VISIBILITY TRIANGLE



5.1.G - ENTRY LANDSCAPE CONCEPT

10-feet from public utilities and public sidewalks, unless modified by PUD street tree plans. (S)

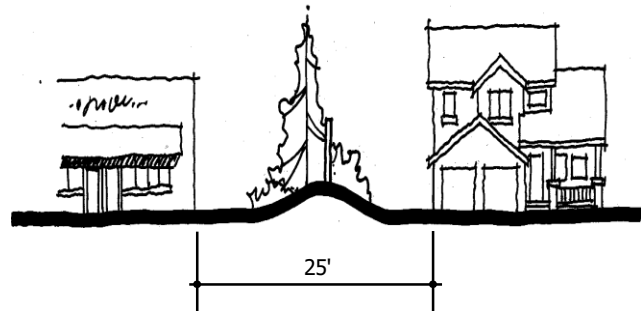
5.2 Perimeter Landscaping Adjacent to Abutting Property

Policy:

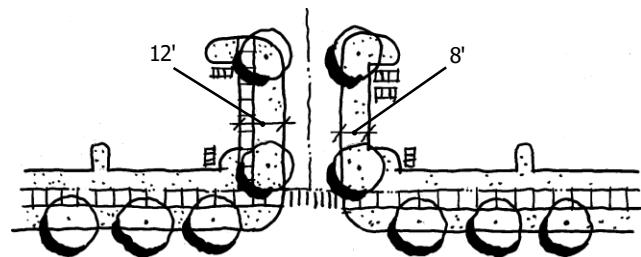
Visual buffers should be provided between similar land uses to accomplish transitions and to mitigate potential conflicts between dissimilar uses.

Standards and Guidelines:

- A. Between properties within the same zone district:
 1. Provide a minimum 10-foot wide buffer planting strip along internal side property lines. For the public zone portion of the side property line, provide 1 tree for every 30 linear feet of property line and appropriate shrubs, ground cover and/or turf native or hybridized grass areas. (S) This may not apply to internal property boundaries within a multiple-lot development to the extent the lots are developed under a single PUD Development Plan and achieve other site design policies of these guidelines. (G)
- B. Adjacent to residential and agricultural zoning districts, and/or open space:
 1. Provide a minimum 25-foot wide buffer planting strip incorporating an average 3-foot high berm containing a minimum of 1 tree for every 20 linear feet of property line and a screen hedge incorporating both deciduous and evergreen shrubs a minimum of 3-feet in height (at maturity) along a minimum of 75% of this perimeter area. (S)
- C. Common/Shared Access Drives:
 1. Provide a minimum 8-foot wide buffer strip along both sides of a shared access drive when no sidewalk is included. (S)
 2. Provide a minimum 12-foot wide buffer strip along both sides of a shared access drive when a sidewalk is included. (S)



5.2.B - BUFFER PLANTING STRIP



5.2.C - COMMON/SHARED ACCESS DRIVES

5.3 Parking Lot Landscaping

Policy:

Parking lots are necessary features of building sites which, if not designed properly, can visually detract from the overall development character. Parking lots should be designed to blend with each building site's character using landscape plantings and grading, and should not be readily visible from public streets.

Standards and Guidelines:

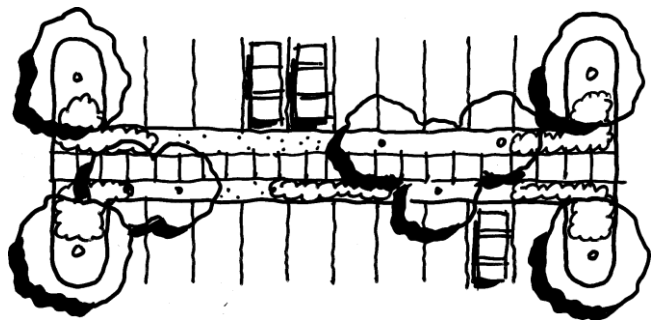
- A. Use low, opaque walls and/or flowering plants combined with berming and/or raised planting beds to create a visual buffer of parking areas from peripheral streets or frontages. (S)
- B. Lower the grades of parking lots below existing street elevations to aid in obscuring views of automobiles, while promoting views of architectural elements of the structures beyond. (G)
- C. A minimum of 1 canopy shade tree per 16 parking spaces is required in all parking lots, to be planted in islands, medians, and perimeter areas adjacent to lots (excluding streetscape tree plantings). (S) To be considered a parking lot shade tree, trees shall be located in a protected landscape area, which are bounded on at least 3 sides by parking area paving (unless the tree is located within a corner island). (S)
- D. Utilize landscaped islands and medians to improve the definition of circulation patterns, provide shading for paved areas and break up continuous rows of parking. (G)
 - E. Landscaped Islands
 - 1. Provide a minimum 6-foot wide landscaped island at the end of every row of parking, equal in length to the parking space(s). (S)
 - 2. In addition to the trees, plant each island with a minimum of 8 shrubs, not exceeding 3 feet in height at maturity. (S)
 - F. Landscaped Medians
 - 1. Place 12-foot wide landscape medians between every other parking bay in lots for more than 125 cars to visually break large parking lots into smaller modules. (S)
 - 2. Where walkways in medians will not be utilized, the medians may be reduced to a width of 8-feet. (G)



5.3.A - VISUALLY BUFFER PARKING AREAS

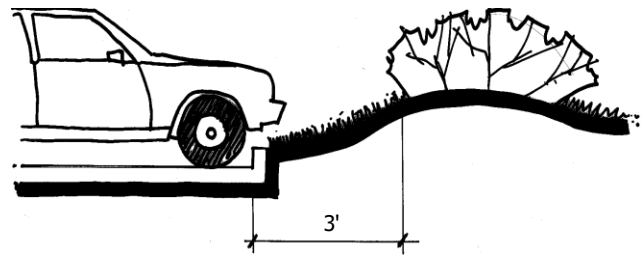


5.3.A - VISUALLY BUFFER PARKING AREAS



5.3.F - LANDSCAPED MEDIAN

3. Provide a minimum of 1 canopy shade tree and 8 shrubs for each 30 linear feet of median. (S)
 4. The use of landscape medians is encouraged as a transition slope between parking bays on hillside parking lots (maximum slope of 4:1). (G)
- G. Where head-in parking occurs, locate all shrubs a minimum of 3-feet from the edge of the parking lot curb. (S)



5.3.G - SHRUB SPACING

5.4 Building Site Landscaping

Policy:

The coordination of landscape design for individual building sites and larger, multi-parcel projects is essential for creating a consistent, high-quality character. A coordinated design unifies the various buildings and strengthens the cohesiveness of the development. Individual landscape treatments for building sites should compliment the roadway landscapes, create distinctive settings for buildings, reinforce the design of the open space systems, and provide amenities for pedestrians.

Standards and Guidelines:

- A. Use landscaping that is of appropriate scale relative to the proposed adjacent structures. (G)
- B. Intensify landscaping at building entrances. (S)
- C. Loading areas shall incorporate evergreen trees and shrubs for screening intermixed with deciduous shrubs for seasonal color. (S)
- D. Provide a minimum planting width of 10-feet adjacent to a minimum of 50 percent of the building, with emphasis given to portions of the building visible to the street, or with public entries. These planting areas shall contain the following: deciduous trees at a ratio of one tree per 30 linear feet of building frontage, along with appropriate shrubs, perennial flowers, and ground cover. (S) Provide additional landscaping around the perimeter of buildings to soften the edge between sidewalks/parking lots and structures. (G)
- E. Protect landscaping from vehicular and pedestrian encroachments with raised



5.4.B - ENTRY LANDSCAPING



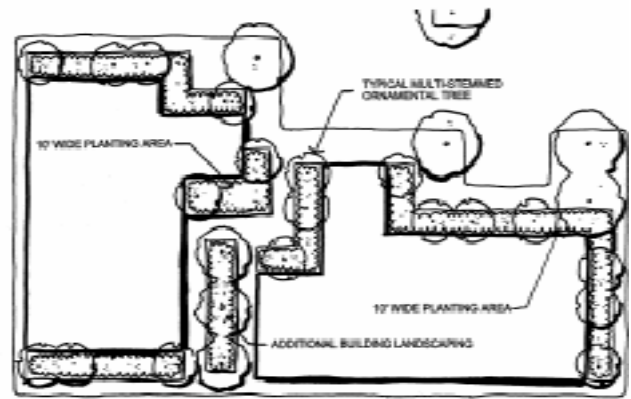
5.4.C - LANDSCAPE SCREENING OF SERVICE AREAS



5.4.C - LANDSCAPE SCREENING OF SERVICE AREAS

planting surfaces, depressed walks, and/or curbs. (G)

- F. Use flowering perennial plants to enhance employee break or other pedestrian gathering areas. (G)
- G. Employee break areas or other pedestrian gathering areas shall include a heavy landscape treatment to provide interest, shelter from wind and summer sun, and highlight the area. (S)
- H. Minimum Landscape coverage required within each building site and within the entire development shall be 25 percent. (S)
- I. In stormwater detention areas, consider landscape materials that help remove debris and potentially toxic substances found in non-point source runoff. (G) Wetland plantings are appropriate in these areas. (G)
- J. No organic mulch materials shall be located below the surface level of the 100-year storm detention level. (S)
- K. Landscaping within Public Easements
 - 1. Landscaping within public easements is generally limited to shrubs, ground cover, and small ornamental trees. (G) No canopy/shade trees shall be planted within such easements. (S)
 - 2. Berming is generally acceptable within public easements in conjunction with plant material. (G) Berming is not to be used instead of plant material. (S)



5.4.D - BUILDING LANDSCAPING



5.4.D - ENTRY LANDSCAPING

5.5 Landscape Irrigation/Water Conservation

Policy:

A significant percentage of the City's treated water supply is used to irrigate plant materials and grasses. Every effort should be made to conserve water by utilizing alternative means for maintaining a suitable landscape environment.

Standards and Guidelines:

- A. Low water use and water conservation concepts can be incorporated into the landscape design of each industrial development without compromising the intent to establish significant visual amenities through landscaping. For example:



5.4.G - EMPLOYEE BREAK AREA

1. Incorporate a 'zoned planting scheme' to reduce water demand by grouping plants with similar water requirements. (S)
2. Use drought tolerant plant species suitable to this climate that have minimum watering and pruning requirements. (G)
3. The use of water conserving grasses, ~~such as fescue sods,~~ is preferred. Limit the use of blue grass to areas which function as recreation areas or have high foot traffic. (G)
4. Non-irrigated native grasses are encouraged in areas of low visibility from public and private streets. (G) As such grasses only experience short periods of growth, avoid mowing native grasses too low. (G)
5. Incorporate heavily mulched planting beds to aid in retaining moisture and to make planting areas easier to maintain. Improve the soil prior to planting for better water absorption and retention. (G)
6. Incorporate advanced irrigation measures and scheduling. Install an efficient automatic irrigation system that will incorporate water conservation measures. Spray heads are recommended for lawn and ground cover areas, with drip irrigation for shrubs and trees. (S)

5.6 Landscape Standards and Plant Material Selection

Policy:

For a strong visual impact, plants should be used in masses of the same species. Random spotting of many different types is not appropriate. Planting should reinforce the site planning concepts and complement architectural forms. Plant materials selections from the Recommended Plant Materials List (Appendix 'A') are encouraged. Contact the Planning Division for other Xeriscape planting guides.

Standards and Guidelines:

- A. *Landscape Zones*: Depending on the size and magnitude of an individual parcel, the project's landscape areas should be divided

into one or more of the following basic zones. (G)

1. *High Visibility Zone* (located at site and building entrances and pedestrian areas and within the streetscape planting area) This zone may include:

- i. Manicured lawns-grass that is native to Colorado or hybridized for arid conditions that require weekly mowing and regular watering (including blue-grass/fescue mixes or other suitable grasses).
- ii. Formal plantings of trees and shrubs.
- iii. Perennial beds.

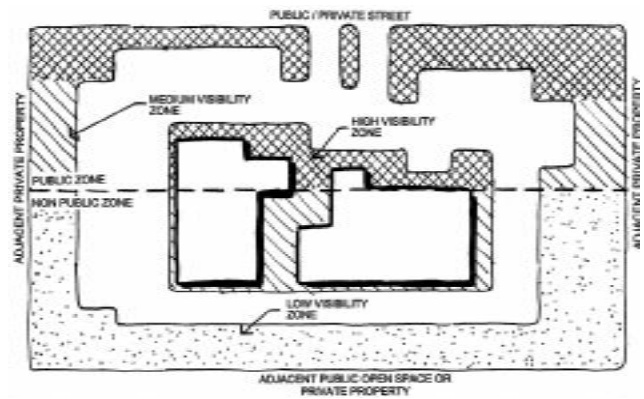
2. *Medium Visibility Zone* (located along side property lines and other interior areas of the site) This zone may include:

- i. Drought tolerant grasses which require less water and maintenance (but still provide a manicured green look during the growing season ~~including fescue type grasses~~)
- ii. Shrubs
- iii. Trees
- iv. Irrigated Seed

3. *Low Visibility Zone* (located in environmentally sensitive areas, along waterways; adjacent to public open spaces; and the balance of the site. These may include:

- i. Natural areas and native grasses (which require very low water and maintenance)
- ii. Existing vegetation
- iii. Drought resistant plant species
- iv. Meadow-like/open fields
- v. Wetlands areas

- B. Selection of plant materials is encouraged from the *Recommended Plant Materials List* attached as Appendix A, (G), and in light of the following standards and guidelines:
 1. Select plant materials on the basis of suitability to climate, setting and compatibility with other development plantings, character and functions. (G)
 2. Select plant materials that are free of disease and harmful insect problems. (S)
 3. Tree species shall be varied to minimize the impact and spread of disease. (S) A



5.6.A.1,2,3 - VISIBILITY ZONES

- given species shall not account for more than 30% of trees on a given site. (S)
4. The quality of plant material selected will follow the guidelines of the "American Standard for Nursing Stock" by the American Association of Nurserymen. (S)
 5. Proper drainage is required for all major plantings to ensure the establishment of a good root system and healthy growth. (S)
 6. The installation of all landscaping shall be done by an established landscape contractor who follows the procedures set forth by the American Association of Landscape Contractors and its local agencies (S).
 7. In situations where installation of landscaping is deferred to after the issuance of the first Certificate of Occupancy, which may be approved, at the City's discretion, due to seasonal planting constraints, a performance guarantee for 125 percent of the value of the work, in a form acceptable to the City, is required to ensure completion of landscaping. (S)
 8. Artificial plants of any type, size or color are not allowed as exterior landscaping within any development parcel. (S)
- C. Encourage the use of water conserving landscapes by minimizing irrigated ~~sed~~ grass areas ~~(such as blue grass)~~ which require significant watering and maintenance. (G)
In general, where grass lawn areas are used, choose a species that will require low maintenance in cutting and low less watering ~~than typical blue grass (fescue sods are preferred)-~~. (G)
- D. Choose plant materials that provide variety and year-round color and screening. Select materials which highlight each season (G) :
1. Spring: Flowering plants
 2. Summer: Shade
 3. Fall: Leaf color
 4. Winter: Branch form and texture
- E. Edging is required to separate grass areas from shrubs, ground cover and mulch. (S)
- F. Utilize porous paving materials for paths, plazas, etc., such as patio bricks, interlocking pavers, concrete stepping stones and/or sandstone and crusher fines. (G)

- G. Plant perennial flowerbeds in visible areas such as pedestrian plazas, building entries. (S)
- H. Mulching:
 - 1. All planting beds should be mulched with wood or decorative rock to stabilize soils, control erosion, and conserve water use. (S)
 - 2. Where rock mulch is used, a minimum of 1 shrub per 25 square feet of mulch shall be provided except as required by an soils engineering report when used adjacent to a building foundation. (S)
 - 3. Rock mulch shall be varied in size and coloration. (S)
 - i. Rock mulch size is restricted to the 1- to 3-inch range. (S)
 - ii. Rock mulch shall only consist of river rock, crushed granite and/or Colorado sandstone varieties. (S)
- I. Use landscape or weed barrier fabric within all shrub beds and mulched areas to control weeds. (S)
- J. Deciduous to evergreen shrub ratio should approach 3:1 unless reduced by exceptional screening requirements. (G)
- K. All Landscape Plans should be prepared by a qualified Landscape Architect. (S)

5.7 Planting Size Standards

Policy:

An immediate landscape impact is desired within all industrial developments, and to facilitate this, minimum plant-size standards are required. Larger sizes are encouraged.

Standards and Guidelines:

A. Provide landscaping according to the following minimum sizes*: (S)

Deciduous shade/canopy trees	2.5" caliper
Ornamental trees	2.0" caliper
Evergreen trees	6'-8' height (minimum 25% must be 8')
Multi-Stem Ornamentals	8'-10' height
Shrubs	5 gallon container
Vines	1 gallon container
Ground Cover/Perennials	2 ¼" pots

*Caliper measured by ANSI standard Z60.1.

5.8 Landscape Maintenance and Replacement

Policy:

The property owner is responsible for providing, protecting and maintaining all landscaping in a healthy and growing condition.

Standards and Guidelines:

The following requirements shall be noted on the PUD landscape plan:

- A. The property owner shall remove and replace dead or diseased plant materials immediately with the same type, size and quantity of plant material as originally installed. (S)
- B. Avoid replacing landscape materials during the dry winter months between December and February and in mid-summer. (G)
- C. Contact the Planning Division for specific time requirements for landscape material replacement. (G)
- D. Landscape materials located in the public right-of-way are to be maintained by the abutting property owner. (S)

5.9 Site Furniture and Features

Policy:

Site furnishings include benches, waste receptacles, planters, railings and bollards. Visual consistency of these elements is desired throughout each development. All components of outdoor site furniture should be low maintenance, highly durable and resistant to vandalism and theft.

6. FENCES & WALLS

Goal:

Fences and walls should be decorative and contribute to the visual quality of the project and the overall development. Walls, fences, and landscape materials shall be used to screen service areas, loading areas, and outdoor storage areas. When not required for security, screening, or grade transitions, the size of walls and fences should be minimized. When required, however, fencing should be as inconspicuous as possible and walls should be low.

6.1 Wall and Fence Design and Materials

Policy:

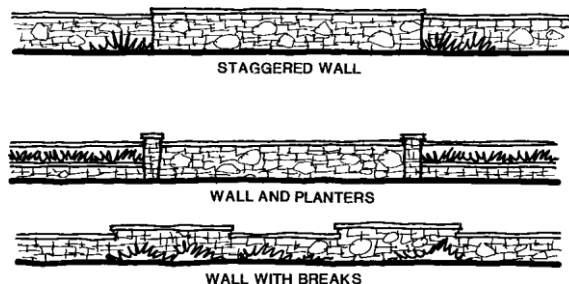
Fencing and walls shall be constructed of materials that are compatible with the adjacent building architecture and their appearance softened with landscape materials.

Standards and Guidelines:

- A. Avoid using retaining walls in excess of 30-inches in height (G). Where taller retaining walls are required, provide safety protection in the form of railings, fences or hedges, or create a terrace with two (2) shorter walls. (S)
- B. Incorporate architectural treatment on both sides of perimeter walls. (S)
- C. Provide landscaping in combination with walls and fences to soften their appearances. (G)
- D. Chain-link fencing with or without wood slatting is not an acceptable screen material. (S)
- E. Break up long expanses of fences or walls, with periodic columns, insets, landscape pockets or changes in materials. (S)
- F. Construct walls and fences from durable materials such as stone, brick, or metal with dark finishes (wrought iron or similar), or a combination of these materials. (G)
 1. Wood fences are discouraged, however, if authorized, the following features must be included:
 - i. Fence shall be stained. (S)



6.1.A - AVOID RETAINING WALLS IN EXCESS OF 30"



6.1.E

- ii. Must include piers and/or pilasters a maximum distance of 15-feet on center that are faced with brick, stone or other appropriate heavy material. (S)
 - iii. The fence shall include a cap element. (S)
- G. Concrete walls are permitted if faced with masonry or stone, or if the surface is scored or textured. (G)
- H. Fence or wall runs greater than 50 linear feet shall be articulated with architectural offsets and incorporate landscape pockets. (S)
- I. Bring berms up to the outside of a screening wall or reduce the grade on the inside to minimize its visibility. (G)

6.2 Screening Requirements

Policy:

A project must include adequate screening of meters, transformers, storage and loading and service areas.

Standards and Guidelines:

- A. *Where located within a side yard, or visible from street view*, screen loading docks and service areas with a minimum of 6-feet high screen wall constructed of the same materials and finishes as the main building. (S)
- B. All authorized outside storage shall be screened using fencing, walls and/or landscape materials. (S)
- C. Screen all utility equipment, including auxiliary power generators, from view with fencing, walls, and/or landscaping. (S)



6.2.A - SCREEN LOADING AND SERVICE AREAS FROM STREET VIEW

7. SIGN DESIGN

Goal:

Signs should be consistent with overall project design but should be subordinate to architectural and landscape elements. Signs serve to identify, inform, direct, regulate and interpret. Each industrial building or group of industrial buildings should have a consistent and comprehensive sign program from project identification at the street through individual tenant suite identity. Placement, scale, and readability should be considered in developing a sign package.

7.1 Sign Materials

Policy:

Design and construct signs of durable, high quality architectural materials.

Standards and Guidelines:

- A. The sign package must utilize materials, colors, and designs that are compatible with the associated structures. (S)
- B. Sign materials must be of proven durability. (S)

7.2 Sign Number and Area

Policy:

The size of signs should be modest and afford businesses sufficient visibility and identification without becoming a dominant part of the landscape or interfering with vehicular movement along the public streets.

Standards and Guidelines:

- A. Number of Signs
 1. The maximum number of flush-mounted signs allowed for freestanding buildings is one per individual tenant building frontage, not to exceed one sign per tenant, nor to exceed one per public entry door. Small informational signs not exceeding 5 square feet in area and 6-feet in height are permitted on rear man and loading door entrances. (S)
 2. One freestanding, ground-mounted,



TYPICAL MONUMENT SIGN



TYPICAL MONUMENT SIGN



TYPICAL MONUMENT SIGN

double-faced sign is permitted for each freestanding building. (S)

- i. Where a freestanding office building contains multiple tenants, or multiple accesses off a public right of way, an increase in the number of freestanding ground mounted signs may be permitted through the planned unit development plan process. (G)

3. Window signage is limited to the individual tenant name only. (S)

B. Area of Signs

1. Surface-mounted signs shall not exceed 15 square feet of surface area each, nor exceed 80 square feet total per building. (S)
2. Freestanding, ground-mounted signs shall not exceed 25 square feet per face. (S)
3. Window signage not exceeding 10 percent of the area of the window in which it is located is permitted. (S)

C. Character Height

1. Individual tenant sign characters shall not exceed 18-inches in height regardless of area. (S)
2. If a single building is occupied by a single tenant, the maximum character size may be increased to 24-inches, however, the building is then restricted to one sign per public street frontage. (S)
3. Regardless of area, character heights shall be uniform for each project. (S)

D. Sign Height

1. Monument signs shall not exceed 6-feet in height. (S)
2. Surface-mounted signs should be mounted at a height that helps identify tenant entries. (G) Surface-mounted signs shall not exceed 25-feet in height from grade immediately below the sign. (S)



TYPICAL MONUMENT SIGN



7.2.C.2 - SINGLE TENANT SIGN

7.3 Location/Placement/Visibility

Policy:

Signs should be located to be visible from streets and paths without conflicting with safe vehicular movement and visibility.

Standards and Guidelines:

- A. Signs should be sufficiently visible from public streets so that site entrances can be readily identified by both pedestrians and persons in vehicles. (G)
- B. Locate monument signs in a planter setting within a landscaped area. (S)
- C. Signs shall be set back a minimum of 10-feet from the right of way. (S)
- D. Locate signs outside vision clearance areas and easements. (S) (see also 5.1.F.1)
- E. Signs on roofs are not allowed. Signs shall not exceed the height of the roof parapet. (S)
- F. Signs facing or visible to gateway arterial roadways and off-street multi-use paths are prohibited. (S)

7.4 Sign Illumination

Policy:

In industrial areas, sign illumination should serve to identify individual developments only.

Standards and Guidelines:

- A. Monument signs may be illuminated with a maximum of one, ground-mounted 100-watt metal halide fixture per face. (S)
- B. Building mounted signs may not be illuminated either directly or indirectly. (S)
- C. When external light sources are directed at the sign surface, conceal the light source from the 'lines of sight' of pedestrians and motorists. (S)
- D. Window signage shall not be illuminated. (S)
- E. Visible neon tubing is not allowed as a method of sign illumination nor shall it be used as an architectural treatment. (S)

7.5 Allowable Sign Types

Policy:

The type of sign used should reinforce the urban environment of industrial developments. Signs should be designed as a 'family', incorporating similar, compatible materials that reinforce the design and style of the project architecture. The following standards and guidelines apply with regard to the listed sign types.

Standards and Guidelines:

A. Monument Signs

1. Project monument signs, if authorized, may be located at the street or primary entries to industrial developments to provide for overall project identity. (G) Such signs should contain the name of the project that it identifies or the building street number and may include the names of individual tenants, but shall not contain change panels or advertising. (S)
2. Affix monument signs to the ground in a continuous connection. (S)
3. All monument signs shall provide the address and street of the building served, with minimum 3-inch text. (S)
4. For flexible space projects containing multiple tenants, project identity signage requires additional variables that must be considered. Conceptual designs for signs serving these types of facilities must be submitted to the Planning Department. (S)



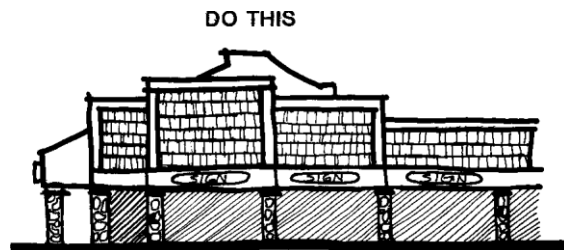
TYPICAL WALL SIGN DESIGN AND LOCATION



TYPICAL WALL SIGN DESIGN AND LOCATION

B. Surface-mounted Signs on Buildings

1. For multi-tenant buildings, locate wall-mounted signs at the first floor level only. (S) Wall signs shall identify the individual business, building or building complex by name or trademark only. (S)
2. Wall-mounted signs may not project more than 8-inches from the face of the building and external raceways are not permitted. (S)



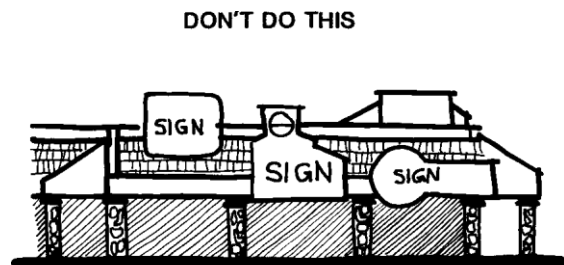
EMPLOY A CONSISTENT SIGN PATTERN

C. Projecting Signs

1. Projecting signs are not permitted. (S)

D. Pole-mounted Signs

1. Pole-mounted signs are allowed only as traffic regulation signs or to provide appropriate directions to loading and receiving areas, visitor parking, and other areas within each development site. (S)
2. Pole-mounted signs shall not exceed 4 square feet in area and 6-feet in height measured from grade. (S)



INCONSISTENT SIGN PATTERNS CREATE CONFUSION. SIGNS WITHIN OR ABOVE ROOF AREA ARE PROHIBITED

- E. Flashing or moving signs are not permitted. (S)

8. EXTERIOR SITE LIGHTING

Goal:

Exterior lighting should be used to provide illumination for the security and safety of entry drives, parking, service and loading areas, pathways, courtyards and plazas, without intruding on adjacent properties. Site lighting shall be architecturally compatible and consistent in design between sites.

8.1 Fixture Design

Policy:

Exterior light fixtures should be compatible and relate to the architectural character of the buildings on a site. Site lighting should be provided at the minimum level to accommodate safe pedestrian and vehicle movements, without causing any off-site glare.

Standards and Guidelines:

- A. Poles and fixtures should be designed to be architecturally compatible with structures and lighting on adjacent properties. (G)
- B. Poles and fixtures shall be compatible with all other fixtures on site. (S)
- C. Illuminate all intersections with perimeter public roads with similar poles and fixtures used internal to the development. (G)
- D. Select and locate all lighting fixtures to shield or confine light spread within a site's boundaries. (S)
- E. To facilitate security, specify lighting levels that are adequate for visibility, but not overly bright. All building entrances should be well-illuminated. (G)
- F. Use metal halide or other white light fixtures. High-pressure sodium is not allowed in any application. (S)
- G. Maximum height of all poles within landscaped and plaza areas is 20-feet, measured from grade. Pole pedestals (bases) are limited to a minimum of eight-inches in height. (S)
- H. Decorative light fixtures, which are appropriately shielded, and provide visual interest, are allowed. (G)

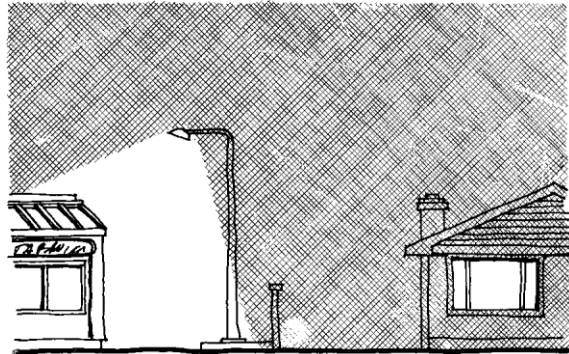
8.2 Parking Lot Lighting

Policy:

Parking lot lighting should be unobtrusive and provide safe light for orderly functions.

Standards and Guidelines:

- A. Make all parking lot light fixtures similar in design for all surface parking areas. (S)
- B. Select lighting with a concealed light source of the 'cut-off' variety to prevent glare and 'light trespass' onto adjacent buildings and sites. (S)
- C. Provide separate, pedestrian scale lighting for all pedestrian ways through parking lots. (G)
- D. Maximum height of parking lot poles is 24-feet measured from finish grade. (S)
- E. Locate poles in medians wherever possible with a maximum base height of 2-feet. (G)
- F. 'Wall packs' are permitted only in loading and service areas, and shall be down-lit and fully shielded from view. (S)



SELECT AND LOCATE LIGHT FIXTURES TO CONFINE LIGHT SPREAD

8.3 Pedestrian Area Lighting

Policy:

Walkway lighting should be scaled to the pedestrian and should provide for safe use of pathways and pedestrian areas. Walks should be lighted for the safe passage of pedestrians, as should areas that are dangerous if unlit, such as stairs, ramps, intersections, and underpasses.

Standards and Guidelines:

- A. Bollard light fixtures or other low-level fixtures are encouraged to identify pedestrian walkways and drop-off areas at entrances to buildings. (G)
- B. Emphasize pedestrian-to-vehicle intersections with low-level decorative streetlights. (G)
- C. Illuminate all primary walkways, steps or ramps along pedestrian routes. (G)
- D. Incandescent or metal halide lamps are strongly encouraged. (G)
- E. Use building mounted fixtures for walkways and plazas near buildings. (G)

8.4 Site Security Lighting

Policy:

Security lighting may be necessary on some sites, but it should not negatively impact the site and building architecture or adjacent parcels.

Standards and Guidelines:

- A. No light source (bulb) shall be directly visible from adjacent parcels. (S)
- B. Provide only as much light/illumination as necessary to provide safety and security of the area. (G)

8.5 Light Intensity

Policy:

The light intensity levels within all areas should correspond to use and potential hazards.

Standards and Guidelines:

- A. A photometric lighting plan is required for all proposed industrial developments to ensure adequate and appropriate light levels are provided for each site condition. (S)
- B. The following levels of illumination should be maintained for each of the specific locations¹: (G)

Building Entrances	5.0 footcandles	54 lumens/square meter
Sidewalks	2.0 footcandles	22 lumens/square meter
Bikeways	1.0 footcandles	11 lumens/square meter
Courts/Plazas/Terraces	1.5 footcandles	16 lumens/square meter
Ramps	5.0 footcandles	54 lumens/square meter
Stairways	5.0 footcandles	54 lumens/square meter
Underpasses	5.0 footcandles	54 lumens/square meter
Waiting Areas	1.0 footcandles	11 lumens/square meter
Parking Lots	1.0 footcandles	11 lumens/square meter
Roadways	1.5 footcandles	16 lumens/square meter

¹ Values given area in minimum average maintained horizontal, footcandles (lumens/square meter) which are measured at the average point of illumination between brightest and darkest areas, 4'-5' above the ground surface. (Source: IES Lighting Handbook - 4th Edition).

² Metric conversion is provided for convenience only. Photometric plans must be submitted using imperial measurement values.

- C. Site lighting should provide consistent levels of illumination, avoiding pockets of very high or low levels of illumination. (G)
- D. Maximum 400-watt fixtures are permitted for parking lot pole lighting. (S)
- E. Wall packs of a full cut-off and fully shielded design shall not exceed a maximum of 70-watts for man doors and 175-watts in loading areas. (S)

{END}

APPENDIX A RECOMMENDED PLANT MATERIALS LIST

DECIDUOUS TREES

Common Name	Botanical Name	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Norway Maple	(Acer platanoides) (3)	M	L	Yes	Good fall color (yellow)
Red Maple	(Acer rubrum)	M	L	Yes	Good (yellow to red) fall color
Wier's Cutleaf Maple	(Acer saccharinum 'Wier')	M	H	No	Very susceptible to snow storm breakage
Sugar Maple	(Acer saccharum)	H	L	Yes	
Ohio Buckeye	(Aesculus glabra)	M	L	Yes	Poisonous seeds, good fall color
Native Riverbirch	(Betula fontinalis)	H	L	No	
Western Catalpa	(Catalpa speciosa)	M	M	No	Fruits can be messy
Western Hackberry	(Celtis occidentalis)	M	L	Yes	
Autumn Purple Ash	(Fraxinus americana 'Autumn Purple')	M	L	Yes	Good fall color (yellow to red)
Green Ash	(Fraxinus pennsylvanica lanceolata) (3)	M	L	Yes	Good fall color (yellow)
Honeylocust	(Gleditsia triacanthos inermis) (3)	M	L	Yes	
Lanceleaf Cottonwood	(Populus acuminata) (1)	M	H	No	Best used in parks, open space, & riparian areas
Narrowleaf Cottonwood	(Populus angustifolia) (1)	M	H	No	Best used in parks, open space, & riparian areas
Siouxland Cottonwood	(Populus deltoides) (1)	M	H	No	Best used in parks, open space, & riparian areas
Plains Cottonwood	(Populus sargentii) (1)	M	H	No	Best used in parks, open space, & riparian areas
Bur Oak	(Quercus macrocarpa)	M	L	Yes	
Pin Oak	(Quercus palustris)	M	L	Yes	Good fall color (bronze to red)
English Oak	(Quercus robur)	M	L	Yes	Good fall color
Northern Red Oak	(Quercus rubra borealis)	M	L	Yes	
Peachleaf Willow	(Salix amygdaloides) (1)	H	H	No	Best used in parks, open space, & riparian areas
Weeping Willow	(Salix elegantissima) (1)	H	H	No	Best used in parks, open space, & riparian areas
Niobe Weeping Willow	(Salix x blanda 'Niobe') (1)	H	H	No	Best used in parks, open space, & riparian areas
American Linden	(Tilia americana)	M	L	Yes	
Little Leaf Linden	(Tilia cordata)	M	L	Yes	
Redmond Linden	(Tilia euchlora 'Redmond')	M	L	Yes	

ORNAMENTAL TREES

Common Name	Botanical Name	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Amur Maple	(Acer ginnala)	M	L	NA	Good fall color (orange to red)
Shadblow Serviceberry	(Amelanchier canadensis)	M	L	NA	Nice fall color (yellow to red)
Eastern Redbud	(Cercis canadensis)	M - H	L	NA	Showy flowers
Cornelian Dogwood	(Cornus mas)	M	L	NA	Showy flowers
Thornless Cockspur Hawthorn	(Crataegus crus-galli inermis)	L	L	NA	Thornless, good fall color (orange to red)
Cockspur Hawthorn	(Crataegus crus-galli)	L	L	NA	Thorns, good fall color (orange to red)
Downy Hawthorn	(Crataegus mollis)	L	L	NA	
Golden Raintree	(Koelreuteria paniculata)	M	L	NA	Showy flowers
Flowering Crab	(Malus varieties) (3)	L - M	M	NA	
Wild Plum	(Prunus americana)	L	M	NA	Suckers
Newport Purple Plum	(Prunus cerasifera 'Newport')	M	L	NA	Red-purple foliage
Shubert Chokecherry	(Prunus virginiana)	M	L	NA	Red-purple foliage
Bradford Pear	(Pyrus calleryana 'Bradford')	M	M	NA	Not too hearty in this region, showy flowers
Ussurian Pear	(Pyrus ussuriensis)	M	L	NA	Showy flowers
Peking Lilac	(Syringa pekinensis)	M	L	NA	Showy flowers
Japanese Tree Lilac	(Syringa reticulata)	L - M	L	NA	Showy flowers, good fall color (yellow)
Washington Hawthorn	Crataegus phaenopyrum)	M	L	NA	Good fall color, red

DECIDUOUS SHRUBS

Common Name	Botanical Name	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Thin Leaf Alder	(<i>Alnus tenuifolia</i>)	M	L	NA	Nice fall color (yellow)
Serviceberry	(<i>Amelanchier alnifolia</i>)	L	L	NA	Nice fall color
Chokeberry	(<i>Aronia melanocarpa</i>)	H	M	NA	Suckers, good fall color (red)
Sagebrush	(<i>Artemisia</i>) (3)	L	L	NA	
Four Wing Saltbush	(<i>Atriplex canescens</i>)	L	M	NA	
Korean Barberry	(<i>Berberis koreana</i>)	M	M	NA	Thorns
Mentor Barberry	(<i>Berberis mentorensis</i>)	M	M	NA	Thorns, good fall color (yellow to red)
Redleaf Japanese Barberry	(<i>Berberis thunbergii atropurpurea</i>)	M	M	NA	Thorns
Green Japanese Barberry	(<i>Berberis thunbergii</i>)	M	M	NA	Thorns
Blue Mist Spirea	(<i>Caryopteris x clandonensis</i>)	L	L	NA	
Curlleaf Mountain Mahogany	(<i>Cercocarpus ledifolius</i>)	L	M	NA	
Mountain Mahogany	(<i>Cercocarpus montanus</i>)	L	M	NA	
Quince	(<i>Chaenomeles</i> spp.)	M	M	NA	Showy flowers
Rabbit Brush	(<i>Chrysothamnus nauseosus</i>)	L	M	NA	
Variegated Dogwood	(<i>Cornus alba bariegata</i>)	M - H	M	NA	
Colorado Redosier Dogwood	(<i>Cornus sericea coloradense</i>) (3)	M - H	M	NA	Colored twigs provide nice winter color
Yellowtwig Dogwood	(<i>Cornus sericea flaviramea</i>) (3)	M - H	M	NA	Colored twigs provide nice winter color
Kelsey Dwarf Dogwood	(<i>Cornus sericea kelseyi</i>)	M	M	NA	
Redtwig Dogwood	(<i>Cornus stolonifera</i>)	M - H	M	NA	Colored twigs provide nice winter color
Cranberry Cotoneaster	(<i>Cotoneaster apiculata</i>)	M	M	NA	
Spreading Cotoneaster	(<i>Cotoneaster divaricata</i>)	M	M	NA	
Rock Cotoneaster	(<i>Cotoneaster horizontalis</i>)	M	M	NA	
Silverberry	(<i>Eleagnus commutata</i>)	M	M	NA	
Burning Bush	(<i>Euonymus alata</i>) (3)	M	M	NA	Nice fall color (red)
New Mexico Privet	(<i>Forestiera neomexicana</i>)	M	M	NA	
Forsythia	(<i>Forsythia intermedia</i>)	M	M	NA	Showy flowers
Honeysuckle	(<i>Lonicera</i>) (3)	M	M	NA	
Mockorange	(<i>Philadelphus</i>) (3)	L - M	M	NA	
Mountain Ninebark	(<i>Physocarpus monogynus</i>)	M	M	NA	
Potentilla	(<i>Potentilla fruticosa</i>) (3)	M	M	NA	Showy flowers
Sandcherry	(<i>Prunus besseyi</i>)	M	M	NA	
Cistena Plum	(<i>Prunus cistena</i>)	M	M	NA	
Native Chokecherry	(<i>Prunus virginiana melanocarpa</i>)	L - M	M	NA	
Scrub Oak	(<i>Quercus gambelii</i>)	L	L	NA	

Tallhedge Buckthorn	(Rhamnus frangula columnaris)	M	M	NA	
Smooth Sumac	(Rhus glabra)	L	M	NA	Nice fall color (orange to red)
Threeleaf Sumac	(Rhus trilobata)	L	M	NA	Nice fall color (orange to red)
Staghorn Sumac	(Rhus typhina)	L	M	NA	
Alpine Currant	(Ribes alpinum)	L - M	M	NA	
Golden Currant	(Ribes aureum)	L - M	M	NA	
Rose	(Rosa) (3)	L - M	M	NA	
Coyote Willow	(Salix exigua)	M - H	M - H	NA	Best in moist areas
Bluestem Willow	(Salix irrorata)	M - H	M - H	NA	
Dwarf Willow	(Salix purpurea nana)	M - H	M - H	NA	
Arctic Willow	(Salix purpurea)	M - H	M - H	NA	
Elder	(Sambucus canadensis)	M - H	M	NA	
Buffaloberry	(Shepherdia argentea)	L	M	NA	
Spiraea	(Spiraea) (3)	M	M	NA	
Snowberry	(Symphoricarpos albus)	M	M	NA	
Lilac	(Syringa) (3)	M	M	NA	
Viburnum	(Viburnum) (3)	L - M	M	NA	Nice fall color (varies)
Privet	(Vulgare) (3)	M	M	NA	

EVERGREEN TRE (2)

Common Name	Botanical Name	Water Requirement	Maintenance Requirement	Street Tree	Remarks
White Fir	(Abies concolor)	M - H	L	No	
Oneseed Juniper	(Juniperus monosperma)	L	L	No	
Rocky Mountain Juniper	(Juniperus scopulorum 'Varieties')	L - M	L	No	
Red Cedar	(Juniperus virginiana 'Varieties')	M	L	No	
Black Hills Spruce	(Picea glauca densata)	M - H	L	No	
Colorado Blue Spruce	(Picea pungens 'Glaucal')	M - H	L	No	
Colorado Green Spruce	(Picea pungens)	M	L	No	
Bristlecone Pine	(Pinus aristata)	L - M	L	No	
Pinon Pine	(Pinus edulis)	L - M	L	No	
Limber Pine	(Pinus flexilis)	L - M	L	No	
Swiss Mountain Pine	(Pinus mugo)	L - M	L	No	
Austrian Pine	(Pinus nigra)	L - M	L	No	
Ponderosa Pine	(Pinus ponderosa)	L	L	No	
Southwestern White Pine	(Pinus strobiformus)	L - M	L	No	
Scotch Pine	(Pinus sylvestris)	L - M	L	No	
Douglas Fir	(Pseudotsuga menziesii 'Taxifolia')	M	L	No	

EVERGREEN SHRUBS

Common Name	Botanical Name	Water Requirement	Maintenance Requirement	Street Tree	Remarks
Euonymus Sarcocoe	(Euonymus fortunei 'Sarcocoe')	M	M	NA	
Bigleaf Wintercreeper	(Euonymus fortunei vegeta)	M	M	NA	
Euonymus Manhattan	(Euonymus kiautschovicus 'Manhattan')	M	M	NA	
Juniper	(Juniperus sp.) (3)	L - M	L	NA	
Oregongrape	(Mahonia aquifolium)	M	M	NA	Nice fall colors (red to purple)
Creeping Hollygrape	(Mahonia repens)	M	M	NA	Nice fall/winter colors (red to purple)
Gnome Firethorn	(Pyracantha angustifolia 'Gnome')	M	M	NA	
Firethorn	(Pyracantha coccinea) (3)	M	M	NA	
Yew	(Taxus x media 'Hicksii')				

PERENNIALS, GROUND COVERS, AND ORNAMENTAL GRASSES

Due to the large quantity, variety, and changing availability of these plants, please consult your local nursery (preferably a C.N.A. Member). Height, color, texture, moisture, light requirement, and heartiness need to be considered when specifying these plants. Most local nurseries provide a yearly catalog of available plants and their descriptions.

Notes:

1. These plants are not recommended to be planted within 10' of any foundation, curb, road, walkway, or other site structure that may be damaged by their vigorous/shallow root systems.
2. Mature size of all evergreen trees must be considered when determining location for planting. They are not recommended within 8' of any roadway, walkway, entrance, or window as they will eventually obstruct passage or view. Evergreen trees shall not be placed within roadway site triangles. During winter, icy conditions often occur on the north side of evergreen trees. This must be considered for their placement.
3. These plants have numerous different species, varieties and/or cultivars. Consult a local nursery for current availability and proper selection.

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**RESOLUTION NO. 19
SERIES 2025**

**A RESOLUTION RECOMMENDING APPROVAL OF AN ORDINANCE AMENDING
TITLE 17 OF THE LOUISVILLE MUNICIPAL CODE AND DEVELOPMENT DESIGN
STANDARDS TO PROHIBIT NONFUNCTIONAL TURF, ARTIFICIAL, TURF, AND
INVASIVE PLANT SPECIES FOR CERTAIN NEW DEVELOPMENT AND
REDEVELOPMENT**

WHEREAS, the City of Louisville (the “City”), is a Colorado home rule municipal corporation duly organized and existing under laws of the State of Colorado and the City of Louisville Home Rule Charter (the “City Charter”);

WHEREAS, the Colorado General Assembly enacted Senate Bill 24-005, which added a new Article 99 to the Colorado Revised Statutes, prohibiting nonfunctional turf, artificial turf, and invasive plant species, and which requires local entities, including the City, to prohibit the installation, planting, or placement of any nonfunctional turf, artificial turf, or invasive plant species as part of a new non-residential development project or redevelopment project within the City; and

WHEREAS, the Colorado General Assembly enacted House Bill 25-1113, which supplements Senate Bill 24-005 by expanding the definition of “applicable property” to include multifamily residential housing of more than 12 dwelling units, and further requires local entities, including the City, on or before January 1, 2028, to enact or amend its laws regulating new development and redevelopment projects within its jurisdiction so as to limit the installation of turf to reduce irrigation water demand for residential real property; and

WHEREAS, the Planning Commission finds it is in the interest of the public health, safety and welfare of the City and its residents to prevent the installation, planting or placement of nonfunctional turf, artificial turf, and invasive plant species on certain properties as set forth herein.

NOW THEREFORE, BE IT RESOLVED that the Planning Commission of the City of Louisville, Colorado does hereby recommend approval of an ordinance amending Louisville Municipal Code to prohibit nonfunctional turf, artificial turf, and invasive plant species for certain new development and redevelopment.

PASSED AND ADOPTED this 11th day of December, 2025.

 _____ Attest: Cullen Choi, Secretary Planning Commission	:	 _____ Steve Brauneis, Chair Planning Commission
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An Act

SENATE BILL 24-005

BY SENATOR(S) Roberts and Simpson, Bridges, Hinrichsen, Buckner, Cutter, Exum, Fields, Jaquez Lewis, Marchman, Michaelson Jenet, Priola, Winter F., Fenberg;

also REPRESENTATIVE(S) McCormick and McLachlan, Amabile, Bacon, Bird, Boesenecker, Brown, Daugherty, deGruy Kennedy, Duran, Epps, Froelich, Garcia, Herod, Jodeh, Joseph, Kipp, Lieder, Lindsay, Lukens, Mabrey, Martinez, Marvin, Mauro, Ortiz, Parenti, Rutinel, Sirota, Snyder, Story, Titone, Valdez, Velasco, Weissman, Willford, McCluskie.

CONCERNING THE CONSERVATION OF WATER IN THE STATE THROUGH THE
PROHIBITION OF CERTAIN LANDSCAPING PRACTICES.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. In Colorado Revised Statutes, **add** article 99 to title 37 as follows:

ARTICLE 99

Prohibition of Nonfunctional Turf, Artificial Turf, and Invasive Plant Species

37-99-101. Legislative declaration. (1) THE GENERAL ASSEMBLY

Capital letters or bold & italic numbers indicate new material added to existing law; dashes through words or numbers indicate deletions from existing law and such material is not part of the act.

FINDS THAT:

(a) AS COLORADO CONTINUES TO GRAPPLE WITH THE IMPACTS OF CLIMATE CHANGE, GREEN URBAN SPACES, SUCH AS URBAN TREE CANOPIES, ARE A VITAL ADAPTATION TOOL FOR MITIGATING THE IMPACTS OF CLIMATE CHANGE, ESPECIALLY FOR MITIGATING THE URBAN HEAT ISLAND EFFECT, WHICH CAN INCREASE ENERGY COSTS, AIR POLLUTION, AND HEAT-RELATED ILLNESSES AND DEATHS;

(b) HOWEVER, WATER SUPPLY IN THE WESTERN UNITED STATES IS UNDER INCREASING PRESSURE DUE TO CLIMATE CHANGE AND INCREASING DEMAND;

(c) MANY COMMUNITIES IN THE STATE OVERUSE NONNATIVE GRASS FOR LANDSCAPING PURPOSES, WHICH REQUIRES LARGE AMOUNTS OF WATER TO MAINTAIN;

(d) WHILE THERE ARE APPROPRIATE AND IMPORTANT USES FOR TURF, INCLUDING FOR CIVIC, COMMUNITY, OR RECREATIONAL PURPOSES SUCH AS USE IN PARKS, SPORTS FIELDS, AND PLAYGROUNDS, MUCH OF THE TURF IN THE STATE IS NONFUNCTIONAL, LOCATED IN AREAS THAT RECEIVE LITTLE, IF ANY, USE, AND COULD BE REPLACED WITH LANDSCAPING THAT ADHERES TO WATER-WISE LANDSCAPING PRINCIPLES WITHOUT ADVERSELY IMPACTING QUALITY OF LIFE OR LANDSCAPE FUNCTIONALITY;

(e) PROHIBITING THE INSTALLATION, PLANTING, OR PLACEMENT OF NONFUNCTIONAL TURF IN APPLICABLE PROPERTY IN THE STATE CAN HELP CONSERVE THE STATE'S WATER RESOURCES;

(f) INSTALLED VEGETATION THAT ADHERES TO WATER-WISE LANDSCAPING PRINCIPLES CAN HELP REDUCE OUTDOOR DEMAND OF WATER; AND

(g) ADDITIONALLY, ARTIFICIAL TURF CAN CAUSE NEGATIVE ENVIRONMENTAL IMPACTS, SUCH AS EXACERBATING HEAT ISLAND EFFECTS IN URBAN AREAS AND RELEASING HARMFUL CHEMICALS, INCLUDING PLASTICS, MICROPLASTICS, AND PERFLUOROALKYL AND POLYFLUOROALKYL CHEMICALS, INTO THE ENVIRONMENT AND WATERSHEDS.

(2) THE GENERAL ASSEMBLY THEREFORE DECLARES THAT

PREVENTING THE INSTALLATION, PLANTING, OR PLACEMENT OF NONFUNCTIONAL TURF, ARTIFICIAL TURF, AND INVASIVE PLANT SPECIES IN APPLICABLE PROPERTY IN THE STATE IS:

(a) A MATTER OF STATEWIDE CONCERN; AND

(b) IN THE PUBLIC INTEREST.

37-99-102. Definitions. AS USED IN THIS ARTICLE 99, UNLESS THE CONTEXT OTHERWISE REQUIRES:

(1) (a) "APPLICABLE PROPERTY" MEANS:

(I) COMMERCIAL, INSTITUTIONAL, OR INDUSTRIAL PROPERTY;

(II) COMMON INTEREST COMMUNITY PROPERTY; OR

(III) A STREET RIGHT-OF-WAY, PARKING LOT, MEDIAN, OR TRANSPORTATION CORRIDOR.

(b) "APPLICABLE PROPERTY" DOES NOT INCLUDE RESIDENTIAL PROPERTY.

(2) "ARTIFICIAL TURF" MEANS AN INSTALLATION OF SYNTHETIC MATERIALS DEVELOPED TO RESEMBLE NATURAL GRASS.

(3) "COMMERCIAL, INSTITUTIONAL, OR INDUSTRIAL" HAS THE MEANING SET FORTH IN SECTION 37-60-135 (2)(b).

(4) "COMMON INTEREST COMMUNITY" HAS THE MEANING SET FORTH IN SECTION 38-33.3-103 (8).

(5) "COMMON INTEREST COMMUNITY PROPERTY" MEANS PROPERTY WITHIN A COMMON INTEREST COMMUNITY THAT IS OWNED AND MAINTAINED BY A UNIT OWNERS' ASSOCIATION, SUCH AS ENTRYWAYS, PARKS, AND OTHER COMMON ELEMENTS AS DEFINED IN SECTION 38-33.3-103 (5).

(6) "DEPARTMENT" MEANS THE DEPARTMENT OF PERSONNEL CREATED IN SECTION 24-1-128 (1).

(7) "FUNCTIONAL TURF" MEANS TURF THAT IS LOCATED IN A RECREATIONAL USE AREA OR OTHER SPACE THAT IS REGULARLY USED FOR CIVIC, COMMUNITY, OR RECREATIONAL PURPOSES, WHICH MAY INCLUDE PLAYGROUNDS; SPORTS FIELDS; PICNIC GROUNDS; AMPHITHEATERS; PORTIONS OF PARKS; AND THE PLAYING AREAS OF GOLF COURSES, SUCH AS DRIVING RANGES, CHIPPING AND PUTTING GREENS, TEE BOXES, GREENS, FAIRWAYS, AND ROUGHS.

(8) "INVASIVE PLANT SPECIES" HAS THE MEANING SET FORTH IN SECTION 37-60-135 (2)(e).

(9) "LOCAL ENTITY" MEANS A:

(a) HOME RULE OR STATUTORY CITY, COUNTY, CITY AND COUNTY, TERRITORIAL CHARTER CITY, OR TOWN;

(b) SPECIAL DISTRICT; AND

(c) METROPOLITAN DISTRICT.

(10) "MAINTAIN" OR "MAINTAINING" MEANS AN ACTION TO PRESERVE THE EXISTING STATE OF NONFUNCTIONAL TURF, ARTIFICIAL TURF, OR AN INVASIVE PLANT SPECIES THAT HAS ALREADY BEEN INSTALLED, PLANTED, OR PLACED.

(11) "NATIVE PLANT" MEANS A PLANT SPECIES THAT IS INDIGENOUS TO THE STATE OF COLORADO.

(12) "NEW DEVELOPMENT PROJECT" MEANS A NEW CONSTRUCTION PROJECT THAT REQUIRES A BUILDING OR LANDSCAPING PERMIT, PLAN CHECK, OR DESIGN REVIEW.

(13) (a) "NONFUNCTIONAL TURF" MEANS TURF THAT IS NOT FUNCTIONAL TURF.

(b) "NONFUNCTIONAL TURF" INCLUDES TURF LOCATED IN A STREET RIGHT-OF-WAY, PARKING LOT, MEDIAN, OR TRANSPORTATION CORRIDOR.

(c) "NONFUNCTIONAL TURF" DOES NOT INCLUDE TURF THAT IS DESIGNATED TO BE PART OF A WATER QUALITY TREATMENT SOLUTION

REQUIRED FOR COMPLIANCE WITH FEDERAL, STATE, OR LOCAL AGENCY WATER QUALITY PERMITTING REQUIREMENTS THAT IS NOT IRRIGATED AND DOES NOT HAVE HERBICIDES APPLIED.

(14) "REDEVELOPMENT PROJECT" MEANS A CONSTRUCTION PROJECT THAT:

(a) REQUIRES A BUILDING OR LANDSCAPING PERMIT, PLAN CHECK, OR DESIGN REVIEW; AND

(b) RESULTS IN A DISTURBANCE OF MORE THAN FIFTY PERCENT OF THE AGGREGATE LANDSCAPE AREA.

(15) "SPECIAL DISTRICT" HAS THE MEANING SET FORTH IN SECTION 32-1-103 (20).

(16) "TRANSPORTATION CORRIDOR" MEANS A TRANSPORTATION SYSTEM THAT INCLUDES ALL MODES AND FACILITIES WITHIN A DESCRIBED GEOGRAPHIC AREA, HAVING LENGTH AND WIDTH.

(17) "TURF" HAS THE MEANING SET FORTH IN SECTION 37-60-135 (2)(i).

(18) "UNIT OWNERS' ASSOCIATION" HAS THE MEANING SET FORTH IN SECTION 38-33.3-103 (3).

(19) "WATER-WISE LANDSCAPING" HAS THE MEANING SET FORTH IN SECTION 37-60-135 (2)(l).

37-99-103. Prohibition of nonfunctional turf, artificial turf, and invasive plant species - local entities - construction or renovation of state facilities. (1) ON AND AFTER JANUARY 1, 2026, A LOCAL ENTITY SHALL NOT INSTALL, PLANT, OR PLACE, OR ALLOW ANY PERSON TO INSTALL, PLANT, OR PLACE, ANY NONFUNCTIONAL TURF, ARTIFICIAL TURF, OR INVASIVE PLANT SPECIES, AS PART OF A NEW DEVELOPMENT PROJECT OR REDEVELOPMENT PROJECT, ON ANY PORTION OF APPLICABLE PROPERTY WITHIN THE LOCAL ENTITY'S JURISDICTION.

(2) ON OR BEFORE JANUARY 1, 2026, A LOCAL ENTITY SHALL ENACT OR AMEND ORDINANCES, RESOLUTIONS, REGULATIONS, OR OTHER LAWS

REGULATING NEW DEVELOPMENT PROJECTS AND REDEVELOPMENT PROJECTS ON APPLICABLE PROPERTY IN ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION.

(3) THE DEPARTMENT SHALL NOT INSTALL, PLANT, OR PLACE, OR ALLOW ANY PERSON TO INSTALL, PLANT, OR PLACE, ANY NONFUNCTIONAL TURF, ARTIFICIAL TURF, OR INVASIVE PLANT SPECIES AS PART OF A PROJECT FOR THE CONSTRUCTION OR RENOVATION OF A STATE FACILITY, WHICH PROJECT DESIGN COMMENCES ON OR AFTER JANUARY 1, 2025.

(4) NOTHING IN THIS SECTION PROHIBITS:

(a) A LOCAL ENTITY FROM MAINTAINING, OR ALLOWING ANY PERSON TO MAINTAIN, ANY NONFUNCTIONAL TURF, ARTIFICIAL TURF, OR INVASIVE PLANT SPECIES INSTALLED, PLANTED, OR PLACED BEFORE JANUARY 1, 2026;

(b) THE DEPARTMENT FROM MAINTAINING, OR ALLOWING ANY PERSON TO MAINTAIN, ANY NONFUNCTIONAL TURF, ARTIFICIAL TURF, OR INVASIVE PLANT SPECIES INSTALLED, PLANTED, OR PLACED AT A STATE FACILITY BEFORE JANUARY 1, 2025;

(c) A LOCAL ENTITY OR THE DEPARTMENT FROM INSTALLING, OR ALLOWING ANY PERSON TO INSTALL, GRASS SEED OR SOD THAT IS A NATIVE PLANT OR HAS BEEN HYBRIDIZED FOR ARID CONDITIONS;

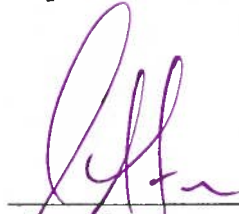
(d) A LOCAL ENTITY OR THE DEPARTMENT FROM ESTABLISHING PROHIBITIONS ON, OR REQUIREMENTS FOR, NONFUNCTIONAL TURF, ARTIFICIAL TURF, OR INVASIVE PLANT SPECIES THAT ARE MORE STRINGENT THAN THE REQUIREMENTS OF THIS SECTION; OR

(e) A LOCAL ENTITY OR THE DEPARTMENT FROM INSTALLING, OR ALLOWING ANY PERSON TO INSTALL, ARTIFICIAL TURF ON ATHLETIC FIELDS OF PLAY.

SECTION 2. Act subject to petition - effective date - applicability. (1) This act takes effect at 12:01 a.m. on the day following the expiration of the ninety-day period after final adjournment of the general assembly; except that, if a referendum petition is filed pursuant to section 1 (3) of article V of the state constitution against this act or an item, section, or part of this act within such period, then the act, item, section, or

part will not take effect unless approved by the people at the general election to be held in November 2024 and, in such case, will take effect on the date of the official declaration of the vote thereon by the governor.

(2) This act does not apply to projects approved by the department of personnel or a local entity before the effective date of this act.



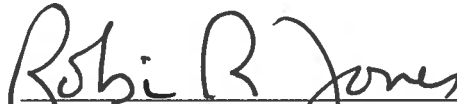
Steve Fenberg
PRESIDENT OF
THE SENATE



Julie McCluskie
SPEAKER OF THE HOUSE
OF REPRESENTATIVES

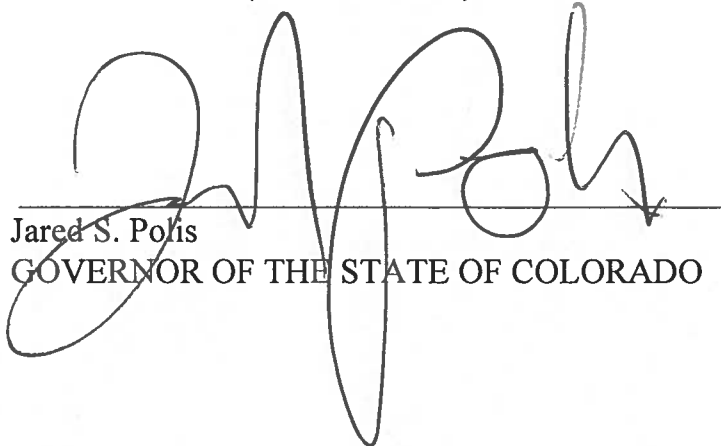


Cindi L. Markwell
SECRETARY OF
THE SENATE



Robin Jones
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES

APPROVED Friday March 15th 2024 at 2:15 pm
(Date and Time)



Jared S. Polis
GOVERNOR OF THE STATE OF COLORADO

An Act

HOUSE BILL 25-1113

BY REPRESENTATIVE(S) Smith and McCormick, Bacon, Boesenecker, Brown, Camacho, Duran, Froelich, Joseph, Lindsay, Martinez, Sirota, Stewart R., Titone, McCluskie;
also SENATOR(S) Roberts, Bridges, Cutter, Danielson, Daugherty, Hinrichsen, Jodeh, Kipp, Kolker, Marchman, Michaelson Jenet, Snyder, Wallace, Weissman, Winter F.

CONCERNING LIMITING THE USE OF CERTAIN LANDSCAPING PRACTICES IN
NEW RESIDENTIAL DEVELOPMENT.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Legislative declaration. (1) The general assembly finds that:

(a) As Colorado continues to grapple with the impacts of climate change, green urban spaces, such as urban tree canopies, are a vital adaptation tool for mitigating the impacts of climate change, especially for mitigating the urban heat island effect, which can increase energy costs, air pollution, and heat-related illnesses and deaths;

(b) However, water supply in the western United States is

Capital letters or bold & italic numbers indicate new material added to existing law; dashes through words or numbers indicate deletions from existing law and such material is not part of the act.

increasingly scarce due to climate change and increasing demand;

(c) Many communities in the state overuse nonnative grass for landscaping purposes, which requires large amounts of water to maintain;

(d) While there are appropriate and important uses for turf, including for civic, community, or recreational purposes such as use in parks, sports fields, and playgrounds, much of the turf in the state is nonfunctional, located in areas that receive little, if any, use, and could be replaced with landscaping that adheres to water-wise landscaping principles without adversely impacting quality of life or landscape functionality;

(e) Prohibiting the installation, planting, or placement of nonfunctional turf in multifamily property in the state can help conserve the state's water resources;

(f) Requiring local governments to regulate turf in new residential properties can help preserve the limited water in our state;

(g) Many communities and developments develop in a water-wise manner already and are appreciated; and

(h) Installed vegetation that adheres to water-wise landscaping principles can help reduce outdoor demand for water while avoiding heat islands.

(2) The general assembly therefore declares that preventing the installation, planting, or placement of nonfunctional turf, artificial turf, and invasive plant species in applicable property in the state is:

(a) A matter of statewide concern; and

(b) In the public interest.

SECTION 2. In Colorado Revised Statutes, 37-99-102, **amend** (1)(a)(II), (1)(a)(III), (7), and (17); **repeal** (1)(b); and **add** (1)(a)(IV), (1.5), (6.5), (10.5), (12.5), (14.5), and (18.5) as follows:

37-99-102. Definitions. As used in this article 99, unless the context otherwise requires:

(1) (a) "Applicable property" means:

(II) Common interest community property; or

(III) A street right-of-way, parking lot, median, or transportation corridor; OR

(IV) APPLICABLE RESIDENTIAL REAL PROPERTY.

(b) ~~"Applicable property" does not include residential property.~~

(1.5) "APPLICABLE RESIDENTIAL REAL PROPERTY" MEANS A MULTIFAMILY RESIDENTIAL HOUSING PREMISES PROPERTY THAT INCLUDES MORE THAN TWELVE DWELLING UNITS.

(6.5) "FUNCTIONAL ARTIFICIAL TURF" MEANS ARTIFICIAL TURF THAT IS:

(a) LOCATED IN A RECREATIONAL USE AREA OR OTHER SPACE THAT IS REGULARLY USED FOR CIVIC, COMMUNITY, OR RECREATIONAL PURPOSES, WHICH MAY INCLUDE A PLAYGROUND, A SPORTS FIELD, A PICNIC GROUND, AN AMPHITHEATER, A PORTION OF A PARK, AND THE PLAYING AREA OF A GOLF COURSE, SUCH AS A DRIVING RANGE, CHIPPING AND PUTTING GREEN, TEE BOX, GREEN, FAIRWAY, AND ROUGH; OR

(b) A COMPONENT OF A PRODUCT DESIGNED AND APPROVED BY A PROFESSIONAL ENGINEER FOR CIVIL INFRASTRUCTURE PROJECTS, INCLUDING BUT NOT LIMITED TO:

(I) COVERS FOR SOLID WASTE FACILITIES AND BROWNFIELD SITES;
AND

(II) REVETMENTS FOR SLOPES, CHANNELS, LEVEES, AND DAMS.

(7) "Functional turf" means turf that is located in a recreational use area or other space that is regularly used for civic, community, or recreational purposes, which may include ~~playgrounds, sports fields, picnic grounds, amphitheaters, portions of parks, and the playing areas of golf courses, such as driving ranges, chipping and putting greens, tee boxes, greens, fairways, and roughs~~ A PLAYGROUND, A SPORTS FIELD, A PICNIC

GROUND, AN AMPHITHEATER, A PORTION OF A PARK, AND THE PLAYING AREA OF A GOLF COURSE, SUCH AS A DRIVING RANGE, CHIPPING AND PUTTING GREEN, TEE BOX, GREEN, FAIRWAY, AND ROUGH.

(10.5) "MULTIFAMILY RESIDENTIAL HOUSING PREMISES PROPERTY" MEANS COMMON INTEREST PROPERTY SUCH AS ENTRYWAYS, PARKS, AND OTHER COMMON ELEMENTS AS DEFINED IN SECTION 38-33.3-103 (5).

(12.5) "NONFUNCTIONAL ARTIFICIAL TURF" MEANS ARTIFICIAL TURF THAT IS NOT FUNCTIONAL ARTIFICIAL TURF.

(14.5) "RESIDENTIAL REAL PROPERTY" HAS THE MEANING SET FORTH IN SECTION 39-1-102 (14.5).

(17) "Turf" ~~has the meaning set forth in section 37-60-135 (2)(i)~~ MEANS CONTINUOUS PLANT COVERAGE CONSISTING OF NONNATIVE GRASSES OR GRASSES THAT HAVE NOT BEEN HYBRIDIZED FOR ARID CONDITIONS AND WHICH, WHEN REGULARLY MOWED, FORM A DENSE GROWTH OF LEAF BLADES AND ROOTS.

(18.5) "URBAN TREE" MEANS A PERENNIAL WOODY PLANT WITH A SINGLE OR MULTIPLE TRUNKS THAT SUPPORT A CANOPY OF BRANCHES AND LEAVES AND THAT PROVIDES ECOLOGICAL, SOCIAL, AND ECONOMIC BENEFITS WITHIN A BUILT ENVIRONMENT.

SECTION 3. In Colorado Revised Statutes, 37-99-103, **amend** (1), (3), (4)(a), (4)(b), (4)(d), and (4)(e); and **add** (4)(f) and (5) as follows:

37-99-103. Prohibition of nonfunctional turf, nonfunctional artificial turf, and invasive plant species - local entities - construction or renovation of state facilities. (1) On and after January 1, 2026, a local entity shall not install, plant, or place, or allow any person to install, plant, or place, any nonfunctional turf, NONFUNCTIONAL artificial turf, or invasive plant species, as part of a new development project or redevelopment project, on any portion of applicable property within the local entity's jurisdiction.

(3) The department shall not install, plant, or place, or allow any person to install, plant, or place, any nonfunctional turf, NONFUNCTIONAL artificial turf, or invasive plant species as part of a project for the

construction or renovation of a state facility, which project design commences on or after January 1, 2025.

(4) Nothing in this section prohibits:

(a) A local entity from maintaining, or allowing any person to maintain, any nonfunctional turf, NONFUNCTIONAL ARTIFICIAL TURF, artificial turf, or invasive plant species installed, planted, or placed before January 1, 2026;

(b) The department from maintaining, or allowing any person to maintain, any nonfunctional turf, NONFUNCTIONAL ARTIFICIAL TURF, artificial turf, or invasive plant species installed, planted, or placed at a state facility before January 1, 2025;

(d) A local entity or the department from establishing prohibitions on, or requirements for, nonfunctional turf, artificial turf, or invasive plant species that are more stringent than the requirements of this section; or

(e) A local entity or the department from installing, or allowing any A person to install, artificial turf on athletic fields of play; OR

(f) A LOCAL ENTITY OR THE DEPARTMENT FROM INSTALLING OR PRESERVING URBAN TREES.

(5)(a) ON AND AFTER JANUARY 1, 2028, A LOCAL ENTITY SHALL NOT INSTALL, PLANT, OR PLACE, OR ALLOW A PERSON TO INSTALL, PLANT, OR PLACE, ANY NONFUNCTIONAL TURF, NONFUNCTIONAL ARTIFICIAL TURF, OR INVASIVE PLANT SPECIES, AS PART OF A NEW DEVELOPMENT PROJECT OR REDEVELOPMENT PROJECT, ON ANY PORTION OF APPLICABLE PROPERTIES THAT INCLUDE MULTIFAMILY RESIDENTIAL HOUSING PREMISES PROPERTY.

(b) NOTWITHSTANDING ANY PROVISION OF THIS SECTION TO THE CONTRARY, A LOCAL ENTITY OR THE DEPARTMENT SHALL NOT RESTRICT A PERSON FROM INSTALLING OR ALLOWING ANOTHER PERSON TO INSTALL GRASS SEED OR SOD THAT:

(I) IS A NATIVE PLANT;

(II) HAS BEEN HYBRIDIZED FOR ARID CONDITIONS; OR

(III) IS A LOW-WATER GRASS.

(c) ON OR BEFORE JANUARY 1, 2028, EACH LOCAL ENTITY WITH LAND USE PLANNING AND ZONING AUTHORITY SHALL ENACT OR AMEND ORDINANCES, RESOLUTIONS, REGULATIONS, OR OTHER LAWS REGULATING NEW DEVELOPMENT PROJECTS AND REDEVELOPMENT PROJECTS TO:

(I) REGULATE THE INSTALLATION OF NONFUNCTIONAL TURF IN ORDER TO REDUCE IRRIGATION WATER DEMAND ON APPLICABLE PROPERTY IN ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION; AND

(II) INCLUDE CONSIDERATION OF APPLICABLE RESIDENTIAL REAL PROPERTY.

SECTION 4. In Colorado Revised Statutes, add 37-99-104 as follows:

37-99-104. Regulation of turf in new residential property - local entities - exemptions. (1) ON OR BEFORE JANUARY 1, 2028, EACH LOCAL ENTITY WITH LAND USE PLANNING AND ZONING AUTHORITY SHALL ENACT OR AMEND ORDINANCES, RESOLUTIONS, REGULATIONS, OR OTHER LAWS REGULATING NEW DEVELOPMENT PROJECTS AND REDEVELOPMENT PROJECTS WITHIN THE LOCAL ENTITY'S JURISDICTION TO REGULATE THE INSTALLATION OF TURF TO REDUCE IRRIGATION WATER DEMAND FOR ALL RESIDENTIAL REAL PROPERTY THAT IS NOT APPLICABLE RESIDENTIAL REAL PROPERTY.

(2) ON AND AFTER JANUARY 1, 2028, WHEN ENACTING OR AMENDING ORDINANCES, RESOLUTIONS, REGULATIONS, OR OTHER LAWS REGULATING NEW DEVELOPMENT PROJECTS AND REDEVELOPMENT PROJECTS, EACH LOCAL ENTITY WITH LAND USE PLANNING AND ZONING AUTHORITY SHALL REGULATE THE INSTALLATION OF TURF TO REDUCE IRRIGATION WATER DEMAND FOR ALL RESIDENTIAL REAL PROPERTY THAT IS NOT APPLICABLE RESIDENTIAL REAL PROPERTY.

(3) EACH LOCAL ENTITY WITH LAND USE PLANNING AND ZONING AUTHORITY MAY CHOOSE THE STANDARD OR MECHANISM BY WHICH IT REGULATES TURF IN NEW DEVELOPMENT PROJECTS AND REDEVELOPMENT PROJECTS OF RESIDENTIAL REAL PROPERTY PURSUANT TO THIS SECTION.

(4) NOTWITHSTANDING ANY PROVISION OF THIS SECTION TO THE

CONTRARY, NEITHER A LOCAL ENTITY NOR THE DEPARTMENT SHALL RESTRICT A PERSON FROM INSTALLING OR ALLOWING ANOTHER PERSON TO INSTALL GRASS SEED OR SOD THAT:

- (a) IS A NATIVE PLANT;
- (b) HAS BEEN HYBRIDIZED FOR ARID CONDITIONS; OR
- (c) IS A LOW-WATER GRASS.

SECTION 5. Act subject to petition - effective date. This act takes effect at 12:01 a.m. on the day following the expiration of the ninety-day period after final adjournment of the general assembly; except that, if a referendum petition is filed pursuant to section 1 (3) of article V of the state constitution against this act or an item, section, or part of this act within such period, then the act, item, section, or part will not take effect unless approved by the people at the general election to be held in

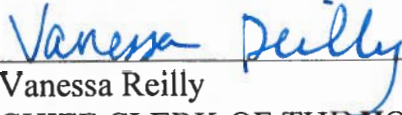
November 2026 and, in such case, will take effect on the date of the official declaration of the vote thereon by the governor.



Julie McCluskie
SPEAKER OF THE HOUSE
OF REPRESENTATIVES



James Rashad Coleman, Sr.
PRESIDENT OF
THE SENATE

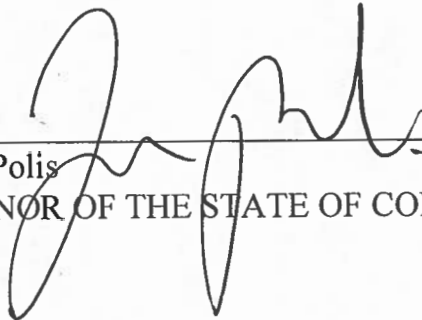


Vanessa Reilly
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES



Esther van Mourik
SECRETARY OF
THE SENATE

APPROVED Tuesday May 20th 2025 at 1:05 pm
(Date and Time)



Jared S. Polis
GOVERNOR OF THE STATE OF COLORADO