

Planner: Lori Levy, AICP

FILE NUMBER: DCA212-008(LL)

INITIATED: Summer 2022

TOPIC: Development Code Amendment to consider developing appropriate standards associated with impermeability, permeability, pervious and impervious surfaces, including, but not limited to definitions, paving, surfaces, materials, and applicability.

COUNCIL DISTRICT: All

CENSUS TRACTS: All

PROPOSAL: Consideration of amending Chapters 51 and 51A of the Dallas Development Code, Sections 51A-2.102 “Definitions”; 51A-4.111 “Agricultural A(A) District” through 51A-4.117 “Manufactured Home MH(A) District”; Sections 51A-4.120 “Office Districts” through 51A-4.127 “Urban Corridor Districts”; 51A-4.507 “Neighborhood Stabilization Overlay”, 51A-4.407.1 “Maximum Lot Impervious Coverage”, 51A-4.803 “Site Plan Review”, 51A-10.101 “Definitions” Landscape and Tree Conservation Regulations of Article X, 51A-10.121 “Application of Division”, 51A-13.304 “Development Type”, 51A-13.703 “Site Plan Review”, and related sections to consider developing appropriate standards associated with impermeability, permeability, pervious and impervious surfaces, including, but not limited to definitions, paving, surfaces, materials, and applicability.

SUMMARY: The proposed code amendments are intended to address the compatibility of impervious surfaces in the required front yard of residential districts and site area, lot, or artificial lots of nonresidential development and will align the Dallas Development Code with the Comprehensive Environmental & Climate Action Plan (CECAP) goal of reducing the environmental impacts of stormwater run-off, such as flooding, and the heat island effect.

STAFF RECOMMENDATION: Approval and move onto CPC.

CODE AMENDMENT WEBPAGE:

<https://dallascityhall.com/departments/pnv/Pages/impervious-coverage-code-amendment.aspx>

APPENDICES

1. Current Yard, Lot and Space Regulations for Residential Districts - [Division 51A-4.110. Residential District Regulations. \(amlegal.com\)](#)
2. Complete Streets Map
3. Comparison Cities
4. Heat Maps for Impervious Surfaces/Tree Canopy Coverage and other resources
5. Other Cities Definitions

BACKGROUND INFORMATION:

- On July 7, 2022, CPC authorized a code amendment initiated by Commissioners Hampton, Stanard, and Anderson to consider developing appropriate standards associated with impermeability, permeability, pervious and impervious surfaces, including, but not limited to definitions, paving, surfaces, materials, and applicability.
- On March 22, April 8, May 5, 8, and 25, June 13, 14, and 16, July 5, 2023, and March 22, 2024 PUD staff met with various internal departmental staff to get input on the impervious coverage code amendment.
- On April 27, 2023, staff had discussions with Commissioner Hampton to get an understanding of the intent of the code amendment from the Code amendment initiators. Items from those discussions, included:
 - a possible definition for maximum impervious surface stated as: The purpose of the maximum impervious surface definition is to protect surface water quality and the health and safety of residents by promoting appropriate development considerations regarding onsite permeable area, rainwater management, storm water quality control and mitigation of heat island effect;
 - maximum impervious area versus minimum permeable surfaces requirements, stormwater/rainwater management, storm water quality/control, site retention, and green infrastructure;
 - the following potential definition for impervious surface: A surface which has been covered with a layer of material so that it is highly resistant to infiltration by water;
 - Other considerations for staff to address included:
 - Buildings, driveways, garage, porches, patios, private walks, accessory building, and any other impervious surfaces constructed on the lots.
 - If highly compacted surfaces which may contribute to run-off materials such as gravel, permeable pavers, or permeable concrete are still considered impervious.
 - Define how water features (fountains, pools, etc.) are to be calculated.
- On May 25, 2023, staff conducted outreach meetings with representatives from Texas Real Estate Council (TREC) and the Dallas Builder's Association (DBA),

and it was suggested that we also reach out to representatives of both MetroTex Realtors and the Apartment Association of Greater Dallas (AAGD).

- On June 12, 2023, staff met with the directors of MetroTex Realtors and AAGD, to discuss some preliminary ideas.
- On August 1, 2023, staff presented the code amendment to ZOAC and ZOAC asked for a few additional items.
- On September 8, 2023, staff met to discuss the design standards for the parking code amendment and a decision was made to include the impervious coverage maximums for nonresidential development for provided parking areas or lots with this impervious coverage code amendment.
- Staff presented the updated proposed recommendations to representatives of TREC, DBA, and NCTCOG on April 1, 2024. Staff also met with GDPC, NCT COG, Greater Dallas Restaurant Association, the Hotel Association of North Texas, and 24Hr Dallas on April 5, 2024 regarding the updated proposed recommendations. Representatives of the Apartment Association of Greater Dallas was unable to meet. A draft summary of the proposal was sent to the industry and professional association leaders.
- On April 22 and 23, 2024 staff conducted two public listening sessions with the same presentation to discuss and receive input on the Draft Impervious Coverage Code Amendment. A total of 28 participants attended (15 in the first session and 13 in the second session, not including staff hosts and cohosts). Staff received the following comments and questions.
 1. Consider lower percentages of maximum impervious coverage for both residential and nonresidential development.
 - a. Staff explained that the maximum percentages are in line with most of the other cities researched and are meant to be effective and achievable.
 2. How does the code amendment address artificial turf?
 - a. Staff explained that artificial turf that is not designed to be pervious per the 2019 Drainage Design Manual, and approved by engineering would be considered an impervious surface and would be included in the maximum impervious coverage calculation.
 3. How will the triggers (applicability) prohibit someone from slowly adding impervious surfaces over time so as not to trigger the maximum impervious coverage requirement for residential developments?
 - a. Staff explained that we will inform the Development Services and Code Compliance Departments of any final ordinance approval.

Non-conformance status would begin the day the ordinance is effective.

- b. Applicability of the maximum impervious coverage percentage for the front yards of residential development will be easily seen by eyes on the street.
- On May 30 and June 5, 2024 staff met with Engineering Consultants who submit engineering plans to the City for industrial and nonresidential development to discuss the impervious coverage proposal.
 - The consultants (RLG, Halff Associates, Inc., Kimley-Horn) performed the calculations on some of their project sites and concluded that the proposed standards as presented should be achievable.
 - Kimley-Horn consultant stated he was not sure the proposal as presented would achieve the impact we are seeking and stated incentives of density bonuses and height would be desirable. Staff is not including incentives of density bonuses or height with this code amendment since those are offered with mixed-income housing development bonuses and are not directly related to impervious surfaces.
 - On June 4, 2024 staff met again with Development Services team to discuss measurement and review for any concerns and none were expressed.

UPDATE:

This report contains the following revisions since the May 14, 2024 ZOAC meeting:

1. Clarifying that impervious coverage is a percentage of “site” area, lot, and artificial lot.
2. Revised definition of impervious surface to specify natural absorption of water and exclude features impeding water.
3. Including buildings in the calculations for impervious coverage.
4. Requiring performance standards for certain nonresidential uses in addition to the maximum percentages of impermeable surfaces.
5. Clarifying that mechanical compaction^{1, 2} applied to soil, and increase of impervious coverage over 2,000 sq. ft. will trigger Article X, Landscape and Tree Conservation Regulations.
6. Other cities' definitions for impervious coverage analysis.

¹Soil compaction is the practice of applying mechanical compactive effort to densify a soil by reducing the void space between soil particles. Compaction occurs when particles are pressed together to reduce the space between them.

²[Soil Compaction Handbook low_res 0212 DataId 59525 Version 1.pdf \(multiquip.com\)](#)

EXISTING REGULATIONS AND POLICIES:

Current City Codes Relevant to Impervious Surface Regulations

Chapters 51 and 51A of the Dallas Development Code do not have specific limitations on maximum impervious surface or coverage like many comparison cities. However, there are some relevant and related regulations to encourage the reduction of impervious surfaces.

- Article IV of the Dallas Development Code: Other Yard, Lot, and Space Regulations

Although there is nothing currently in the overall Dallas Development Code to specifically define or limit permeability or impervious coverage, the Development Code regulates some features that are closely related such as front, side, and rear yard setbacks, minimum lot area, lot width, lot depth, maximum height, maximum floor area and maximum lot coverage. The amount of impervious coverage is not considered in the calculation of lot³ coverage⁴. Subsection (a) General provisions of Sec. 51A-4.401 Yard, Lot and Space Requirements provides that:

- (1) Required front yards must be open and unobstructed except for fences and light poles 20 feet or less in height. Except as otherwise provided in this section, ordinary projections of window sills, belt courses, cornices, and other architectural features may not project more than 12 inches into the required front yard. A fireplace chimney may project up to two feet into the required front yard if its area of projection does not exceed 12 square feet. Cantilevered roof eaves and balconies may project up to five feet into the required front yard.
- (2) The front yard setback is measured from the front lot line of the building site or the required right-of-way as determined by the thoroughfare plan for all thoroughfares, whichever creates the greater setback.

Per Sec. 51A-4.401(c), "A person shall not erect, alter, or convert any structure or part of a structure to cover a greater percentage of a lot than is allowed in the district regulations."

³ Lot is defined as a building site that fronts on a public or private street, except that in the case of a planned development district, the building site may front on an access easement, and in the case of a shared access development, the building site may front on a shared access area.

⁴ Coverage is defined as the percentage of lot area covered by a roof, floor, or other structure, except that roof eaves up to 24 inches and other ordinary building projections up to 12 inches are excluded.

- Article X of the Dallas Development Code: Landscaping Regulations

The landscaping regulations (Article X) of the Dallas Development Code contain parameters around what can be placed in required landscaped areas and, for all uses other than single family and duplex uses, when 2,000 square feet of impervious paving is added, landscaping requirements are triggered.

Sec. 51A-10.126. Landscape Design Options.

There are some design options in Article X that can be selected toward a list of required credits, such as permeable pavement and low-impact development (green infrastructure) such as rain gardens and bioswales, and open spaces maintained as athletic fields.

- *Special Districts*

Additionally, some planned development districts may have limits for impervious surfaces or modifications to landscaping requirements and some conservation districts have some varying limitations on impervious surfaces.

The following [Conservation Districts](#) have standards associated with impervious surfaces:

Vickery Place, Kessler Park, Belmont Addition, and M-Streets – Greenland Hills require front yards to be no more than 30 percent impervious surface.

Edgemont Park requires impervious surfaces in the front yard to be no more than 20 percent of the front yard, but excludes the driveway.

M-Streets – East requires front yards to be paved or hardscaped no more than 50 percent. Parkways may not be paved or hardscaped except for curb cuts and sidewalk extensions.

Rawlins requires front yards to be paved or covered with hardscape, mulch or dirt no more than 25 percent. A maximum of 50 percent of the front yard may be covered with flower beds.

Most of the conservation districts (Lakewood, Hollywood Santa Monica, M-Streets Greenland Hills, M-Streets – East, Northern Hills, Edgemont Park, Stevens Park, and Rawlins) have requirements for driveway width, location, the number of curb cuts, and location of the garage and access.

Several of the districts (Lakewood, North Cliff, Belmont Addition, Vickery Place, and Rawlins) also allow some pervious materials of brick or stone for driveways. M-Streets -East allows ribbon driveways.

- [Neighborhood Stabilization Overlays](#)

The following Neighborhood Stabilization Overlays have garage placement standards which reduce impervious surfaces in the front yard:

Northhaven Estates and Cedar Oaks require the residential garage location to be to the rear with no restrictions on access locations for the rear garage. Greenland Hills, Lakewood North Ridge Estates, and Vanderbilt Marquita require both the location of the residential garage to be in the rear and restrict access to the garage to be from either the front or side lot line. Vanderbilt Marquita does make an exception to garage access location with no restrictions for lots abutting Abrams Rd. or Hillside Drive. Street views for these Neighborhood Conservation Districts show that these requirements are effective in largely reducing the impervious area within the front yards.

- *Stormwater Drainage Utility Fees*

For city-wide codes, the most relevant requirements for impervious coverage in the Dallas City Code currently is in Chapter 2, Article XXVIII, Stormwater Drainage Utility, which specifies how stormwater fees should be calculated on water bills and is based on the amount of impervious surface on a lot.

- *Section R332 Green Building Program for Residential Development*

The International Building Code has some requirements for impervious coverage in R322.5 Prescriptive requirements for stormwater that apply only to new development for residential lots. The requirement states that for all proposed projects, lots must be designed so that at least 70 percent of the built environment, not including any area under a roof, is permeable or designed to capture water runoff for infiltration onsite.

Areas that may be counted toward the 70 percent requirement include:

1. Vegetative landscape such as grass, trees and shrubs.
2. Permeable paving, installed by an experienced professional. Permeable paving must include porous above-ground materials, such as open pavers and engineered products, and a 6-inch porous sub-base. The base layer must be designed to ensure proper drainage from the home.

3. Permeable surfaces that are designed to direct all runoff toward an appropriate permanent infiltration feature such as a vegetated swale, onsite rain garden or rainwater cistern.

- *Section 408.2 Green Building Program for Nonresidential Development*

There are pervious cover requirements in the Green Building Code (GBC) for hardscape material for new construction and additions over 400 square feet for nonresidential development. Hardscape material is required to be at least 50% of one or any combination of the following options:

1. Site hardscape materials (Initial solar reflectance of not less than .30 in accordance with ASTM E 1918 or ASTM C 1549).
2. Shading by structures.
3. Shading by trees or pervious pavement and permeable unit pavement. Pervious and permeable concrete pavements and concrete paving without added color or stain are exempted from the initial solar reflectance requirement.

There are also requirements for cool (reflective) roofs in the GBC that apply to any new structure with a roof, including covered parking greater than 400 square feet. The GBC requires at least 75 percent of roofing material to meet a specified number based on the roof slope that includes an option for vegetative roofs for buildings in order to meet those requirements along with an option for roofing material meeting a specified number for solar reflectivity and thermal emittance.

RESIDENT CONCERNS FOR RESIDENTIAL DEVELOPMENT

One document that spurred CPC's decision to initiate a hearing on this subject originated from a Dallas resident. The document described concerns about stormwater runoff, flooding, the heat island effect, and compatibility issues concerning existing residential development. Although the issues that were described pertain mainly to residential development and the Dallas Development Code does not have requirements regarding impervious surface coverage, the recommendations for this subject focus on both residential districts, and residential development, and nonresidential districts, and nonresidential development.



Photo Credits: Dallas Resident

KEY FINDINGS FROM THE GREEN (STORMWATER) INFRASTRUCTURE STUDY FOR URBAN FLOOD RESILIENCE

In 2021, the Green Stormwater Infrastructure Study for Urban Flood Resilience⁵ was completed and provided to the City of Dallas. The analysis was conducted by The Nature Conservancy and Texas A&M Agrilife Extension in collaboration with the City of Dallas and the Trust for Public Land, funded by Lyda Hill Philanthropies.

The goal of the study was to identify where in Dallas green (stormwater) infrastructure techniques and engineered plant and soil systems that mimic and allow for nature-based solutions that help to enhance and support stormwater management to address urban flooding while factoring in cost, capacity, and future impacts of climate change.

Findings from the analysis revealed substantial and cost-effective opportunities for green infrastructure to enhance urban flood management, especially in areas where existing man-made channelized systems are undersized for capacity to effectively handle both two-year and extreme 10 and 100-year storm events. These findings are summarized from the study below.

- ❖ Results of climate change will be an average increase in the number of system hotspots (+26%) and area of challenged watersheds (+30%) compared to current conditions for the three return period storms studied.
- ❖ Several cost-effective opportunities have been implemented in Green (Stormwater) Infrastructure to improve stormwater management in Dallas, particularly in vulnerable watersheds, such as Joe’s Creek, Cedar Creek, Five-Mile Creek, and White Rock Creek Watersheds.
- ❖ Overflows modeled for all storms show a 17% to 31% reduction and delayed peak flows which can reduce aerial flooding, as well as creek flows, and overbank flooding using Green (stormwater) infrastructure.
- ❖ Green (stormwater) infrastructure was found to be 77% less costly than upgrading existing gray (man-made) infrastructure alone, to meet modeled overflows, and a combination of green and gray provides the maximum cost-effective benefits.
- ❖ Bioretention areas—particularly in parking lots—represent the “biggest bang for the buck,” of the systems studied with the most widely available siting opportunities.

⁵ Green Stormwater Infrastructure for Urban Resilience: Executive Summary [Executive Summary](#)

- ❖ Rain gardens and cisterns, as well as bioretention areas in parks and planting strips, also offer substantial opportunities for distributed benefits.
- ❖ Green (stormwater) infrastructure practices combined with additional “greening” interventions—can support community health and resilience within the City of Dallas, by reducing urban heat island impacts, improving ecological function, enhancing urban flood management, and improving water quality.

ALIGNMENT WITH CITY-WIDE PLANS AND POLICIES:

Data from the Dallas Council adopted Comprehensive Environmental Climate Action Plan (CECAP), the Environmental Protection Agency (EPA), and the heat maps attached in the Appendices from the Trust for Public Lands, show that impervious surfaces exacerbate flooding due to lack of adequate infiltration of water into the soil from rainfall, runoff, and stormwater, and also contribute to hotter temperatures from the heat island effect. The heat island effect is the result of urbanized areas experiencing higher temperatures than outlying areas caused by heat from the sun that is absorbed and re-emitted more than natural environments or landscapes, such as forests and water bodies due to structures such as buildings and infrastructure, such as roads, bridges, and parking lots⁶.

The code amendment to address the lack of requirements for impervious coverage will align the Dallas Development Code with the Comprehensive Environmental & Climate Action Plan (CECAP) goal of reducing the environmental impacts of stormwater runoff, such as flooding, and the heat island effect by reducing stormwater runoff that contributes to flooding and the heat island effect and with several City-wide goals and objectives in ForwardDallas Comprehensive Plan (2006), Draft ForwardDallas Comprehensive Land Use Plan 2.0, and the Complete Streets Design Manual, as amended.

ForwardDallas Comprehensive Plan (2006)

- ✓ Protection of riparian areas and drainage systems

DRAFT ForwardDallas Comprehensive Land Use Plan 2.0

Theme Connection - Environmental Justice + Sustainability

- ✓ Theme Goal: Actively and equitably protect communities from the effects of environmental hazards, while enhancing environmental quality through proactive protection, conservation, and sustainable practices in both natural and built environments.

⁶ [Heat Island Effect | US EPA.](#)

- Objective 1: Support Citywide Environmental Justice (EJ) Goals
- Objective 2: Mitigate Negative Environmental Impacts from New Development
- Objective 3: Support the Environmental Protection of Key Natural Assets

Urban Design Element - Green + Open Space

- ✓ Integrate shade trees to expand the urban forest and improve neighborhood character.
- ✓ Reduce irrigation and increase green infrastructure for drainage and flooding by climate-aware design of buildings, roofs, and open space.
- ✓ Incorporate green infrastructure elements such as channels of absorptive landscaping, permeable pavement, and green roofs to mitigate urban flooding and heat island effects.

Environmental Justice + Sustainability Implementation

- ✓ Action Step 5: Update the Development Code to reduce the percentage of impervious surface areas, where appropriate.
- ✓ Action Step 7: Update Development Code to incorporate green infrastructure practices into land use planning and development, such as rain gardens, green roofs, permeable pavements, bioswales, and vegetated swales, providing incentives where possible.

CECAP

- ✓ Goal 1: Dallas' Buildings Are Energy-Efficient and Climate Resilient
 - B13 – Establish urban greening factor requirements for new developments that quantify how projects contribute to urban greening for reduced stormwater runoff and urban heat island improvements
- ✓ Goal 5: Dallas Protects Its Water Resources And Its Communities From Flooding And Drought
- ✓ Goal 6: Dallas Protects And Enhances Its Ecosystems, Trees, And Green Spaces That In Turn Improve Public Health
- ✓ Goal 8: All Dallas Communities Breathe Clean Air

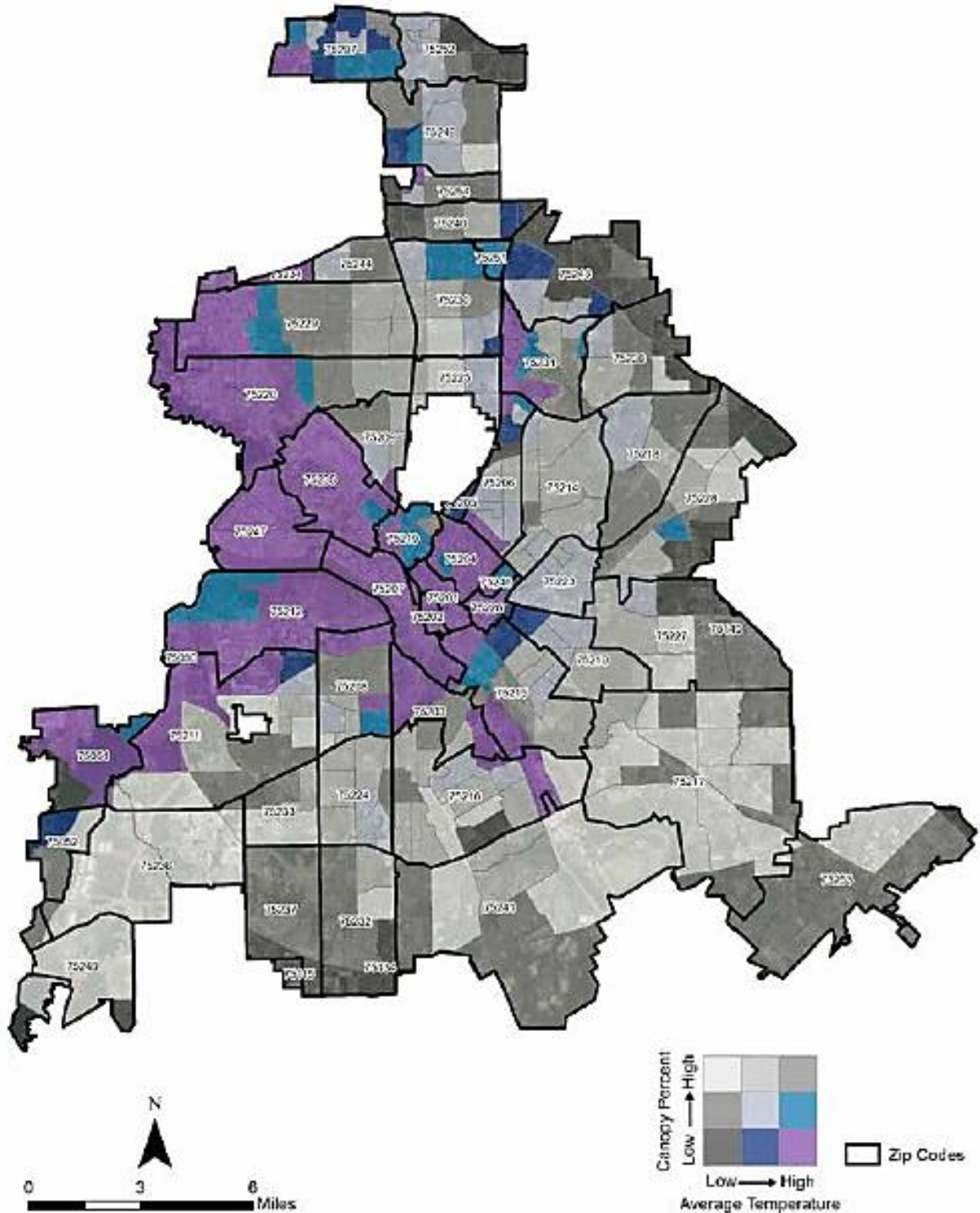
COMPLETE STREETS DESIGN MANUAL, AS AMENDED

- ✓ Include environmentally sustainable solutions
- ✓ Reduce impervious setbacks and frontage

Addressing the lack of impervious coverage requirement will also help to provide more equity in Dallas as many disadvantaged or low-income areas are more prone to flooding and less shade from the excessive heat as shown in Figure 15 below from the Urban Forest Masterplan. [City of Dallas 2021 Urban Forest Master Plan.pdf \(dallascityhall.com\)](#)

Figure 15. Areas of high average temperatures and low tree canopy cover
Areas shaded in purple and blue are those that have low to moderate tree canopy cover and moderate to high average temperatures. Trees can reduce temperatures by up to 15°F in Dallas.

Data Sources: Texas Trees Foundation Urban Heat Island Management Study (2017) and Urban Tree Canopy Assessment Update (2019)



STAFF SUMMARY OF RECOMMENDATIONS

1. SEC. 51A-2.102. Definitions

A. Add the following definitions:

- i. IMPERVIOUS COVERAGE means a percentage of site area, lot, or artificial lot that is covered by impervious surface.
- ii. IMPERVIOUS SURFACE means a surface that prevents or substantially impedes natural absorption of water and from recharging groundwater.

B. Amend the following definition by adding, "Lot" and renumbering:

- i. ~~(26)~~(XX) LOT COVERAGE means the percentage of lot area covered by a roof, floor, or other structure, except that roof eaves up to 24 inches and other ordinary building projections up to 12 inches are excluded.

2. Division 51A-4.110. District Regulations. Adding Maximum Impervious Coverage percentage for all districts to the Yard, lot and space regulations as described in this report (40% for residential uses in the required front yard, except that agricultural is 30%. For nonresidential site area, lots, or artificial lots 60% when abutting parkway streets and 80% elsewhere with additional standards for certain uses and with bonuses as described later in this report).

3. SEC. 51A-4.407.1. Maximum Impervious Coverage

A. Applicability.

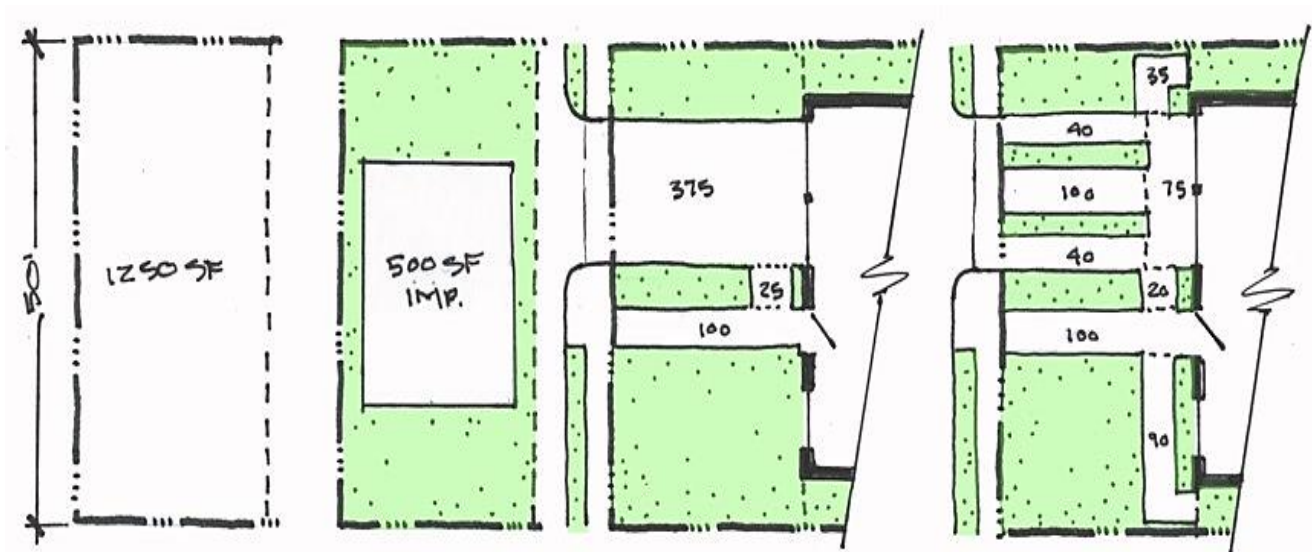
- i. Applicable to lots developed with residential uses when the cumulative area of impervious coverage is increased more than 200 square feet in the required front yard.
- ii. Applicable to site area, lot, or artificial lots developed with nonresidential uses when the cumulative area of impervious coverage increases by more than 2,000 square feet within a 24-month period.

B. General provisions.

- i. Sites containing residential uses.

- a. Single family, duplex and multifamily district maximum impervious coverage for residential uses are measured as a percentage of the required front yard area that is covered by impervious surfaces and all other districts (TH, CH) are measured as a percentage of area between the street-facing façade and the right-of-way line that is covered by impervious surfaces.
- i. Linear surfaces that do not exceed 12 inches in depth, such as flower bed edges, retaining walls, and fences, are excluded from this measurement. If any portion of a public sidewalk is located within the front yard, the public sidewalk surface is excluded from this measurement.
1. A base maximum impervious coverage of 30 percent will be applied to the required front yard for the A(A) Agricultural District since the lots have larger, 50' front yards and a base maximum impervious coverage of 40 percent will be applied for all other residential districts.

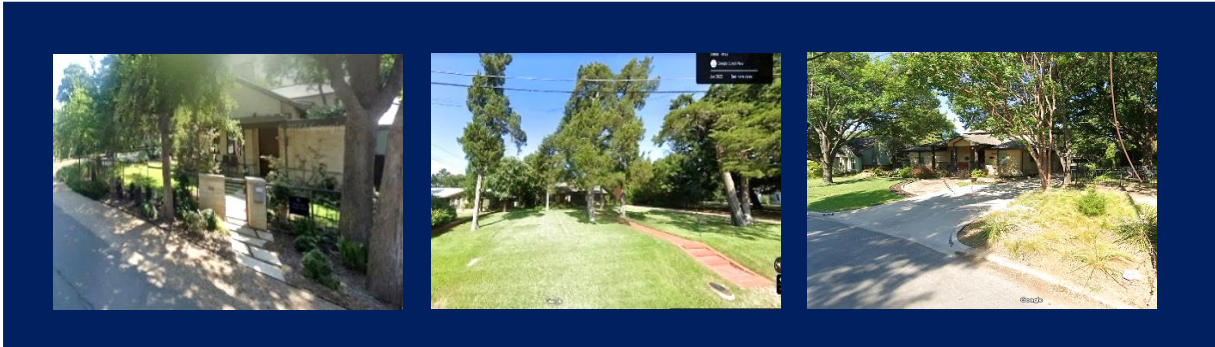
**Example of 40% Maximum Impervious Coverage
(R-7.5 District 50' wide lot and 25' front yard setback)**



Drawing: Don Raines, Planning & Urban Design

- a. Nonresidential uses (schools, churches, etc.) will be subject to the impervious coverage for nonresidential districts (see the next section).
- b. Maximum impervious coverage requirements in a planned development, historic, or conservation district are controlled by the planned development, historic, or conservation district regulations.

2. Additional maximum impervious coverage percentage may be available for lots in residential districts that do not abut parkway streets with specified incentives:
 - a. Up to 10% additional maximum impervious coverage percentage may be allowed in the required front yard with the following design standards:
 1. Green Infrastructure techniques such as rain gardens and bioswales designed per the Drainage Design Manual, as amended or additional trees where not required.



Photos from L to R: SF home with green infrastructure (rain gardens) in the front yard; SF home with trees in the front yard; SF home with rain garden and pervious pavers in the front yard
Photo on the left courtesy of Don Raines, Planning & Urban Design; Google Maps

EXAMPLES OF SURFACES EXCLUDED FROM CALCULATIONS OF IMPERVIOUS SURFACE AREA FOR RESIDENTIAL DEVELOPMENT



Photos from L to R: Townhomes with brick pavers; SF homes with pervious and impervious paving in the front yard.
Photo credits: Don Raines, Planning & Urban Design

- b. A maximum of 5% additional impervious coverage may be allowed in the required front yard for each of the following features (up to a combined total of 10%):
 - 1. Water collection techniques, including but not limited to rain barrels.



<https://www.bobvila.com/articles/best-rain-barrels/>

- c. The board (BDA) may grant a special exception to the impervious coverage requirements to consider unique situations that the proposed code amendments do not cover when the special exception will not be contrary to the public interest and will not adversely affect neighboring properties.

ii. Sites containing nonresidential developments.

A. Measurement.

- i. Maximum impervious coverage for sites containing nonresidential developments is measured as a percentage of impervious surfaces for site area, lots, or artificial lots.
- ii. Buildings are included in the calculation.
- iii. Linear surfaces that do not exceed 12 inches in depth, such as flower bed edges, retaining walls, and fences, are excluded from this measurement. If any portion of a public sidewalk is located within the front yard, the public sidewalk surface is excluded from this measurement.

EXAMPLES OF SURFACES EXCLUDED FROM CALCULATIONS OF IMPERVIOUS SURFACE AREA FOR NONRESIDENTIAL DEVELOPMENT



Photo Credits: Top Left – Multiuse Occasional Parking, [06_GGGChapter3.pdf \(coastalgadnr.org\)](#); Top Right – Porous Concrete (Walmart Parking Areas), [06_GGGChapter3.pdf \(coastalgadnr.org\)](#); Bottom Left and Right – Porous Paver Turf Block, [Smart Surface Guidebook Final 0727.pdf](#)

B. Maximum Impervious Coverage.

- i. A base maximum impervious coverage percentage will be applied for site area, lot, or artificial lots for nonresidential developments as follows:
 1. 80% for all site area, lot, or artificial lots for nonresidential developments, except those lots abutting parkway streets.
 2. 60% for all site area, lot, or artificial lots abutting parkway streets.
- ii. Additional standards apply for certain nonresidential uses
 1. Truck-related, vehicle-related, and nonresidential uses with more than 80 parking spaces must achieve a total of 10 points for any of the following greening factor, green (stormwater) infrastructure, or a combination thereof.

a. 30' Buffer Yard Adjacent to All Streets (5 pts)

- i. One large or medium canopy tree in a double staggered row every 30' linear feet for the total length of the perimeter;
- ii. 75% of the large or medium canopy trees must be evergreen;
- iii. Buffer yard plant materials are required exterior and interior to the screening wall as applicable and along the full length of screening walls along the street right-of-way;
- iv. If the site area, lot, or artificial lot is adjacent to streets on all sides, and all 30' Buffer Yards Adjacent to all Streets are incorporated, 10 pts. may be awarded; and
- v. Street right-of-way may be included up to 25% of the required buffer yard (subject to city licensing, permit and tree location requirements of Art. X)

b. 20' Buffer Yard Adjacent to All Other Properties or Across an Alley (5 pts)

- i. Min. 18 evergreen trees for every 100 linear feet along street R.O.W. (to provide continuous screen) or double staggered row of large evergreen shrubs along the front of the screening wall;

- ii. Continuous shrub row along the front of the fence if the fence is placed within 5' of the property line. Grow to minimum height of six feet; and
- iii. Lawn or groundcover is required for the buffer yard outside of shrub and tree planting areas.

c. 20' Buffer Yard (All Other Buffer Yards) (5 pts)

- i. A large or medium canopy tree is required in a single row for the total length of the perimeter; and
- ii. Minimum of 75% of large canopy trees must be evergreen

All Buffer Yards (a-c above)

- i. The design must show plants by species, and in combination with other plants, to provide growth and maintenance for the purpose of air quality control and aesthetic design according to its placement adjacent to the exterior or interior sides of the screening wall; and
- ii. Plant materials shall be considered based on the horizontal depth of the buffer yard, differences in elevation, the types and density of planting, existing woods on adjacent property, and other combinations of man-made and natural.

d. Green (Stormwater) Infrastructure with Tree Plantings (10 pts)

- i. Bioretention and rain gardens with tree plantings within all parking rows or immediately adjacent to parking rows.

e. Green (Stormwater) Infrastructure (5 pts)

- i. Bioretention and rain gardens within all parking rows or immediately adjacent to parking rows.

f. Cool Pavement Coating or Light Reflective, Paint (5 pts)

- i. Cool pavement coating or light reflective paint for all off-street surface parking areas, including drive aisles, loading areas and vehicle maneuvering areas.

C. Additional maximum impervious coverage percentage available for site area, lot, or artificial lots for nonresidential developments with specified incentives and exemptions as follows:

- i. Additional maximum impervious coverage percentage up to 10% (for a total of 90%) may be allowed for site area, lot, or artificial lots in nonresidential developments.

- ii. Site area, lots, or artificial lots that abut parkway streets are not eligible for additional impervious coverage.
- iii. Truck-related, vehicle-related, and nonresidential uses with more than 80 parking spaces are not eligible for additional impervious coverage.
- iv. Up to a cumulative 10% additional maximum impervious coverage percentage may be approved with the incorporation of the following surfaces and greening factors (listed as 1-4 on the following page).
- v. A maximum additional five percent impervious coverage is allowed for any one of the following features for a maximum total of 10 percent (listed as 5-6 on the following page):
 - a. Water management techniques, including but not limited to diverted downspouts and rain barrels that capture and recycle water used in site area, lot, or artificial lots for landscaping or cisterns for stormwater storage that are designed and approved per the Drainage Design Manual, as amended.
 - b. Use of all-weather and drainable material (pervious paving), other than hot-mix asphalt or concrete, which is approved by the building official for off-street parking surfaces including pedestrian pathways whether required or not required for off-street parking areas. Surfaces are required to be contained so sediment and materials are not discharged off the site and are maintained in good condition.
 - c. Reflective, light-colored cool paving for off-street surface parking areas and pedestrian pathways whether required or not required.
 - d. Other techniques or methods that effectively reduce stormwater runoff or the heat island effect while maximizing health and equity co-benefits as determined by the director or designee.

List of all surfaces and greening factor incentives

1. Green infrastructure (bioswales, raingardens) within all site area, lot, or artificial lots.
2. Plantings abutting all off-street parking areas.
3. Solar PV trees, solar off-street parking surface coating, or solar farms in parking areas.
4. When located within the interior of the site, off-street parking areas including pedestrian pathways whether required or not with approved all-weather and drainable (pervious) materials as approved and designed per the drainage design manual, as amended.

5. Water management to recycle and conserve water in all site area, lot, or artificial lots to water landscaping.
 6. Cool pavement, or light-colored paving for off-street surface parking area and pedestrian pathways (whether required or not required).
 7. Other techniques or methods that reduce stormwater runoff or the heat island effect as determined by the director or designee.
- iv. All-weather and drainable materials and green (stormwater) infrastructure should be selected based on soil suitability and slope conditions per best industry practices, and per the drainage design manual, as amended and will be subject to Engineering approval.
 - v. The board (BDA) may grant a special exception to the impervious coverage requirements to consider unique situations that the proposed code amendments do not cover when the special exception will not be contrary to the public interest and will not adversely affect neighboring properties.

(See photo examples of these incentives on the following pages).

1. Green Infrastructure
(bioswales, raingardens)

Photos from L to R: Bioswale and trees in parking lot, bioswale inlet in parking lot, bioswale in parking lot



2. Plantings abutting all off-street surface parking areas

Photos from L to R: Evergreen hedges abutting sidewalk, berm with evergreen hedges and trees, medium trees shading sidewalk



3. Solar PV trees, solar coatings, or solar farms

Photos from L to R: Solar trees with EV charging, solar road coating, solar farm



4. Within interior of the site, all-weather and drainable (pervious) materials

Photos from L to R: Pervious parking areas Audelia and Walnut Hill, Pervious parking areas and bioswale, pervious turf block parking



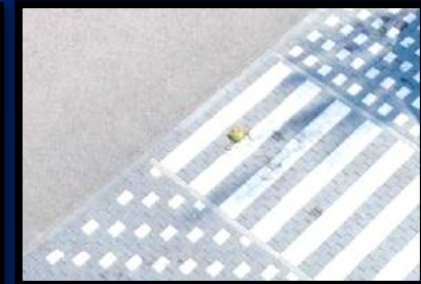
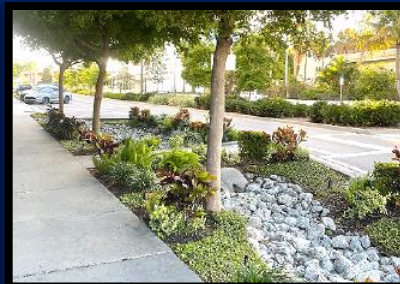
5. Water management to recycle and conserve water for landscaping use

Photos from L to R: Cisterns, overland flow, disconnected downspouts



6. Cool pavement, or light-colored paving

Photos from L to R: Cool sealed paving, light pervious, white painted pavers with light paving



7. Other techniques or methods that reduce stormwater runoff or the heat island effect

Photos from L to R: Vegetated canopy, blue (cistern) canopy, PV or shaded walkways through parking areas



Photo Credits:

1. [Smart Surface Guidebook Final 0727.pdf](#)
2. Google Maps; Tucson shaded sidewalk courtesy of ZOAC member Rieves
3. [Smart Surface Guidebook Final 0727.pdf](#)
4. Audelia and Walnut Hill photo courtesy of David Nevarez, City of Dallas; [Smart Surface Guidebook Final 0727.pdf](#)
5. [Smart Surface Guidebook Final 0727.pdf](#); [2_1_12_new_commercial_landscaping_handout_hollon.pdf \(austintexas.gov\)](#)
6. [Smart Surface Guidebook Final 0727.pdf](#)
7. <https://www.velopa.com/project-solution/structura-shelter-with-sedum-roof/#lq=1&slide=1>, [Smart Surface Guidebook Final 0727.pdf](#)

- 4. SEC 51A-4.507. Neighborhood Stabilization Overlay (NSO) Options for Residential Districts**
 - A. Adding language to 51A-4.507(e)(2) Neighborhood Stabilization Overlay, to allow a neighborhood to consider a more or less restrictive maximum impervious coverage percentage for the front yard.

- 5. SEC 51A-10.101. Definitions. Landscape And Tree Conservation Regulations of Article X.**
 - A. Revising several definitions from Article X to align with new definitions in Article 1.

- 6. SEC 51A-10.121. Application of Division.**
 - A. Clarifying that Article X will apply when mechanical compaction of soil is applied or impervious coverage or porous surfaces on the lot or tract is increased by 2000 square feet within a 24-month period.

- 7. SEC 51A-4.803. Site Plan Review.**
 - A. Revising several terms from the Development Impact Review section of when a site plan is required and site plan requisites to align with the new definitions in Article 1.

- 8. SEC 51A-4.127. Urban Corridor Districts.**
 - A. Removing the permeable surface area requirement under the Yard, lot, and space regulations for urban corridor districts so that the new regulations in Article 1 apply.

- 9. SEC 51A-13.703.**
 - A. Revising a term from the Site Plan Review to align with new definitions in this Article 1.

- 10. SEC 51A-13.304. Development Type**
 - A. Adding Impervious Coverage to the Summary of Development Type Regulations to Form Districts.

STAFF ANALYSIS

1. Definition

In determining an appropriate definition for impervious coverage, staff considered permeability⁷ and other sections of the Dallas Development Code for potential conflicts and applicability with respect to zoning. Staff considered the potential definitions from stakeholder input as well as the following definitions as contained in Sec. 2-168. Definitions; Stormwater Drainage Utility Rates; Exemptions; Incentives for Residential-Benefitted Properties; Billing And Collection Procedures Of Article XXVIII. Stormwater Drainage Utility.

(6) IMPERVIOUS AREA means any surface that prevents or substantially impedes the natural infiltration of stormwater into the ground, and includes, but is not limited to, roads, parking areas, buildings, patios, sheds, driveways, sidewalks, and surfaces made of asphalt, concrete, and roofing materials.

(8) STORMWATER means rainfall runoff, snow or ice melt runoff, or surface runoff and drainage.

Staff also reviewed regulations on impervious surface limitations found within several conservation districts. However, since these definitions were inconsistent between varying conservation districts and because conservation district staff expressed difficulties in interpreting those standards, none were used as a basis for this recommendation.

Staff reviewed the zoning definitions of impervious area or coverage of the comparison cities and found the term varied significantly nationwide. The terms used for the definition vary widely from Impervious Cover, Impervious Surface, Lot and Impervious Surface Coverage, Impermeable Coverage, Permeable Surface, and Nonpermeable. Regarding which exact term to use in this report, staff has been using the term “impervious coverage” but is open to other terms comparison cities have used.

Of the cities staff researched (23), definitions for impervious coverage or similar terms were found for 14 of those cities. Of those 14 cities with definitions, 12 (Addison, Atlanta, Baltimore, College Station, El Paso, Fort Worth, Houston, Lancaster, Minneapolis, Richardson, Rockville, San Jose) describe what is meant by impervious or non-pervious or nonpermeable in the definition.

⁷ Permeability is a physical property of soil and is defined as the rate of water movement through interconnected pores within soil or rock. Permeability describes how fast or easily water can move from one point to another underground [Porosity and Permeability Definition & Overview | What Is Soil Porosity? - Video & Lesson Transcript | Study.com](#)

8 of those cities (Baltimore, College Station, Houston, Lancaster, Minneapolis, San Antonio, San Jose, University Park) specify what is included and/or excluded as impervious surfaces in the definition.

College Station includes definitions for both impervious cover and impervious surface.

Frisco specifies the percentage of impervious coverage and the calculation in the definition.

San Francisco describes and specifies what is meant by pervious or permeable and includes a maintenance requirement in the definition.

El Paso specifies the rainfall coefficient pursuant to the drainage design manual in the definition.

Richardson defines impervious coverage as lot coverage.

Atlanta, Rockville, and Minneapolis have similar definitions for impervious surface as staff proposes.

Staff does not recommend including measurements or duplicating maintenance statements or specific rainfall coefficients that are in the drainage design manual into the definition for amendments to Chapter 51A. The purpose of the definition is to explain what is meant by the term and should adhere to that purpose. Since design criteria such as rainfall coefficients are technical and must be approved by engineering, it is best to keep that information in the drainage design manual and at most reference that section. Staff does not recommend duplicating information from other sections in Chapter 51A for several reasons. Sections of the Code should be simple, readable and streamlined by aligning closely with only what is relevant to the topic or in this case zoning regulations to help minimize conflicting information or sections. Also, by avoiding duplication it will be easier to amend only what is necessary over time.

2. Applying Maximum Impervious Coverage to Residential Front Yards

By addressing impervious coverage requirements in the required front yard, it limits the amount of impervious paving and will allow homeowners and builders more flexibility in providing more useable space to fit their needs and lifestyles, such as front porches, and gardens that foster a sense of community and add more eyes on the street to possibly deter crime.

Staff researched a total of 23 cities (Addison, Arlington, Austin, College Station, Duncanville, El Paso, Frisco, Ft. Worth, Houston, Lancaster, Richardson, Rockville, San Antonio, San Jose, University Park and Georgetown) of which seven are index cities

(Atlanta, Baltimore, Boston, Minneapolis, San Diego, San Francisco, and Seattle) for regulations pertaining to impervious coverage or area. 16 of the 23 comparison cities that staff researched limit impervious paving or hardscape areas with a specific percentage that is required within front yards of residential districts and impervious paving or hardscape limits for nonresidential districts in the zoning regulations in order to address these climate impacts in urbanized areas.

Of the 23 cities that staff researched, only Baltimore limits the impervious area both within the front and rear yards for row houses in the residential districts.

Since there are already other ordinances in place that prohibit a property from diverting stormwater onto an adjacent property that can address the rear and side yards, staff recommends the impervious coverage requirements on residential properties be limited to required front yards.

Additionally, restricting the required front yard and not the entire lot or other yards will afford homeowners the flexibility to use their backyards and property to fit their needs. Finally, only limiting impervious surfaces in the required front yard will facilitate implementation and compliance with these requirements since it is relatively easy to visually observe and calculate by knowing the lot width and multiplying that by the required setback and then focusing on the area calculation of paving/hardscape surface within that area.

3. Impervious Coverage Percentage for Residential Districts

Based on our research, staff recommends a base maximum with a conservative maximum impervious area that includes no environmental design standards and an increased allowance that can be approved administratively when environmental design standards are implemented to incentivize environmental, sustainable design. Initial maximums recommended is 30 percent for the Agricultural district since the minimum front yard setback is 50 feet and the lots tend to be wider and more rural, and 40 percent for the remaining residential districts (R(A), D(A), MF(A), MH(A), TH(A) and CH districts).

4. Incentivizing Design Standards for Residential Districts

Staff recommends incentivizing improved environmental design by allowing additional impervious coverage up to an additional maximum of 10 percent in a residential district when the site is not abutting a parkway street, as shown on the map and referenced in the Complete Streets Design Manual, as amended, and incorporates green infrastructure techniques or pervious driveways as described in the summary recommendations above. No options for the additional 10 percent for lots abutting parkway streets will provide

additional protection for those street types identified as needing additional stormwater considerations due to the proximity to the vulnerable watersheds with respect to flooding.

Staff does not recommend additional impervious coverage percentage for sites located abutting parkway streets since the parkway streets have been classified as streets that follow environmentally, vulnerable flood-prone areas and watersheds in Dallas⁸. See a copy of the Complete Streets Vision Map for Parkway Streets in the Appendices attached.

Incentivizing desired sustainable, green infrastructure design standards for additional percentages of impervious coverage will help the homeowners and builders to achieve the impervious coverage limitations, provide some flexibility in designing the layout on the lot, and helps the City achieve the desired sustainable pervious solutions toward CECAP and other important City goals.

Incentivizing green infrastructure will provide homeowners and builders some flexibility in having other impervious structures or elements in the required front yard such as porches or pedestrian pathways, and additional room for trees, and gardens while still allowing the City to achieve the desired percentage of impervious coverage in the required front yard. Green infrastructure techniques, such as rain gardens, bioswales, and pervious (all-weather and drainable) paving, such as grasscrete or turf block pavers help the homeowners and the City to achieve the desired infiltration of rainwater into the soil while allowing creativity, beauty and potential habitat for the homeowner to enjoy and help maintain the balance of nature.

5. Neighborhood Stabilization Overlay (NSO) Options for Residential Districts

Section 51A-4.507 Neighborhood Stabilization Overlay regulates neighborhood-specific yard, lot, and space requirements of single family neighborhoods to help ensure compatibility of existing neighborhoods with respect to character, stability, and livability. The NSO is an overlay district that adds additional requirements to the base zoning district, such as R-7.5 (A) residential district that controls development on the residential lots within an existing neighborhood, as specified by a particular approved NSO ordinance. Those additional requirements per Sec. 51A-4.507 can include front yard setback, side yard setback, garage location, placement, and connection, and height as outlined in that section. Per Sec. 51A-4.507 (e)(2) Neighborhood stabilization overlay, only the range of the front yard setback of the underlying or base zoning may be considered in the NSO and may be greater or lesser than the front yard setback of the underlying zoning district. This range must be within the same distance of the required

⁸ https://dallascityhall.com/departments/pnv/DCH%20Documents/DCS_ADOPTED_Jan272016.pdf.

underlying zoning district and the median of the existing single family structures within that block face⁹.

At least one of the metroplex cities, Lancaster, allows additional requirements for special districts, such as their Neighborhood Preservation Overlay, similar to a Dallas NSO to include lot coverage, driveway, curbs, and sidewalks, garage entrance location, and landscaping as well as lot size, and front yard, and side yards.

While our impervious coverage limitation of 40 percent for required front yards as prescribed in this code amendment would apply to residential developments, a particular neighborhood with an NSO may find it necessary or desirable to have a more or less restrictive percentage of impervious coverage in the front yard. It is recommended to include an amendment to the Neighborhood Stabilization Overlay options to include a lesser or greater percentage of impervious coverage. This may be particularly important if the range of the required front yard setback is modified through the NSO as well.

Since this is a new standard, no conflicting standards would apply to existing NSOs.

6. Staff Recommendations to Apply Maximum Impervious Coverage for Nonresidential Site Area, Lot, or Artificial Lots

Staff recommends adding a standard for impervious coverage for site area, lot, or artificial lots for nonresidential development which is intended to reduce stormwater runoff that contributes to flooding, the heat island effect, and the degradation of water quality. Since there are no universal impervious coverage standards for nonresidential development, but there are existing lot coverage by building standards, nonresidential developments have parking areas that often have large expanses of impervious surfaces that largely contribute to the stormwater runoff. Therefore, staff recommends that the impervious coverage requirements for nonresidential properties be applied to nonresidential site area, lot, or artificial lots. The proposed standards allow nonresidential development to mitigate the effects of stormwater runoff and still allow flexibility with site design by utilizing the impervious coverage incentives to parking areas.

Staff also recommends a reduced impervious coverage for site area, lot, or artificial lots for nonresidential developments for site area, lots, or artificial lots abutting parkway streets, per the Complete Streets Design Manual, as amended since those are the most vulnerable, flood-prone areas that need further protection.

Staff also recommends adding additional standards in the form of performance standards for certain nonresidential uses that typically have large expanses of impervious surfaces.

⁹ [SEC. 51A-4.507. NEIGHBORHOOD STABILIZATION OVERLAY. \(amlegal.com\)](#)

Of the six cities that require maximum percentages of impervious area of lots for nonresidential districts, University Park limits impervious coverage of the lot to 90 percent for all nonresidential districts, Addison limits it to 80 percent for most of the commercial districts, 90 percent for industrial districts, and variable percentages for other nonresidential districts. Austin limits impervious areas to 80 percent for the general office, neighborhood commercial, and industrial districts, and variable for other nonresidential districts. Georgetown limits impervious areas to 70 percent for all nonresidential districts of lots over 5 acres, and 70 percent for the commercial, public facilities, and mixed-use downtown districts for lots less than 5 acres, 75 percent for the office district, and 85 percent for the industrial districts, and no impervious limitations for the business park districts of lots less than 5 acres. For nonresidential lots that are located over the Edwards Aquifer Recharge or Contributing Zones, and less than 5 acres are limited to 70 percent, while lots over 5 acres are limited to 70 percent for the first 5 acres, and 55 percent for the remaining acreage.

Although, 4 cities (Atlanta, Baltimore, Fort Worth, Houston) do not have specified maximum percentages for impervious area for nonresidential districts, they do have other regulations that limit the parking areas and parking lots to 90 percent impervious surfaces. For example, Atlanta and Baltimore require 10 percent of the parking lot area to be landscaped areas. Fort Worth requires an additional buffer yard or setback for the expansion of any parking area. Houston prohibits parking, driveways or any other auto-related uses such as access to a drive-through window in the Walkable Places and TOD districts. One city (Frisco) requires that nonresidential lots have at least 10 percent of useable open space.

Staff's recommendation of a conservative base standard of no more than 80 percent impervious coverage for nonresidential site area, lots, or artificial lots and 60 percent for site area, lots, or artificial lots abutting parkway streets is in line with most other comparable, metroplex and index cities researched and is demonstrated with staff's drawings that it can be achievable with minimal modifications to parking areas while providing flexibility for the remainder of the lot.

7. Applying Maximum Impervious Coverage to Site Area, Lot, or Artificial Lots in Nonresidential Developments

Staff recommends applying the maximum impervious coverage for nonresidential developments for site area, lot, or artificial lots of sites including pedestrian paths, drive aisles, maneuvering, handicap or accessible areas or landscape buffer areas where immediately adjacent to such parking and loading areas that are located within the off-

street parking area. Parking structures (garages) and underground parking is exempted from impervious coverage.

8. Incentivizing Sustainable Solutions for Pervious Surfaces for Nonresidential Developments

The Dallas Development Code currently has minimal design standards or environmental design standards for nonresidential developments, including parking areas. There are currently no requirements or incentives in the Dallas Development Code to reduce the amount of impervious or pervious paving specifically for nonresidential parking lots, although the surface parking lots largely contribute to storm water runoff, the heat island effect, and the degradation of water quality. There are also no requirements for green infrastructure although there are some options available toward required landscaping credits in Article X, Landscaping and Tree Conservation regulations. The 2019 Drainage Design Manual, as amended also allows some flexibility mostly for private development and streets to use green infrastructure, stating, "Permeable interlocking pavers are suitable for sidewalks, walking paths, pedestrian plazas, parking lots, driveways, street parking areas, and low-traffic roads."

There are no incentives to encourage developers to provide a lower percentage of minimum parking spaces above required parking on nonresidential lots or restrict less parking to reduce impervious surfaces or screening requirements for parking lots in most of the nonresidential districts, such as the retail or commercial districts. There are only off-street parking lot screening requirements from adjoining residential uses and from the streets in the office and urban corridor districts.^{10,11} Some design options in Article X can be selected toward a list of required credits, such as trees planted in the median to meet landscaping requirements, parking lot screening, permeable vehicular paving, green infrastructure (rain gardens and bioswales), and open spaces maintained as athletic fields.

The EPA defines green infrastructure as the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters.¹²

Staff recommends incentivizing greening factors like trees and plantings or green infrastructure (bioswales or rain gardens) for nonresidential development in parking areas to allow the natural infiltration of water from rainfall, runoff, and stormwater drainage

¹⁰ Sec. 51A-4.121. Office Districts. [Division 51A-4.120. Nonresidential District Regulations. \(amlegal.com\)](#)

¹¹ Sec. 51A-4.127. Urban Corridor Districts. [Division 51A-4.120. Nonresidential District Regulations. \(amlegal.com\)](#)

¹² [What is Green Infrastructure? | US EPA](#)

to reduce flooding, degradation of water quality, and reduce heat associated with impervious and hardscape surfaces. Additional trees provide shade, cleaning of the air, a more comfortable and safe walking environment, increase the tree canopy coverage, and help blend or soften the expanse of large impervious surfaces, such as parking with surrounding land uses. The incentives for solar trees (canopies) in the parking areas help to provide shade and provide energy sources and solar farms help to divert the rainfall to the natural rain gardens planted below the solar panels reducing flooding while also providing energy.

CONCLUSION

These amendments will help the City to achieve CECAP goals of reducing the environmental impacts of stormwater runoff, such as flooding, and the heat island effect by reducing stormwater runoff that contributes to flooding, and the heat island effect.

The impervious coverage maximums will reduce the amount of impervious surfaces while increasing the amount of natural, pervious surface area, like vegetation and trees to facilitate the natural infiltration of water from rainfall, runoff, and stormwater drainage to reduce flooding, degradation of water quality, and heat associated with impervious and hardscape surfaces, such as parking areas.

The impact of additional trees and plantings cannot be overstated in terms of the positive environmental impacts of this seemingly small change. In addition to allowing the natural permeability or infiltration of rainfall runoff, snow or ice melt runoff, or surface runoff and drainage, trees also help to filter the air by removing particulate matter and pollution from the air we breathe. Trees can help stormwater to infiltrate into the ground by an increase of 20 to 60 percent and can reduce the daytime temperatures by 15 degrees Fahrenheit and up to 2 degrees Fahrenheit at night. Texas Trees Foundation stated in the Smart Growth for Dallas study, "Tree planting and preservation [has been] found to be more than 3.5 times as effective in lowering temperatures as cool materials strategies."¹³ One large, live oak tree can also clean approximately up to 5 pounds of air pollutants from the air, including ozone, sulfur dioxide, and particulate matter.¹⁴

Any additional tree plantings will also help to increase the tree canopy coverage in both the private and public realm to implement recommendations to increase the tree canopy from the Urban Forest Master Plan – a stated goal of CECAP. Any additional trees in lieu of impervious surface area will also provide much-needed shade while offering a more

¹³ Smart Growth for Dallas: [Smart Growth for Dallas \(tplgis.org\)](http://tplgis.org)

¹⁴Urban Forest MasterPlan:

<https://dallascityhall.com/projects/forestry/DCH%20Documents/City%20of%20Dallas%202021%20Urban%20Forest%20Master%20Plan.pdf>

comfortable and safe walking environment and will help blend or soften the expanse of large off-street parking surface areas associated with nonresidential development with surrounding land uses.

Addressing the lack of impervious coverage requirement will also help to provide more equity and better health outcomes in Dallas as many disadvantaged or low-income areas are more prone to flooding and have less shade from the excessive heat that leads to poorer health outcomes.

Based on other cities researched, input from internal departments, studies conducted for the City by our non-profit partners, and preliminary drawing samples provided by PUD staff that demonstrate that the desired percentage of reduction of impervious surface is achievable, and will help reduce stormwater runoff, and the heat island effect, staff recommends the following draft ordinance amendments.

Proposed 51A Amendments

Note: Underlines indicate new text and ~~strikethroughs~~ indicate deleted text.

MAXIMUM IMPERVIOUS COVERAGE

SEC. 51A-2.102.DEFINITIONS.

(XX) IMPERVIOUS COVERAGE means a percentage of site area, lot, or artificial lot that is covered by impervious surface.

(XX) IMPERVIOUS SURFACE means a surface that prevents or substantially impedes water from recharging groundwater.

~~(26)~~ (XX) LOT COVERAGE means the percentage of lot area covered by a roof, floor, or other structure, except that roof eaves up to 24 inches and other ordinary building projections up to 12 inches are excluded.

Division 51A-4.110. Residential District Regulations.

(4) Yard, lot, and space regulations. (Note: The yard, lot, and space regulations in this subsection must be read together with the yard, lot, and space regulations contained in Division 51A-4.400. In the event of a conflict between this subsection and Division 51A-4.400, Division 51A-4.400 controls.)

A maximum impervious coverage percentage for all Residential and Nonresidential Districts is added to the Yard, lot, and space regulations as follows:

Sec. 51A-13.304 Development Type

(a) General

4. Summary of Development Type Regulations

	Mixed Use Shopfront	Single-Story Shopfront	General Commercial	Apartment	Townhouse Stacked	Townhouse	Manor House	Single-Family House	Civic Building
	Mu	Ss	Gc	Apt	Ts	Th	Mh	Sf	Civ
Lot									
Area per unit or building (min sf)	none	none	none	none	1,200	1,200	depends on # of units	35,000	3,000
Area per building (max sf)	none	none	none	none	none	none	20,000	5,000	none
Width (min ft)	none	none	none	none	16	16	50	35	30
Width (max ft)	none	none	none	none	none	none	100	45	none
Lot Coverage (max)	100%	80%	80%	80%	80%	80%	60%	60%	60%
Impervious Coverage (% of Lot)	80% ¹	80% ¹	80% ¹	40% ¹	40% ¹	40% ¹	40% ¹	40% ¹	80% ¹

¹ Maximum Impervious Coverage for Nonresidential Uses in all districts with lots abutting a parkway street as shown on the Complete Streets Vision Map, and referenced in the Complete Streets Design Manual, as amended shall be 60 percent.

Note: The following Section 51A-4.407.1 is an entirely new proposal. Underlining is not shown for easier reading.

SEC. 51A-4.407.1 MAXIMUM IMPERVIOUS COVERAGE.

(a) Applicability. This section applies to:

(1) Lots developed with residential uses when the cumulative area of impervious coverage is increased by more than 200 square feet in the required front yard.

(2) Site area, lots, or artificial lots developed with nonresidential uses when the cumulative area of impervious coverage increases by more than 2,000 square feet within a 24-month period.

(b) General provisions.

(1) When a site area, lot, or artificial lot contains both residential and nonresidential uses, both subparagraphs (c) and (d) apply. The calculation of impervious coverage is based on the proportion of total impervious coverage required for residential and nonresidential uses in relation to the proposed building footprints.

(A) As an example of a horizontal mixed-use development, a building site with one nonresidential building and two separate residential buildings. If the nonresidential building is on an artificial lot size of 10,000 square feet an impervious coverage of 80 percent impervious coverage for the nonresidential artificial lot would apply. If the two residential buildings were contiguous and the front yard setback area was a total area of 1,000 square feet, the impervious coverage for the residential buildings would be 400 square feet across the contiguous front yard setback abutting the residential buildings.

(B) As an example of a vertical mixed-use development, a building site with a first-floor nonresidential use and residential use on the upper stories on a 10,000-square-foot lot (100 feet by 100 feet on a corner lot with two streets) would limit impervious coverage, including the building, to 8,000 SF overall. Since the site contains a residential use that cannot be separated from the nonresidential building if the 15-foot deep front

yard area was 3,000 square feet, the impervious coverage of 40 percent of the front yard would also apply and therefore is limited to 1,200 square feet of impervious surfaces in the front yard areas.

(2) Site area, lots, or artificial lots abutting a parkway street, as shown on the Complete Streets Vision Map and referenced in the Complete Streets Design Manual, as amended are not eligible for additional impervious coverage described in subsection (c) or (d) in this section.

(3) The maximum impervious coverage requirements in a planned development, historic, or conservation district are controlled by the planned development, historic, or conservation district regulations.

(4) The board (BDA) may grant a special exception to impervious coverage when, in the opinion of the board, the special exception will not be contrary to the public interest and will not adversely affect neighboring properties.

(5) Linear surfaces that do not exceed 12 inches in depth, such as flower bed edges, retaining walls, and fences, are excluded from this measurement. If any portion of a public sidewalk is located within the front yard, the public sidewalk surface are excluded from this measurement.

(c) Sites containing residential uses.

(1) Measurement.

(A) In single family, duplex and multifamily districts, maximum impervious coverage for residential uses is measured as a percentage of the required front yard area that is covered by impervious surfaces.

(B) In all other districts, maximum impervious coverage for residential uses is measured as a percentage of the area between the street-facing façade and the right-of-way line that is covered by impervious surfaces.

(2) Additional impervious coverage. A cumulative additional 10 percent impervious coverage is allowed for the incorporation of the following features.

(A) A maximum additional 10 percent impervious coverage is allowed when green infrastructure techniques to mitigate stormwater runoff, such as bioswales and rain gardens with tree, shrub, or other suitable plantings, are incorporated into the site design and approved per the Drainage Design Manual, as amended.

(B) A maximum additional five percent impervious coverage is allowed for each of the following features for a maximum total of 10 percent:

(i) Water collection techniques, including but not limited to rain barrels, as designed and approved per the Drainage Design Manual, as amended.

(ii.) Bioswales and rain gardens.

(d) Sites containing nonresidential uses.

(1) Measurement. Maximum impervious coverage for sites containing nonresidential uses is measured as a percentage of impervious surfaces used in site area, lot, or artificial lots.

(2) Additional standards for certain nonresidential uses. Truck-related, vehicle-related, and nonresidential uses with more than 80 parking spaces must achieve a total of 10 points for any of the following greening factor, green (stormwater) infrastructure, or a combination thereof.

(A) 30' Buffer Yard Adjacent to All Streets (5 pts)

(i) One large or medium canopy tree in a double staggered row every 30' linear feet for the total length of the perimeter;

(ii) 75% of the large or medium canopy trees must be evergreen;

(iii) Buffer yard plant materials are required exterior and interior to the screening wall as applicable and along the full length of screening walls along the street right-of-way;

(iv) If the site area, lot, or artificial lot is adjacent to streets on all sides, and all 30' Buffer Yards Adjacent to all Streets are incorporated, 10 pts. may be awarded; and

(v) Street right-of-way may be included up to 25% of the required buffer yard (subject to city licensing, permit and tree location requirements of Art. X)

(B) 20' Buffer Yard Adjacent to All Other Properties or Across an Alley (5 pts)

(i) Min. 18 evergreen trees for every 100 linear feet along street R.O.W. (to provide continuous screen) or double staggered row of large evergreen shrubs along the front of the screening wall;

(ii) Continuous shrub row along the front of the fence if the fence is placed within 5' of the property line. Grow to minimum height of six feet; and

(iii) Lawn or groundcover is required for the buffer yard outside of shrub and tree planting areas.

(C) 20' Buffer Yard (All Other Buffer Yards) (5 pts)

(i) A large or medium canopy tree is required in a single row for the total length of the perimeter; and

(ii) Minimum of 75% of large canopy trees must be evergreen

(D) The following conditions must be met for all buffer yards (A-C above)

(i) The design must show plants by species, and in combination with other plants, to provide growth and maintenance for the purpose of air quality control and aesthetic design according to its placement adjacent to the exterior or interior sides of the screening wall; and

(ii) Plant materials shall be considered based on the horizontal depth of the buffer yard, differences in elevation, the types and density of planting, existing woods on adjacent property, and other combinations of man-made and natural.

(E) Green (Stormwater) Infrastructure with Tree Plantings (10 pts)

(i) Bioretention and rain gardens with tree plantings within all parking rows or immediately adjacent to parking rows.

(F) Green (Stormwater) Infrastructure (5 pts)

(i) Bioretention and rain gardens within all parking rows or immediately adjacent to parking rows.

(G) Cool Pavement Coating or Light Reflective, Paint (5 pts)

(i) Cool pavement coating or light reflective paint for all off-street surface parking areas, including drive aisles, loading areas and vehicle maneuvering areas.

(3) Additional impervious coverage. A cumulative additional 10 percent impervious coverage is allowed for the incorporation of the following features.

(A) An additional 10 percent impervious coverage is allowed when green infrastructure techniques to mitigate stormwater runoff, including but not limited to bioswales and rain gardens, are designed and approved per the Drainage Design Manual, as amended, and the following surfaces and greening factors:

(i) Plantings abutting all off-street parking areas.

(aa) An evergreen hedge, located adjacent to sidewalks with plant materials located in a bed that is at least three feet wide with a minimum soil depth of 24 inches. Initial plantings must be capable of obtaining a solid appearance within three years. Plant materials must be placed a maximum of 24 inches on center over the entire length of the bed unless the building official approves an alternative planting density that

a landscape authority certifies as being capable of providing a solid appearance within three years.

(bb) Earthen berm, located adjacent to sidewalks planted with turf grass or ground cover recommended for local area use by the director of parks and recreation. The berm may not have a slope that exceeds one foot of height for each two feet of width.

(cc) Large to medium, 2-inch to 3-inch caliper trees where not required, located adjacent to sidewalks per the recommended plant list in Article X.

(ii) Solar energy generation techniques, such as solar trees, solar coatings, and solar farms throughout all site area, lot, or artificial lots designed per industry and best management practices, as amended.

(iii) When located behind the buildings within the interior of the site, use of an all-weather and drainable material, other than hot-mix asphalt or concrete, which is approved by the building official for off-street parking surfaces including pedestrian pathways whether required or not required. Surfaces must be contained so sediment and materials are not discharged off the site and are maintained in good condition.

(iv) Other techniques or methods that effectively reduce stormwater runoff and the heat island effect while maximizing health and equity co-benefits as determined by the director or designee.

(3) A maximum additional five percent impervious coverage is allowed for each of the following features, up to a cumulative maximum increase of 10 percent:

(i) Water management techniques, including but not limited to diverted downspouts and rain barrels that capture and recycle water used in site area, lot, or artificial lots for landscaping or cisterns for stormwater storage that are designed and approved per the Drainage Design Manual, as amended.

(ii) Reflective, light-colored cool paving coatings for off-street surface parking lots and pedestrian pathways whether required or not required.

(iii) Other techniques or methods that effectively reduce stormwater runoff or the heat island effect while maximizing health and equity co-benefits as determined by the director or designee.

(e) Schedule of maximum impervious coverage.

(1) Except as provided in this section, a person shall not increase Impervious Coverage that is greater than is allowed in the district regulations (Divisions 51A-4.100 et seq.). A schedule of maximum impervious coverage is contained in Section 51A-4.410.

SEC 51A-4.507. NEIGHBORHOOD STABILIZATION OVERLAY.

(e) Neighborhood stabilization overlay.

(1) In general.

...

(F) The yard, lot, and space regulations of the neighborhood stabilization overlay must be read together with the yard, lot, and space regulations in Division 51A-4.400. In the event of a conflict between the neighborhood stabilization overlay and Division 51A-4.400, the neighborhood stabilization overlay controls

(2) Front yard setback. ...

(3) Corner side yard setback. ...

(4) Interior side yard setback. ...

(5) Maximum Impervious Coverage. The maximum impervious coverage must be within the range between the maximum impervious coverage of the underlying zoning and the median impervious coverage of developments within the district. This range may allow for a maximum percentage of impervious coverage that is lesser than the maximum impervious cover of the underlying zoning. For example, if the maximum impervious coverage of the underlying zoning is 40 percent and the median maximum impervious

coverage of the front yards within the district is 10 percent, the maximum impervious coverage selected must be between 40 percent and 10 percent.

(6[5]) Height. ...

(7[6]) Garage access, connection, location. ...

ARTICLE X. LANDSCAPE AND TREE CONSERVATION REGULATIONS.

Division 51A-10.100. In General.

51A-10.101. Definition

(13) COVERED SOIL AREA means an area of soil that is under ~~nonpermeable~~ surfaces and is designed to accommodate tree root growth.

(18) ENHANCED PAVEMENT means any ~~permeable or nonpermeable~~ decorative pavement material intended for pedestrian or vehicular use approved by the director. Examples of enhanced pavement include, but are not limited to, brick or stone pavers, grass paver, exposed aggregate concrete, and stamped and stained concrete.

(39) NONPERMEABLE COVERAGE means impervious coverage ~~with any pavement that is not "permeable pavement"~~ as defined in ~~this section~~ Article I.

(44) PERMEABLE PAVEMENT means ~~director approved paving systems, pavers, or other structural surfaces that allow storm~~ all-weather and drainable material, other than hot-mix asphalt or concrete, or off-street parking surface which is approved by the building official. ~~water infiltration.~~

(49) REMOVE OR SERIOUSLY INJURE means an intentional or negligent action that will more likely than not cause a tree to decline and die within five years of the act. Actions that constitute removing or seriously injuring a tree include, but are not limited to: cutting down a tree; damaging the root system or the trunk of a tree (such as by operating machinery near, or by clearing or grading the area around, the trunk of a tree); failing to repair an injury to a tree from fire or other causes, which results in or permits tree

infections or pest infestations into or on the tree; applying herbicidal or other lethal chemicals; and placing ~~nonpermeable~~ pavement over the root system of a tree.

51A-121. APPLICATION OF DIVISION

(4) Property located within or in close proximity to an airport boundary if the city's director of aviation determines that the required landscape materials will threaten public health or safety.

(b) Only Section 51A-10.125(a) of this division applies to lots containing single family or duplex uses.

(c) This division only becomes applicable to a lot or tract when ~~the nonpermeable coverage~~ mechanical compaction of soil is applied or impervious coverage or porous surfaces on the lot or tract is increased by more than 2,000 square feet within a 24-month period, not including portions of pedestrian pathways, that are between three feet in width and 15 feet in width, or when an application is made for a building permit for construction work that:

(1) increases the number of stories and increases the height of a building on the lot;
or

(2) increases by more than 35 percent or 10,000 square feet, whichever is less, the combined floor areas of all buildings on the lot within a 24-month period. The increase in combined floor area is determined by adding the floor area of all buildings on the lot within the 24 months prior to application for a building permit, deducting any floor area that has been demolished in that time or will be demolished as part of the building permit, and comparing this figure with the total combined floor area after construction.

(d) When this division becomes applicable to an individual lot or tract, its requirements are binding on all current and subsequent owners of the lot or tract.

(e) The city council shall, as a minimum, impose landscaping requirements that are reasonably consistent with the standards and purposes of this division as a part of any ordinance establishing or amending a planned development district, or granting or amending a specific use permit. (Note: This subsection does not apply to ordinances that merely renew a specific use permit when no substantive changes are made other than to extend the time limit of the permit.) All landscaping requirements imposed by the city council must be reflected in a landscape plan that complies in form and content with the requirements of Section 51A-10.123 and complies with Division 51A-10.100.

Division 51A-4.800. Development Impact Review.

51A-4.803. Site Plan Review.

(a) When a site plan is required....

(3) A site plan is not required under Subsection (a)(1) if the permit is only needed for:

(A) restoration of a building that has been damaged or destroyed by fire, explosion, flood, tornado, riot, act of the public enemy, or accident of any kind; or

(B) construction work that does not change the use or increase the existing building height, floor area ratio, or ~~nonpermeable~~ impervious coverage of the lot.

...

(d) Site plan requisites.

...

(5) The following information, in addition to being shown graphically, must be separately tabulated in a conspicuous place on the plan for quick and easy reference:

...

(D) Square footage and percentages of ~~building~~ lot coverage and ~~nonpermeable~~ impervious coverage of the lot.

Division 51A-13.100. General Provisions.

SEC. 51a-13.703. SITE PLAN REVIEW.

(a) Site Plan Required.

...

(2) A site plan is not required if the permit is only needed for:

(A) restoration of a building that has been damaged or destroyed by fire, explosion, flood, tornado, riot, act of the public enemy, or accident of any kind; or

(B) construction work that does not change the use or increase the existing building height, floor area ratio, or ~~nonpermeable~~ impervious coverage of the lot.

SEC. 51A-4.127. URBAN CORRIDOR DISTRICTS.

(c) UC Districts

(7) Landscape and open space provisions.

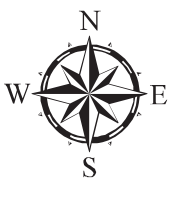
~~(F) Permeable surface area. A minimum of 10 percent of the lot area must be open space in the form of permeable surfaces such as perimeter landscape buffer strip, recreation area, or conservation area. Discrete open space areas smaller than 25 square feet or less than 5 feet wide, and landscaping in the public right-of-way, are not counted towards this 10 percent requirement.~~

Complete Streets Vision Map

Legend

Street Typology

- Commercial
- Industrial
- Mixed Use
- Parkway
- Residential



Printed 9/4/2018



Street Typology

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NOAA, Fugro, Japan, METI, Esri, China, Swisstopo, Esri, Korea, Esri, Thailand, ADFG, © OpenStreetMap contributors, and the GIS User Community

Maximum Impervious Area City Comparisons
Table 1 of 5

	DALLAS			ADDISON			ATLANTA			AUSTIN			BALTIMORE			
Maximum Impervious Coverage for Residential	Proposed			Y			Y			Y			Y			
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	Max. Impervious Area (%) - RY	District
	10%	30% ¹	A (A)	N/A	60	R-1	N/A	N/A	N/A	N/A	65%	Lots < 4,000 SF (Cottage and Urban Home - Small Lot Amnesty)	25%	40%	N/A	R-1A-R-1E (Larger Lots)
	40%	40% ¹	R-ac(A) R-1/2ac(A) R-16(A)	40%	60%	R-1 R-2	N/A	N/A	N/A	N/A	40%	All other Resid. Districts	30%	50%	N/A	R-1, R-2
				65%	80%	R-3										
	45%	40% ¹	R-13(A) R-10(A) R-7.5(A) R-5(A)	60%	70	R-4(SF-D)	N/A	N/A	N/A	N/A	N/A	N/A	35%	50%	N/A	R-3, R-4
	60%	40% ¹	TH-1(A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	R-5 through R-10 (Rowhouse)			
	60%	40% ¹	TH-2(A)	60%	90	R-4 (SF-A)	N/A	N/A	N/A	N/A	N/A	N/A	40%	45%	65%	R-5
	60%	40% ¹	TH-3(A), D(A), MF-1(A)(SAH)-MF-	60%	70	R-4 (D, Triplex, Fourplex, MF)	N/A	55%	Per Storm water permit	MF	N/A	N/A	40%	50%	65%	R-7

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 1 of 5

	DALLAS			ADDISON			ATLANTA			AUSTIN			BALTIMORE			
Maximum Impervious Coverage for Residential	Proposed			Y			Y			Y			Y			
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	Max. Impervious Area (%) - RY	District
			3(A)(SAH)													
	60%	40% ¹	CH(A)	60%	70	R-5	N/A	N/A	N/A	N/A	N/A	N/A	40%	60% (Lots >= 80' depth; otherwise 80%)	65%	R-8
	20%	30%	MH(A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35%	60%	N/A	R-9 SF-D or SF-Semi-detached
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40%	N/A	65%	Row-house
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40%	N/A	N/A	MF
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40%	N/A	N/A	All other
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35%	60%	N/A	R-10 SF-D or SF-Semi-detached
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	80%	N/A	65%	Row-house

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 1 of 5

	DALLAS			ADDISON			ATLANTA			AUSTIN			BALTIMORE			
Maximum Impervious Coverage for Residential	Proposed			Y			Y			Y			Y			
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	Max. Impervious Area (%) - RY	District
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	80%	N/A	N/A	MF
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70%	N/A	N/A	All other
	N/A	N/A	N/A	80%	90%	M-1 (Mixed-Use Neigh.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	60%	70%	M-1 (Mixed-use MF)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	60%	75%	M-2 (Mixed-Use Suburban)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	60%	75%	M-3 (Mixed-Use Urban Corridor)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	90%	100%	M-4 (Mixed-Use Center)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	90%	100%	M-5 (Mixed-Use Regional)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 2 of 5

	DALLAS			BOSTON			COLLEGE STATION			DUNCANVILLE			FRISCO					
Maximum Impervious Coverage for Residential	Proposed			Y			Y			Y			Y					
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Front Loaded only)	District			
	10%	30% ¹	A (A)	Groundwater-retaining paving required system that will promote infiltration of rainfall to groundwater capture of a volume of <= 1.0 across that portion of surface area of lot to be paved		Groundwater Conservation Overlay District; Greenbelt Protection Overlay District	N/A	30%	R,WE, E (N)(P)	20%	N/A	SF-43	N/A	50%	AG			
	40%	40% ¹	R-ac(A) R-1/2ac (A) R-16(A)				N/A	40%	WRS	50%	N/A	SF-13 SF-10	20%	50%	RE			
	45%	40% ¹	R-13(A) R-10(A) R-7.5(A) R-5(A)				N/A	50%	RS(J)	50%	N/A	SF-7	30%	50%	SF-16			
	60%	40% ¹	TH-1(A)				N/A	N/A	N/A	N/A	55%	GS (J)(P)	50%	N/A	TF-7 (Townhouse)	40%	50%	SF-12.5
	60%	40% ¹	TH-2(A)				N/A	N/A	N/A	N/A	75%	T	50%	N/A	TF-7 (Townhouse)	45%	50%	SF-10 SF-8.5 SF-7
	60%	40% ¹	TH-3(A), D(A),				N/A	N/A	N/A	N/A	65%	D	50%	N/A	TF-7 (D) MF-14 MF-21	55%	50%	D MF OTR

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 2 of 5

	DALLAS			BOSTON			COLLEGE STATION			DUNCANVILLE			FRISCO		
Maximum Impervious Coverage for Residential	Proposed			Y			Y			Y			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Front Loaded only)	District
			MF-1(A)(S AH)-MF-3(A)(S AH)	N/A	N/A	N/A	N/A	Per engineer drainage analysis	MF MU						(Original Town Resid.) PH
	20%	30% ¹	MH(A)	N/A	N/A	N/A	N/A	N/A	MHP	N/A	N/A	N/A	N/A	50%	MH
	60%	40% ¹	CH(A)	N/A	N/A	N/A	Clustered Residential Districts			N/A	N/A	N/A	65%	50%	TH
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30%	R,WE,E (N)(P)	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30%	WRS	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40%	RS(J)	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50%	GS (J)(P)	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	55%	T	N/A	N/A	N/A	N/A	N/A	N/A

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 3 of 5

	DALLAS			FT. WORTH			HOUSTON			MINNEAPOLIS			RICHARDSON		
Maximum Impervious Coverage for Residential	Proposed			Y			Y			N			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Driveway Coverage, including parking pads)	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Front Loaded only)	District
	10%	30% ¹	A (A)	N/A	50% 65%-Circular Driveway (one-family dwellings)	AG AR	N/A	Drainage Rate Charges per impervious areas	All	45%	60%	Parks	N/A	N/A	N/A
	40%	40% ¹	R-ac(A) R-1/2ac(A) R-16(A)	20%	50% 65%-Circular Driveway	A-2.5A A-43	N/A	N/A	N/A	45%	60%	Interior 1 Interior 2	50% Lot Cov – the cumulative area of any driveway plus any located btw the front property line and any front building wall		R-2000-M R-1800-M
	45%	40% ¹	R-13(A) R-10(A) R-7.5(A) R-5(A)	30%	50% 65%-Circular Driveway	A-43 A-21	N/A	N/A	N/A	60%	75%	Interior 3 Corridor 3			R-1500-M R-1250-M R-1100-M R-1000-M R-950-M R-850-M
	60%	40% ¹	TH-1(A)	40%	50% 65%-Circular Driveway	A-10	N/A	N/A	N/A	70%	85%	Corridor 4 Corridor 6	N/A	N/A	RA-1100-M

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 3 of 5

	DALLAS			FT. WORTH			HOUSTON			MINNEAPOLIS			RICHARDSON		
Maximum Impervious Coverage for Residential	Proposed			Y			Y			N			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Driveway Coverage, including parking pads)	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Front Loaded only)	District
	60%	40% ¹	TH-2(A)	45%	50% 65%-Circular Driveway	A-7.5		No parking or driveways Within the building line	Walkable Places TOD	80%	90%	Transit 10 Transit 15 Transit 20 Transit 30	N/A	N/A	N/A
	60%	40% ¹	TH-3(A), D(A), MF-1(A)(SAH)-MF-3(A)(SAH)	50%	50% 65%-Circular Driveway	A-5 B (Two-family) MF (Adjacent to Resid.)	N/A	N/A	N/A	N/A	100%	Core 50 Production	50% Lot Cov – the cumulative area of any driveway plus any located btw the front property line and any front building wall		D-1400-M D-2400-M D-300-M
	20%	30% ¹	MH(A)	N/A	50% 65%-Circular Driveway	MH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	60%	40% ¹	CH(A)	N/A	No Front entry driveway or parking	R-1 (Det. Zero Lot Line)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	50% 65%-Circular	R-1 (Attache	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 3 of 5

	DALLAS			FT. WORTH			HOUSTON			MINNEAPOLIS			RICHARDSON		
Maximum Impervious Coverage for Residential	Proposed			Y			Y			N			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Driveway Coverage, including parking pads)	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (Front Loaded only)	District
					Driveway	d ZLA)									
	N/A	N/A	N/A	N/A	50% 65%-Circular Driveway	R-1 (Cluster)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	50% 65%-Circular Driveway	R-2(TH-Cluster)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 4 of 5

	DALLAS			ROCKVILLE			SAN ANTONIO			SAN DIEGO			SAN FRANCISCO		
Maximum Impervious Coverage for Residential	Proposed			Y			N			Y			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (driveway, parking, sidewalk)	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District
	10%	30% ¹	A (A)	15%	10%	R-400	N/A	N/A	RP	10%	N/A	AG-1-1 AR-1-1	N/A	N/A	N/A
	40%	40% ¹	R-ac(A) R-1/2ac(A) R-16(A)	25%	20%	R-200	N/A	N/A	RE R-20	20%	N/A	AG-1-2 AR-1-2	N/A	N/A	N/A
	45%	40% ¹	R-13(A) R-10(A) R-7.5(A) R-5(A)	25%	25%	R-150	N/A	N/A	R6 R5 R-4	N/A	60%	RE-1-1 RE-1-2 RE-1-3	Min. OS Area	50%, plus 20% un-paved and devoted to landscape	RH-1(D) Detached RH-1 (One-Family) RH-1(S) One-Family with Minor Detached RH-2 (Two Family) RH-3 (Three-Family)
25%				30%	R-90	70%	N/A	R-3	N/A	60%	RS-1-1 RS-1-2 RS-1-3				
35%				40%	R-75 R-60 R-60 (5,000 sf)	50%	N/A	R-2	N/A	60%	RS-1-4 RS-1-5 RS-1-6 RS-1-7				
1,500 Sf				40%	Lincoln Park Conservation	45%	N/A	R-1	N/A	N/A	RX-1-1 RX-1-2				
	40%	45%	R-40	N/A	N/A	RM-6 RM-5 RM-4	N/A	N/A	N/A	N/A	N/A				
	60%	40% ¹	TH-1(A)	Min. OS	N/A	RMD-I (Infill)				N/A	N/A	RT-1-1			RM-1 (Resid. Mixed) – Low

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 4 of 5

	DALLAS			ROCKVILLE			SAN ANTONIO			SAN DIEGO			SAN FRANCISCO		
Maximum Impervious Coverage for Residential	Proposed			Y			N			Y			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (driveway, parking, sidewalk)	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District
				Area		RMD-10, 15, 25									Density RM-2 -Mod.
	60%	40% ¹	TH-2(A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RT-1-2			
	60%	40% ¹	TH-3(A), D(A), MF-1(A)(SAH)-MF-3(A)(SAH)	N/A	N/A	N/A	Min. OS Area	N/A	MF-18 MF-25 MF-33 MF-40 MF-50 MF-65	Min. OS Area	N/A	RT-1-3-5 RM-1-1-3 RM-2-4-6 RM-3-7-9 RM-4-10-12-			RM-3 – Med RM-4 - High
	60%	40% ¹	CH(A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Min. Useable OS	N/A	RC (Resid. Commercial)
	20%	30% ¹	MH(A)	N/A	N/A	N/A	N/A	N/A	MH MHC MHP	N/A	60% (RS)	Mobilehome Park Overlay Zone (RM, RX, and RS zones)	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50%, plus 20% unpaved and de-	RTO (Resid. Transit-Oriented)

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 4 of 5

	DALLAS			ROCKVILLE			SAN ANTONIO			SAN DIEGO			SAN FRANCISCO		
Maximum Impervious Coverage for Residential	Proposed			Y			N			Y			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY (driveway, parking, sidewalk)	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District
														voted to landscape	

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons
Table 5 of 5

	DALLAS			SAN JOSE			SEATTLE			UNIVERSITY PARK			GEORGETOWN			
Maximum Impervious Coverage for Residential	Proposed			Y			N			Y			Y			
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%) / FAR (decimal)	Max. Impervious Area (%) - FY (lots >= 40' wide, including pervious surfaces)	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	
	10%	30% ¹	A (A)	.80	N/A	OS A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20%	AG	
	40%	40% ¹	R-ac(A) R-1/2ac (A) R-16(A)	N/A	50% (Paving in Front setback area limited to the greater of 10' in width or 50% of the width of the lot for lots <40' in width) Exception: If paved area is contiguous and provides primary access to 2 required side-by-side parking spaces may exceed 50%	R-1-RR R-1-1 R-1-2	City-wide Drainage Rate Charge based on parcel's run-off estimate, including amt. of pervious and impervious surface			All	N/A	3,600 sf	SF-1 to SF-4 (0-6,000 SF).	N/A	40%	RE
											N/A	60%	6,001-7,500			
											N/A	52% or 4,500 sf (greater of)	7,501-10,000			
											N/A	48% or 5,200 sf (greater of)	10,001-12,000			
											N/A	40% or 5,760 sf (greater of)	12,001-35,000			
											N/A	35% or 4,500 sf (greater of)	35,001 or more			

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

Maximum Impervious Area City Comparisons

Table 5 of 5

	DALLAS			SAN JOSE			SEATTLE			UNIVERSITY PARK			GEORGETOWN		
Maximum Impervious Coverage for Residential	Proposed			Y			N			Y			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%) / FAR (decimal)	Max. Impervious Area (%) - FY (lots >= 40' wide, including pervious surfaces)	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District
					if no more than 25' long and 18' wide										
	45%	40% ¹	R-13(A) R-10(A) R-7.5(A) R-5(A)	N/A	50% (Paving in Front setback area limited to the greater of 10' in width or 50% of the width of the lot for lots <40' in width) Exception also (same as above)	R-1-5 R-1-8				N/A	N/A	N/A	N/A	45%	RL RS
	60%	40% ¹	TH-1(A)	N/A	N/A	R-2 RM				N/A	N/A	N/A	N/A	N/A	N/A
	60%	40% ¹	TH-2(A)							N/A	N/A	N/A	N/A	N/A	N/A
	60%	40% ¹	TH-3(A), D(A), MF-							N/A	63%	SF-A, D-1 D-2, MF-1, MF-2, MF-3 (all lot)	N/A	45%	TF (Two-Family)

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

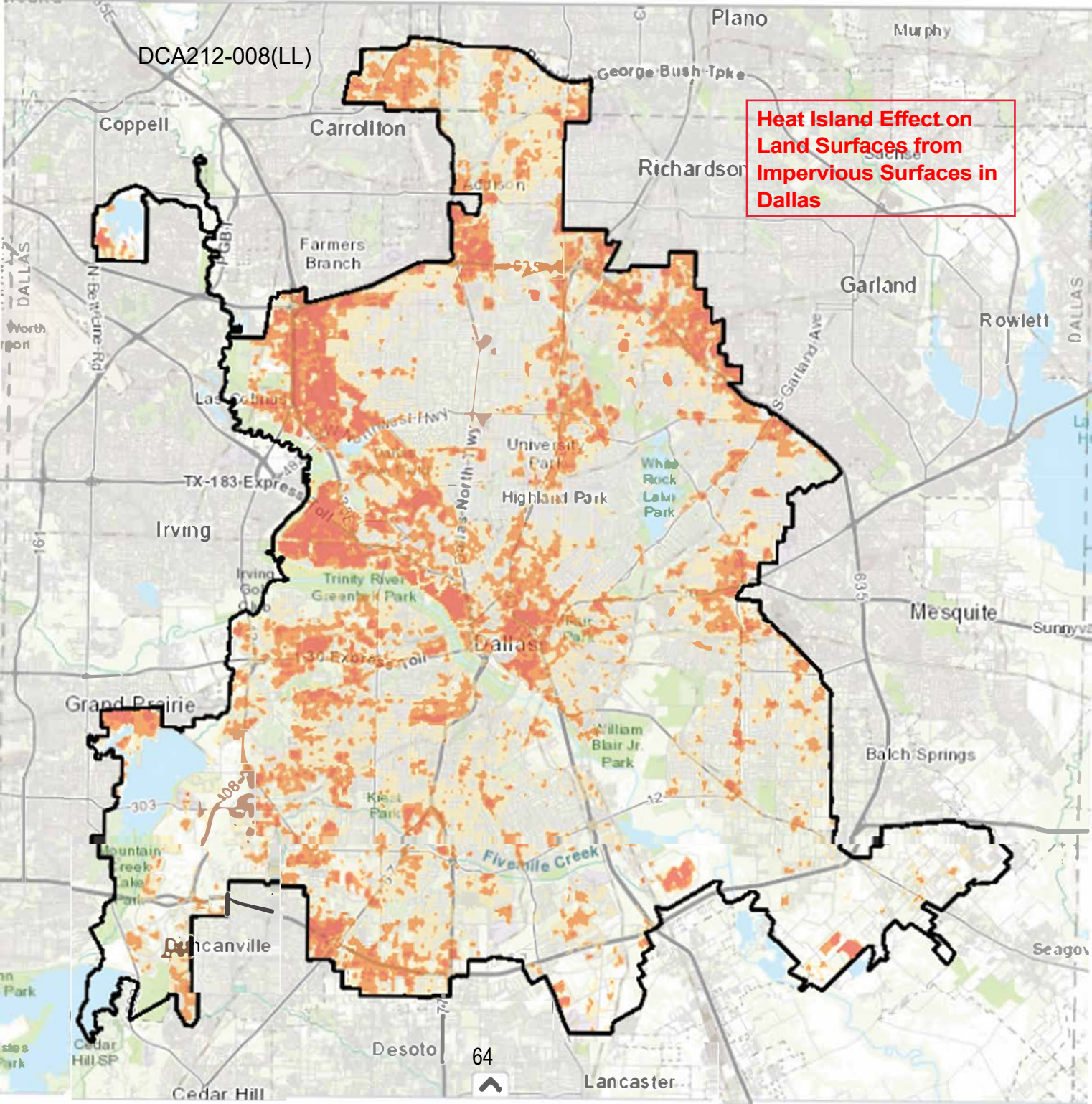
Maximum Impervious Area City Comparisons
Table 5 of 5

	DALLAS			SAN JOSE			SEATTLE			UNIVERSITY PARK			GEORGETOWN		
Maximum Impervious Coverage for Residential	Proposed			Y			N			Y			Y		
Maximum Lot Coverage/ Maximum Impervious Coverage of Front Yard or Cover Percentages (by zoning district)	Max. Lot Coverage (%)	Max. Impervious Coverage (%) - FY	District	Max. Lot Coverage (%) / FAR (decimal)	Max. Impervious Area (%) - FY (lots >= 40' wide, including pervious surfaces)	District	Max. Lot Coverage (%) - FY	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District	Max. Lot Coverage (%)	Max. Impervious Area (%) - FY	District
			1(A)(SAH)-MF-3(A)(SAH)									sizes)	N/A	50%	MF-1 MF-2
	60%	40% ¹	CH(A)	N/A	N/A	N/A				N/A	N/A	N/A	N/A	N/A	N/A
	20%	30% ¹	MH(A)	N/A	N/A	R-MH				N/A	N/A	N/A	N/A	50%	MH

¹Additional 10% of impervious area may be granted with conditions (See 51A-XX of the Dallas Development Code)

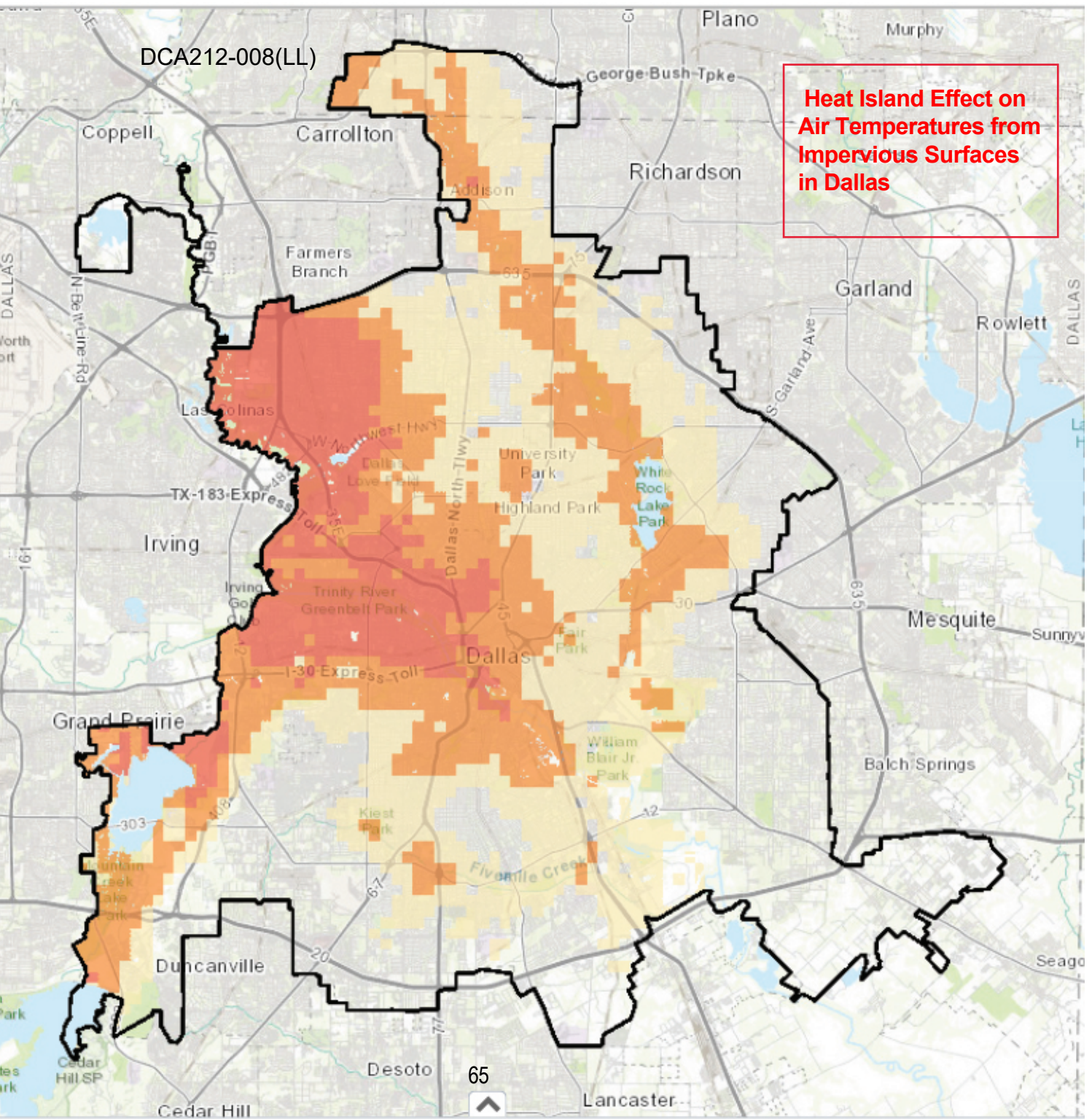
DCA212-008(LL)

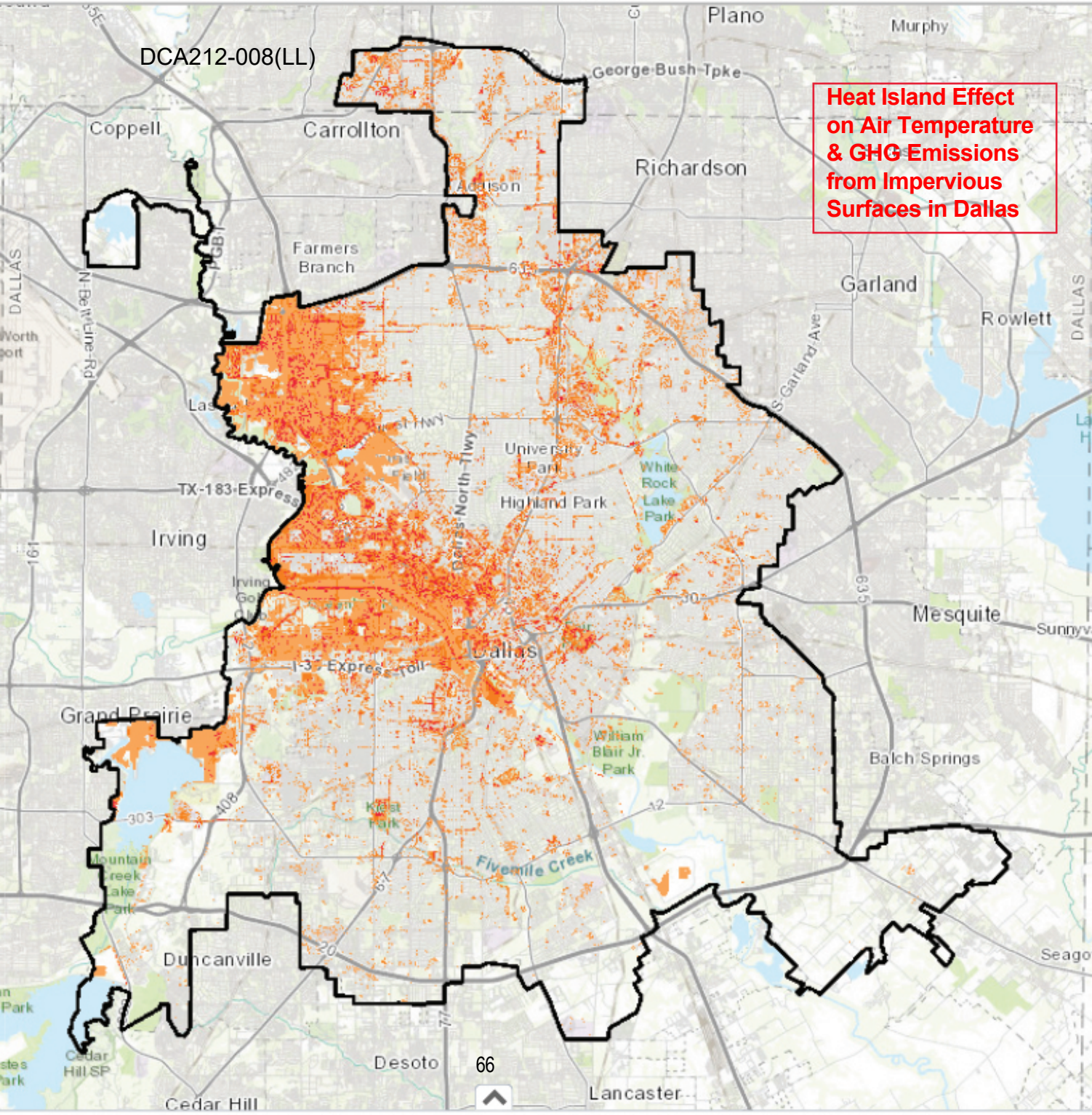
**Heat Island Effect on
Land Surfaces from
Impervious Surfaces in
Dallas**



DCA212-008(LL)

Heat Island Effect on Air Temperatures from Impervious Surfaces in Dallas





**Heat Island Effect
on Air Temperature
& GHG Emissions
from Impervious
Surfaces in Dallas**

DCA212-008(LL)

Plano

Murphy

George Bush Tpke

Coppell

Carrollton

Richardson

Addison

Farmers Branch

Garland

Rowlett

Las

University Park

Highland Park

White Rock Lake Park

Irving

Dallas

Mesquite

Sunnyvale

Grand Prairie

Balch Springs

Mountain Creek Lake Park

Kiest Park

William Blair Jr. Park

Fivemile Creek

Duncanville

Seago

Desoto

66

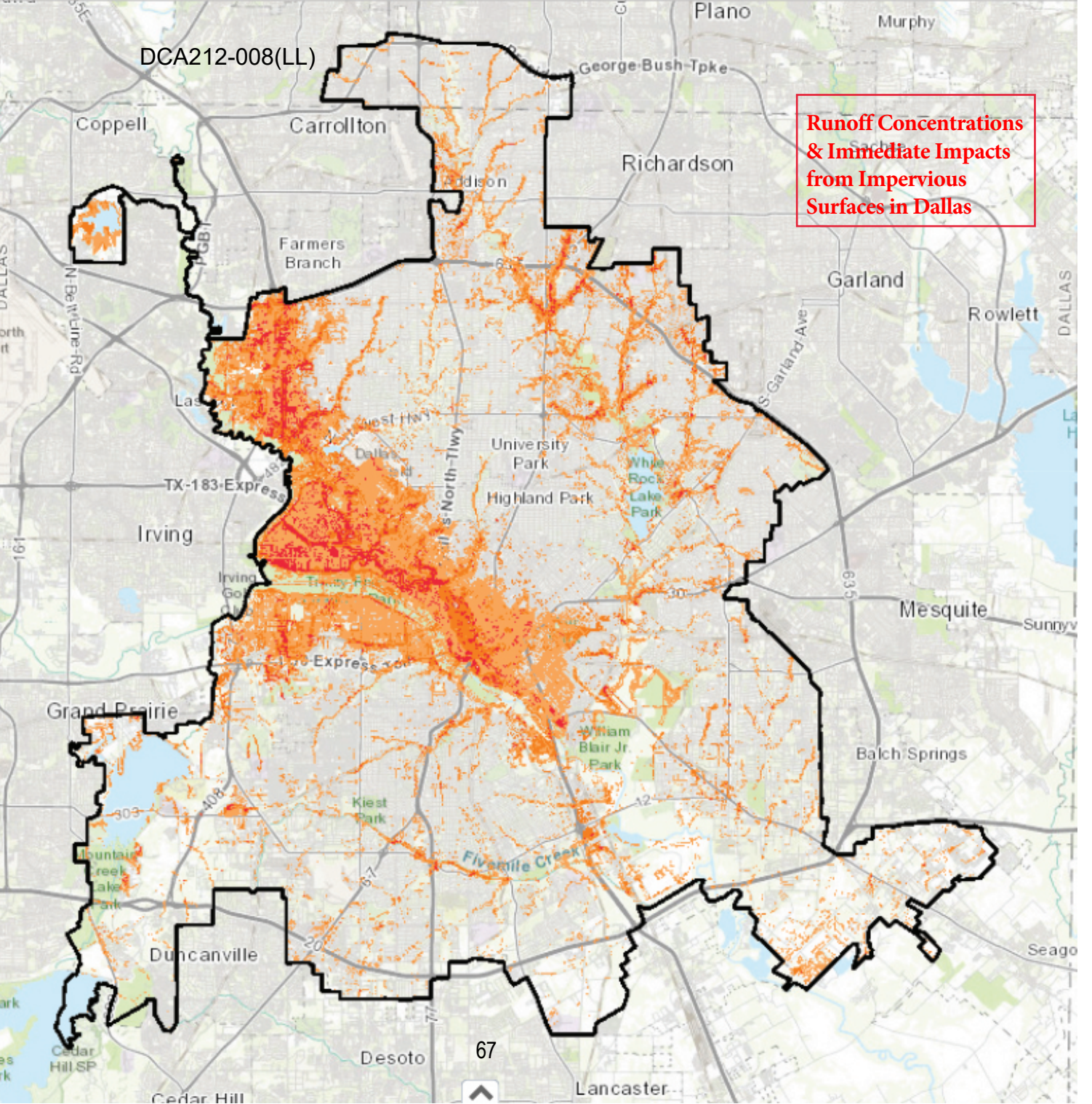
Lancaster

Cedar Hill



DCA212-008(LL)

**Runoff Concentrations
& Immediate Impacts
from Impervious
Surfaces in Dallas**



OTHER CITIES DEFINITIONS

Atlanta

Impervious surface means a surface composed of any material that significantly impedes or prevents infiltration, which includes, but is not limited to, rooftops, buildings, streets and roads, and standard concrete or asphalt surface

Infiltration means the process of absorption of runoff into the subsoil.

College Station

Impervious Coverage – any hard surface, man-made area that does not absorb water, including principal and accessory building roofs, sidewalks, paved parking, driveways, and other paved surfaces.

Impervious surface includes, but is not limited to buildings, sidewalks, drives, all-weather surfaces, paving, rooftops, patios, decking, masonry, stone, and all other alternative pavements. Alternative materials used for landscaping purposes in non-load bearing areas, and the water surface area within the walls of pools are not considered impervious surfaces. An area of gapped decking shall be calculated as fifty (50%) of the proposed docked area for the purpose of impervious cover.

El Paso

Impervious soil means soil which is extremely dense (cementitious sedimentary soil) through which water will not readily penetrate adding to potential stormwater runoff and consists of a rainfall coefficient of .95 pursuant to the Drainage Design Manual.

Impervious surface means any surface such as roofing, solid surface plastic materials, solid surface oil-impregnated materials, concrete, asphalt, etc. through which water will not readily penetrate adding to potential stormwater runoff and consists of a rainfall coefficient of 1.0 pursuant to the Drainage Design Manual.

Frisco

Front Yard Coverage. The cumulative area of any driveway plus any impermeable surface area located between the front property line and any front building wall shall not exceed fifty (50) percent of the area between the front property line and any front building wall.

Ft. Worth

(out of Municipal Drainage/Stormwater)

Impervious area or Impervious surface. A surface that has been compacted or covered with a layer of material so that it is highly resistant to infiltration by water. **Impervious areas** include, but are not limited to, compacted soils with a surface treatment, buildings, pavement, parking lots, driveways, sidewalks and other human-made structure or surface that is built or laid on the natural surface of the land which

has the effect of increasing, concentrating, or otherwise altering stormwater runoff so that flows are increased.

Porous surface (parking). A parking surface constructed of materials that permit water to enter the ground by virtue of their nature or by large spaces in the material, such as pre-cast and mold in-place concrete blocks, concrete grids, interlocking bricks and plastic mats with hollow rings, hexagonal cells or porous concrete.

Houston

Impervious surface means any area that has been compacted or covered such that it does not readily absorb water or does not allow water to percolate through to undisturbed underlying soil strata. Surface materials considered impervious shall include, but not be limited to, bricks, pavers, concrete, asphalt, compacted oil-dirt, compacted or decomposed shale, oyster shell, gravel, or granite, and other similar materials. Surface features utilizing such materials and considered impervious shall include, but not be limited to, decks, foundations (whether pier and beam or slab), building roofs, parking and driveway areas, sidewalks, compacted or rolled areas, paved recreation areas, swimming pools, and other features or surfaces that are built or laid on the surface of the land and have the effect of increasing, concentrating, or otherwise altering water runoff so that flows are not readily absorbed.

Lancaster

Impervious Cover. Roads, parking areas, buildings and other impermeable construction covering the natural land surface that prevent absorption of the water. Water quality basins, swells and other conveyances for overland drainage shall not be calculated as impervious cover.

Minneapolis

Impervious surface. Any material which significantly reduces or prevents natural absorption of stormwater into the soil and cause water to run off the surface in greater quantities and at an increased rate of flow. Impervious surfaces include, but are not limited to, buildings or other structures with roofs, sidewalks, and all stone, brick, concrete or asphalt surfaces.

Rockville

Impervious surface means an area that prevents or severely restricts water from reaching the sub-surface and recharging groundwater. This condition can be caused by a structure, paving, compacted soil or gravel or other feature that forms a barrier between precipitation and the earth's surface. Impervious surface also includes elevated structures, such as a bridge or deck regardless of whether the land surface beneath it itself is pervious or impervious.

San Antonio

Impervious cover. Roads, parking areas, buildings, pools, patios, sheds, driveways, private sidewalks, and other impermeable construction covering the natural land surface; this shall include, but not [be] limited to, all streets and pavement within the subdivision. "Percent impervious cover" is calculated as the area of impervious cover within a lot, tract, or parcel or within the total site being developed, divided by the total area within the perimeter of such lot, tract, parcel or development. Vegetated water quality basins, vegetated swales, other vegetated conveyances for overland drainage, and public sidewalks shall not be calculated as impervious cover.

San Francisco

Permeable Surface. Permeable Surfaces are those that allow water to infiltrate the underlying soils. Permeable Surfaces shall include, but not be limited to, vegetative planting beds, porous asphalt, porous concrete, single-sized aggregate, open-jointed blocks, stone, pavers, or brick that are loose-set and without mortar. Permeable Surfaces are required to be contained so neither sediment nor the permeable surface material discharges off the site.

San Jose

Impervious surface

An "impervious surface" is any surface, on or above ground, that prevents the infiltration or passage of water into the soil. Impervious surfaces include, but are not limited to, non-absorbent rooftops, paved or covered patios, driveways, parking lots, paved walkways, compacted soil or rock, and streets.

Permeable surface area. "Permeable surface area" means an area of land that is not covered by any impervious surface, through which rain water can flow unobstructed to the soil.

Seattle

Lot coverage means that portion of a lot occupied by the principal building, accessory buildings and development including impervious surface, piers, floats, and drydocks, expressed as a percentage of the total lot area.

University Park

Impermeable Coverage.

Impermeable lot coverage is the total area of the lot or zone on the lot covered by impermeable surfaces, such as buildings, driveways and sidewalks. Semi-permeable materials are not included in this calculation. See the Permeability Requirements of Chapter 3, Article 3.100 [Article 3.02, Divisions 2 and 3] of the Code of Ordinances.

Resources

CITY PLANS, POLICIES, AND STUDIES:

[Dashboard | Dallas Climate \(dallasclimateaction.com\)](#)

[Equity Division Racial Equity Plan \(dallascityhall.com\)](#)

[City of Dallas 2021 Urban Forest Master Plan.pdf \(dallascityhall.com\)](#)

[Urban-Heat-Island-Study-Final_Print-Logos.pdf \(texastrees.org\)](#)

GAF Study on Cool Pavement Coatings

<https://www.prnewswire.com/news-releases/peer-reviewed-study-on-gaf-and-climate-resolve-initiative-demonstrates-effectiveness-of-cool-pavement-coatings-in-mitigating-extreme-heat-302114003.html>

GSI Study

[Executive Summary](#)

New CAPA Dallas AI Heat Study (OEQS)

<https://www.dallasclimateaction.com/urbanheatislandstudy>

OTHER STUDIES:

[Impervious Surfaces and Flooding | U.S. Geological Survey \(usgs.gov\)](#)

[Calculation-of-Impervious-Surfaces.pdf \(nola.gov\)](#)

FAS – Federation of American Scientists

[Cooling American with Green and Resilient Infrastructure \(fas.org\)](#)

SMART SURFACES GUIDEBOOK

[Smart Surface Guidebook Final 0727.pdf](#)

SITES

[SITES | Developing Sustainable Landscapes \(sustainablesites.org\)](#)

[Study: Carbon-neutral pavements are possible by 2050, but rapid policy and industry action are needed | MIT News | Massachusetts Institute of Technology](#)

HEALTH STUDIES:

[Persistent urban heat | Science Advances](#)

[Burden of Stroke Attributable to Nonoptimal Temperature in 204 Countries and Territories | Neurology](#)

[Current inequality and future potential of US urban tree cover for reducing heat-related health impacts | npj Urban Sustainability \(nature.com\)](#)

[Climate change contributing to rise in immune health problems | News | Harvard T.H. Chan School of Public Health](#)

PERVIOUS MATERIALS:

[This simple solution could bring some chill to scorching summer heat | CNN](#)

[GEOPAVE Gravel Pavers Parking Lot | Presto Geosystems](#)

[Paver Designs & Hardscaping Services | System Pavers](#)

[Plastic Grid Pavers - TRUEGRID Pavers](#)

[Gravelpave2 Porous Gravel Paving | Gravel Paving Products | Invisible Structures](#)

[Interlocking pavers at Lowes.com: Search Results](#)

[You searched for Interlocking+pavestone+systems - Belgard](#)

[Permeable Interlocking Concrete Pavement \(cement.org\)](#)

[Soak Up the Rain: Permeable Pavement | US EPA](#)

[CT032 FINAL.qxd \(cement.org\)](#)

[Permeable Concrete Pavements - Environmental Concrete - Concrete Network](#)

[Solar panel breakthrough promises record efficiency with new quantum material \(msn.com\)](#)

<https://www.msn.com/en-us/news/technology/scientists-hail-exciting-material-that-can-store-greenhouse-gases/ar->

[AA1nPkIq?ocid=entnewsntp&pc=U531&cvid=64084b12439d40d5b09475a90cc6a1d8&ei=45](https://www.msn.com/en-us/news/technology/scientists-hail-exciting-material-that-can-store-greenhouse-gases/ar-AA1nPkIq?ocid=entnewsntp&pc=U531&cvid=64084b12439d40d5b09475a90cc6a1d8&ei=45)

PROFESSIONAL ARTICLES:

[The Best of Planning's Community Green](#)

[The New Math of Climate Resilience \(planning.org\)](#)