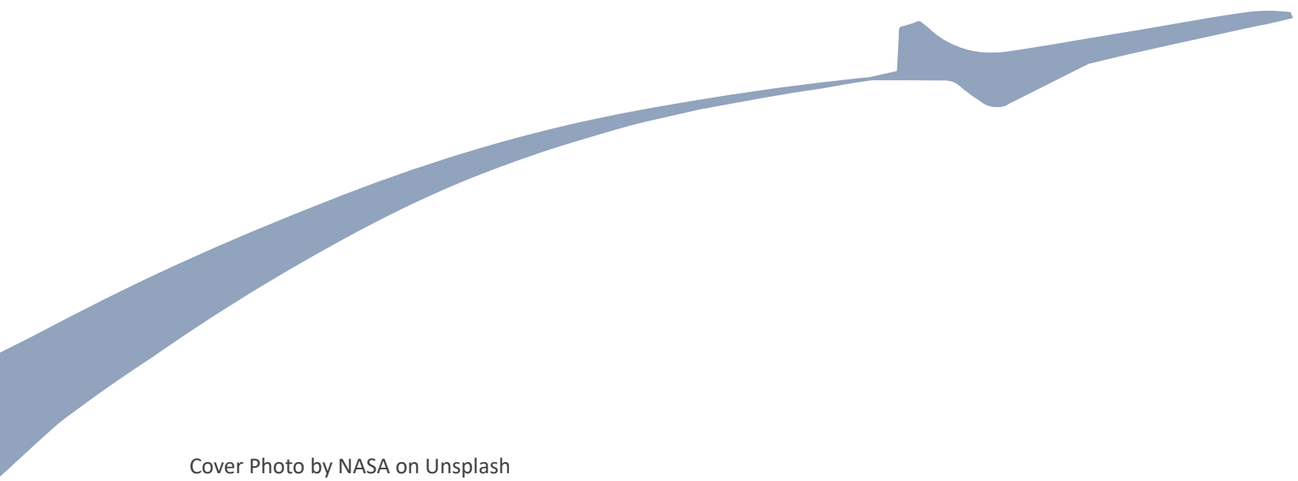
Design Standards

for Houston Spaceport

October 2022

HOUSTON SPACEPORT | HOUSTON AIRPORTS



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ACKNOWLEDGEMENTS

The Design Standards for the Houston Spaceport have been developed by the Houston Airport System (HAS). These Design Standards contain two main compliance categories: Mandatory, and Discretionary. The Design Standards are part of the list of required standards, documents, and procedures, in addition to the list of project requirements contained in the HAS Building Standards link listed below:

HAS INF BSG Link (Building Standards, Permit, and TIP):

https://www.fly2houston.com/biz/resources/building-standards-and-permits

The Houston Spaceport Design Standards have been developed in close participation and coordination with the Houston Airport System Director and Senior Executive Staff, HAS Infrastructure Division, and a select team of Architecture/Engineering Design Firms and individuals that include:

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DESIGN STANDARDS FOR HOUSTON SPACEPORT

2022 Edition

DESIGN STANDARDS APPROVAL PAGE

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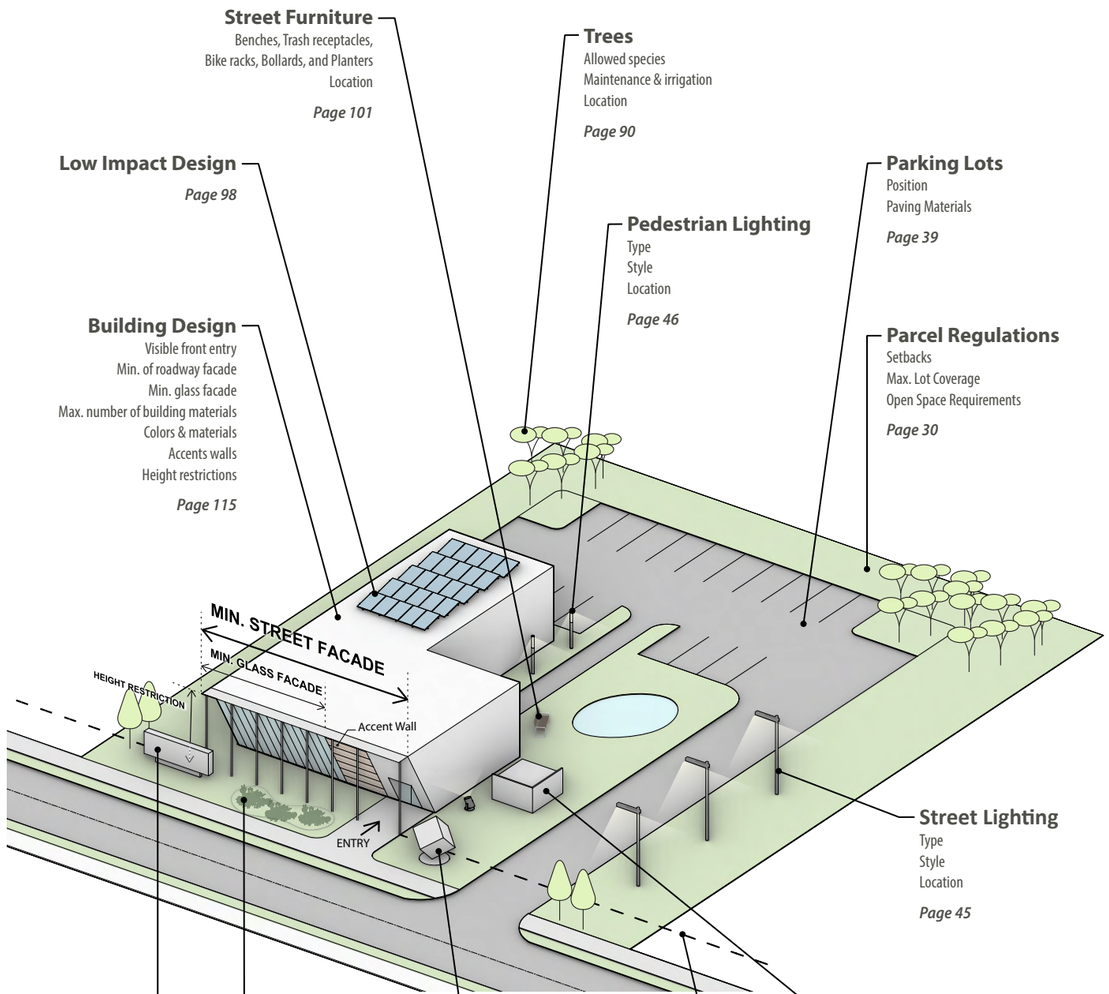

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INTRODUCTION

BACKGROUND

Ellington Field was established as a special purpose airport in May 1917. Initially established as a training facility, overtime, the Airport's purpose and use have changed to provide services to the military, NASA training aircraft, commercial aviation, the U.S. Coast Guard, general aviation, and recently to accommodate future commercial space flight. Ellington Field was renamed to the Ellington Airport (hereafter EFD or Airport) in 2009.

In 2013, Houston Airport System (HAS) made the strategic decision to focus on the potential accommodation and development of the space vehicle related research, assembly as well as space flight at the Airport. Several separate studies were conducted to assess the feasibility of becoming a certified Spaceport, while also integrating the concept into the airport Master Plan Update. In 2015, the Airport was designated as the 10th licensed spaceport in the United States.

HAS has adopted a strategic vision, to be a leader in the nascent Spaceport industry, through the development of targeted facilities and activities on airport property. This Airport is an ideal location as it can serve the aerospace activity, while it offers industry access to NASA Johnson Space Center, The Port of Houston, Texas Medical Center, and the Energy Corridor, as well as multiple public and private Texas Universities and extensive manufacturing facilities located in the area. The Houston Spaceport designated land includes over 434 contiguous acres plus an additional 330 acres of currently undeveloped land near existing facilities being used by Boeing Aerospace and NASA at the present time.

In 2015, a feasibility study was undertaken resulting in a conceptual development plan for the 434-acre site by Ricondo & Associates and Llewelyn-Davies Sahni (L-DS). The development plan was focused to provide a market-sensitive, phased strategy for the eventual construction of a wide range of facilities to meet the emerging needs of the aerospace and spaceport industries. The immediate goal was to present the development concepts at the 2015 Space Commerce Conference and Exposition (SpaceCom), held in November 2015 in Houston, Texas.

Based on the 2015 conceptual plan, in 2020 the first phase of infrastructure at the Houston Spaceport was completed. Improvements included roadway access from Space Center Boulevard, site drainage, signage, utilities, and landscape treatment. As of the Summer of 2022, three companies have signed land leases and commenced building construction. The companies are Axiom Space, Intuitive Machines, and Collins Aerospace. HAS welcomes the opportunity to offer opportunities to other institutions to be located on the Houston Spaceport site. In 2022 HAS contracted with FS Group to create an institute that would bring space industry giants & thought leaders to collaborate with emerging education & training programs of Houston's academic institutions. The result was the Houston Aerospace Institute, which will be the centerpiece of Phase 1 of the Houston Spaceport and serve as a hub of innovation and collaboration between academia and industry.

In 2022, HAS authorized Jacobs, L-DS, Knudson, Labozan Associates, and JLL to prepare development related Design Standards and a Land Use Plan for the Houston Spaceport.

Over an eight-month period, the professional team worked with HAS representatives to develop a Land Use Plan that reflects the vision and provides a guide for future growth and development at the Houston Spaceport. To facilitate the process a set of Design Standards were developed, to guide the physical growth of the Spaceport components to be designed and developed by private companies, thus helping create a vibrant, sustainable, and successful aerospace complex.

PURPOSE OF THE STANDARDS

This Design Standards document contains a set of planning and design controls, adopted by HAS to guide the design of improvements on the development parcels within the Spaceport. The standards are designed to perform two important functions: ensure the implementation of the intentions of the Land Use Plan and, second, provides the basis for the coordinated design control of individual parcels to be developed by various land lease holders. The Design Standards document conveys the intent of the guidelines and facilitates the process of negotiation and review between HAS and the parcel tenant/developer.

The controls focus particularly on the criteria needed to adequately guide the urban design principles of the complex, including but not limited to: sense of arrival; sense of place; human scale development of the project's buildings and their relationship to residual open spaces, roads, and site edges. At the same time, the Standards were created to allow varying details and design approaches within each of the development parcels permitting a reasonable amount of design flexibility and thus credibility.

Table 1.1 Future Land Use Areas by Design Sector

	Zone Description	Acres
a	Airside Zone	145.5
b	Phase I Zone	67.2
c	Walkable Core Zone	39.2
d	SW Landside Zone	30.9
e	Bypass Frontage Zone	9.1
f	ROW + Open Space + Detention	142.7
	Total Acres	**434.6**

Table 1.2 Future Land Use Projected Build-out GSF

	Land Use Sector	Total GSF
a	Assembly/Manufacturing	2,295,424.3
b	Hangar	312,128.0
c	Office/Lab/R&D	1,888,892.0
d	Educational	756,000.0
e	Retail	109,545.0
f	Hotel	64,400.0
g	Food/Beverage	9,000.0
h	Transit HUB	116,511.2
i	Garage (10 Storys)	1,859,540.0
	Total GSF	**7,411,440.5**

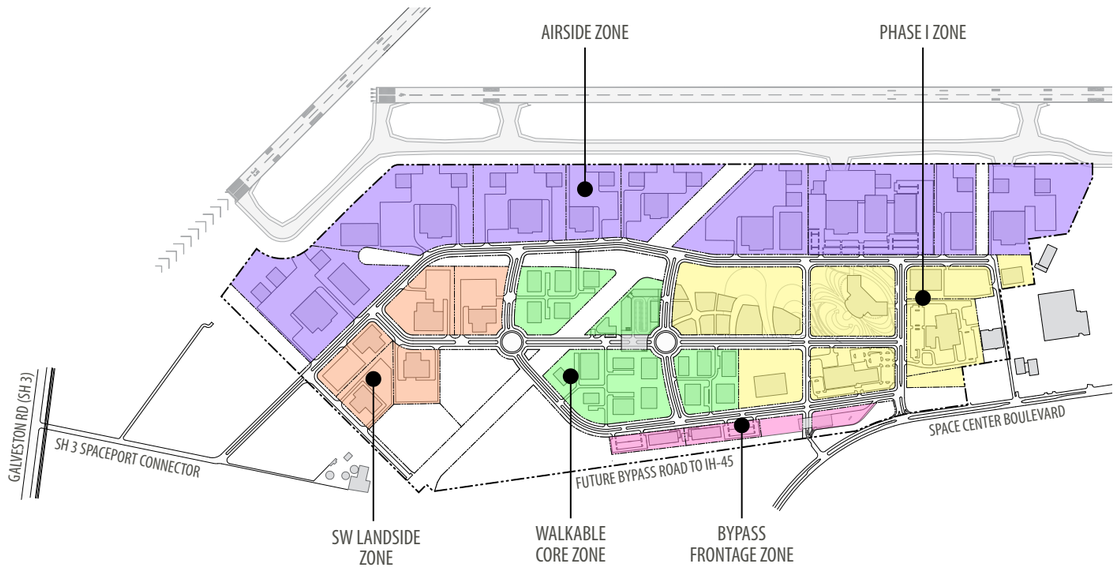


Figure 1.1 Design Sectors

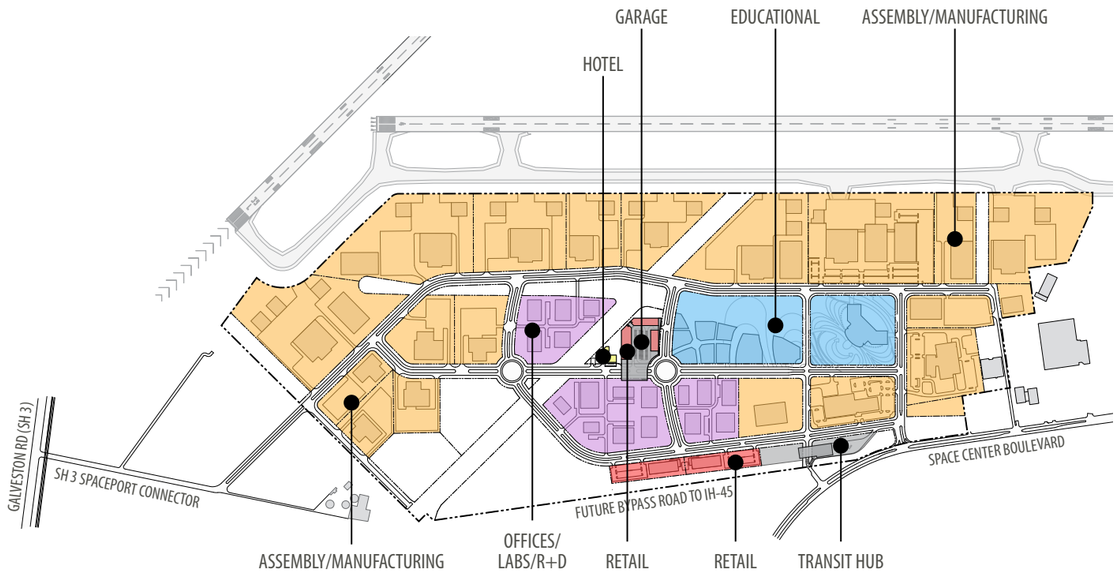


Figure 1.2 Land Use Sectors

GOALS AND OBJECTIVES

The primary purpose of the Standards is to promote a quality development based on planning principles sufficiently flexible to foster a vibrant, sustainable, and successful aerospace community. In support of this goal, the main objectives of the Design Standards are as follows:

- To promote design innovation and excellence;
- To maximize the potential of Spaceport economic activity;
- To accommodate facilities and support services development, while recognizing anticipated growth and change;
- To create a unique ambient image that conveys the presence of the Spaceport in the vicinity as well as in the greater Houston area;
- To allow for a high level of environmental sustainability; and
- To promote a sense of pride for the City and surrounding communities.

VISION & MISSION

The Houston Spaceport to serve as a catalyst in bringing a wide range of aerospace-related industries, research, and education to the City of Houston while connecting the City to the rest of the world.

These objectives allow for the Spaceport to take advantage of the rapid growth of the commercial space market at Houston Spaceport. This site was planned to invite and accommodate any and all space-related activities, including but not limited to: aerospace engineering, component development and fabrication, space vehicle assembly and testing, astronaut training, zero-gravity scientific and medical experimentation, microsatellite development, space tourism, and related workforce development.

PRINCIPLE GUIDELINES

Guideline 1: Encourage low impact design and sustainability.

Guideline 2: Promote a reduced surface parking footprint by planning and designing a walkable core in the heart of the Campus.

Guideline 3: Create a centralized spine down the center of the Campus to allow for public art and other amenities.

Guideline 4: Enhance the design and visual quality of the existing & proposed drainage improvements including the fault hazard band to create a walkable open green space thereby enhancing the drainage and detention capacity for the site.

ARCHITECTURAL DESIGN REVIEW AND APPROVAL PROCESS

The design and construction of all facilities and improvements within Spaceport boundaries must be approved by HAS as described in its current Design Criteria Manual. The standard approval process therein described will be complemented by HAS with architectural and urban design reviews as pertaining these Standards, which stand as a complement to the Manual. The Design Standards is meant to supplement the Design Criteria Manual.

In addition to the design regulations stipulated in these Standards, the applicants should follow and use all applicable Federal Aviation Standards and the airport-specific requirements of the Surveyor's Handbook. For general design, the design professionals must follow the City of Houston's adopted Building Code, and all applicable related standards, requirements, and codes such as the Fire Code, Electrical Code, Mechanical Code, Plumbing Code, Fuel Gas Code, Energy Code, and TAS ADA, from all Authorities having Jurisdiction (AHJs), as required by law.

The Design Standards are not intended to limit or dismiss the experience, knowledge, artistic freedom, or talent from design professionals or contractors. HAS encourages professionals and contractors to recommend alternates when deviations from the standards may be necessary and/or beneficial to the project and HAS without compromising the performance and quality of the project and final outcome. However, adherence to these standards should result in project development that conforms to the goals and objectives of the Houston Spaceport Campus. The general process of approval for construction projects is illustrated in Figure 1.3.

The Design Standards provide a set of criteria and regulations that help guide the design of physical improvements on individual parcels within the Spaceport to ensure that the overall objectives of the Land Use Plan are realized. The design criteria to be implemented through requirements provided at the time of leasing of the land to individual tenants and become part of lease agreements. The land lease is contingent upon compliance of proposed projects with the regulations and design standards described in this document.

Review Process and the Role of the Review Committee

The Review Committee process provides a framework within which Spaceport development may occur, and includes an established formal project approval process. An Architectural Review Committee (ARC) will provide the technical advice required to carry out the review process and act as an advisor in parcel disposition negotiations and subsequent project design/construction phases of the project.

Project Approval Process

A three-stage project approval procedure described below will be utilized to facilitate development of the Spaceport and its components:

1. Pre-lease meeting(s) to discuss project scope and site development needs.
2. Review and approval of schematic design proposal; and
3. Pre-construction documents review and approval.

PRE-LEASE STAGE

The pre-lease stage meeting will primarily relate to the proposed site plan and building program. This stage in the approval process will confirm the potential tenants understanding of the of the Design Standards criteria prior to transactional negotiation resulting in an earnest money land lease. Of particular importance will be for the prospective tenant to demonstrate that the proposed project will comply with the mandatory development controls. The site user will be required to submit the following documents for review and approval by the Architectural Control Committee:

1. Dimensioned Site Plan, scale:1”-20’, including:
   - Property boundaries and road right-of-way.
   - Proposed building footprint identified by use (e.g., office, manufacturing, parking).
   - Compliance with mandatory setback lines (ground and upper levels).
   - Proposed vehicular access.
   - Relation of primary and secondary pedestrian routes: proposed pedestrian access points.
2. Development schedule indicating:
   - Net parcel size.
   - Proposed gross floor space broken down by use (e.g., office, manufacturing, parking).
   - Amount of open space.
   - Building heights.
   - Number of parking spaces and resultant parking ratio.
   - Gross floor area (GFA).
3. Preliminary building program.
4. Preliminary building elevations.

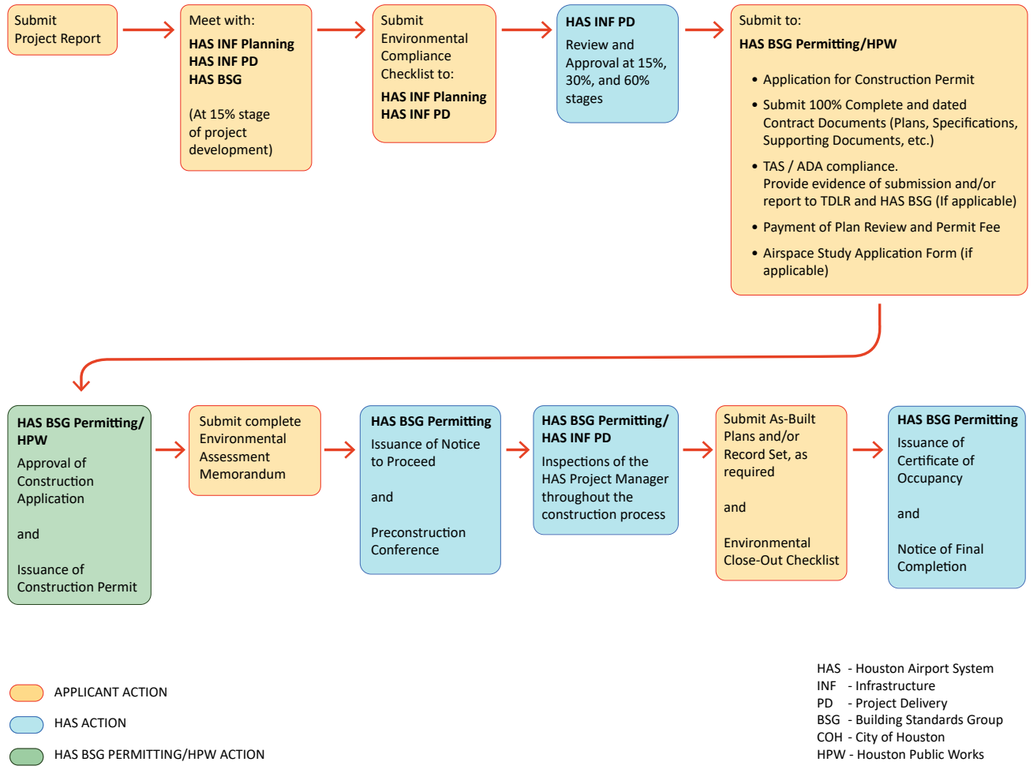


Figure 1.3 General Review/Approval Process for Tenant Design & Contstruction Projects at Houston Spaceport

The Pre-land lease documents submitted will be evaluated by the ARC and a recommendation regarding project approval will be followed by an earnest money contract.

SCHEMATIC DESIGN STAGE

Subsequent to the signing of the lease agreement, the project review process will enter the Schematic Design stage wherein approval will be obtained prior to the signing of the lease agreement. This

stage will require the submission by tenant of a detailed architectural schematic drawing package. This package will be reviewed for conformance with design standards described in this document. The merit of the proposed development in relation to the Land Use Plan objectives for the project as a whole will be evaluated at this stage of the approval process. Consideration by the ARC will also be given to the project's compatibility in terms of architectural design quality with all components of Spaceport including other buildings and green spaces. Relationship of functions to site circulation patterns, building form, and materials will be some of the aspects evaluated.

The following documents will be required as part of the Schematic Design submission package:

1. Revised dimensioned site plan, scale: 1" =20'
   Same requirements as in Pre-lease stage, plus:
   - Preliminary landscape and grading plan.
   - Tree survey locating existing trees.
2. Architectural Drawings, scale: 1/16" = 1'-0"
   - Building Plans.
   - Building Elevations.
   - Building Sections.
3. Revised Development Schedule
   - Same requirements as Per-lease stage.
4. Colored Exterior Architectural Renderings
5. Massing model or renderings.
6. Outline Specifications
   - Contingent upon the Architectural Control Committee's review and incorporation of any required changes by the tenant, Schematic Design approval may be granted.

PRE-CONSTRUCTION STAGE

The project review process will require the tenant to submit a set of contract documents at Schematic (30%), Design Development (60%), Construction Documents (95% and 100% final sealed Construction Documents) levels of completion. Conformance with mandatory controls will be checked once again. A more detailed evaluation of the architectural merits of the proposed project will be undertaken. As in the case of the Schematic Design review, compliance with the design standards will be confirmed by the ARC. Particular attention will be given to the conformance with overall project design standards regarding the architectural detail, landscape treatment, outdoor lighting, and graphic/signage design.

Close coordination between the ARC and the tenant will take place prior to the submission of the final construction documents regarding proposed landscaping, graphics/signage, and exterior lighting.

PERMITTING STAGE

Prospective tenants will be required to submit, as a minimum, the following Contract Documents, and any necessary or required supporting reports and documentation:

1. Construction Drawings (IFC – Issue for Construction set, signed/sealed):
   - Civil
   - FAA Compliant Landscape & irrigation system
   - Structural
   - Architectural
   - Mechanical
   - Electrical
   - Plumbing
   - Graphics
2. Construction Specifications

The Permitting approval will constitute the final formal approval in the development review process.

On-Going Review

Continued coordination between the ARC and the tenant will occur during the construction phase of the project. Of particular importance will be the consideration given to the site grading, road construction, utility hookups, landscape treatment, tree protection, disposal of fill material, construction site security, material, and equipment storage, temporary construction structures and signs. Representatives of the ARC will make site inspections as needed to ensure conformance of building construction with approved drawings.

02

Site Layout

SITE LAYOUT

URBAN DESIGN PRINCIPLES

The urban design principles form the basis of the primary site guidelines, which form the basis of the suggested mandatory and discretionary controls documented in each of the following sections. All suggested controls are FAA compliant.

The following design standards illustrate in simple terms the five urban design ideas below and help to shape the concepts of the proposed future land use plan:

1. **Siting of building:** Determinants for location and interrelationships of buildings.
2. **Open space preservation:** Conservation and consolidation of open space areas to be planted with low maintenance material for maximum user benefit.
3. **Views:** Creation of long-range views, beyond the airport and the bay area to the east, as well as short-range views within the Spaceport.
4. **Circulation Systems:** Provision of vehicular circulation corridors and parking on the site periphery, to preserve the exposure of the central green areas and the required site rain water detention areas, for pedestrian-oriented uses.
5. **Landscape Principals:** Coordinating site layout and design as well as ground plane treatment to unify individual parcel development into an integrated campus.

FUTURE LAND USE PLAN

The Houston Spaceport Land Use Plan is presented here and forms the basis for the design standards presented in this document. For more information regarding the Land Use Plan please refer to the Land Use Plan report.

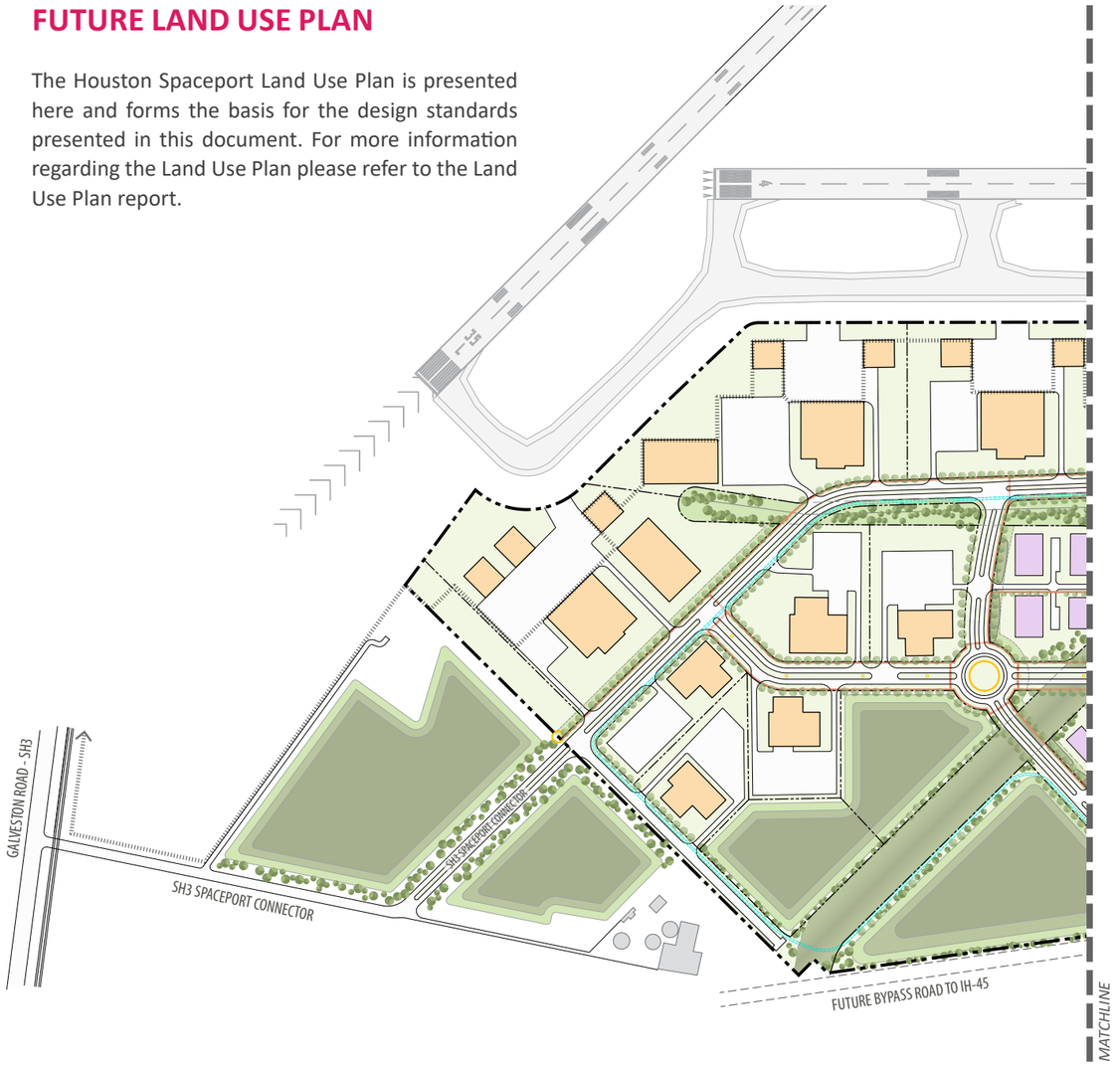


Figure 2.1 Houston Spaceport Land Use Plan

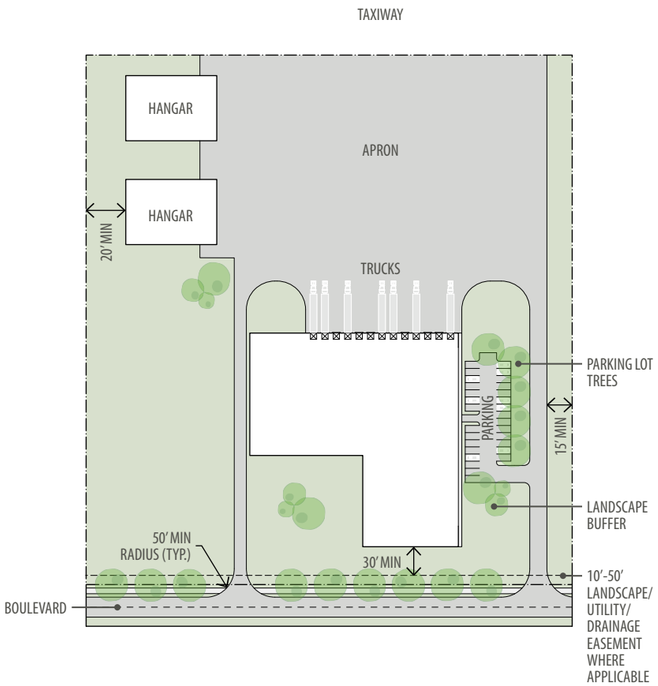


Figure 2.2 Airside

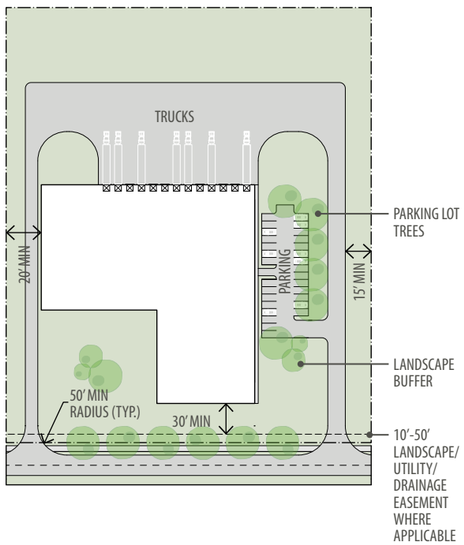


Figure 2.3 SW Landside

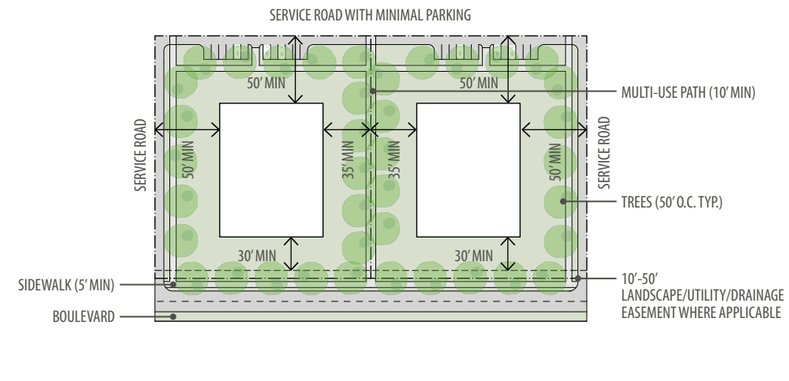


Figure 2.4 Walkable Core

BUILDING LINES AND SETBACKS

(MANDATORY)

Buildings containing assembly and/or manufacturing spaces form the majority of the Spaceport and are located within the Airside and Southwest (SW) Landside Zones. Providing parking and loading docks to the sides and rear of the buildings will allow for a cohesive uniform look from the street. Pavement and curb radii for these parcels reflect the larger truck traffic to these sites.

Buildings containing office, research and laboratory spaces to be located within the central walkable campus core. Groupings of buildings to potentially create a strong visual identity, while connecting them with pedestrian routes. At the same time creating a strong affinity between building entrances and central green space.

1. **Property lines:** boundaries of each development parcel to have precise metes and bounds determined and documented by a survey.
2. **Building setbacks:** building set-back lines from the property line and/or easements, to preserve naturally lit open spaces, desirable sight lines, and ground level setbacks are defined for all parcels.
3. **Build-to Planes:** a vertical plane line to which buildings must be built to create a uniform building setback, aligning the street frontage.

VIEWS

Building heights and bulk: Given the location of the site, on the southern edge of the airport the design objectives are to preserve as well as enhance the long range views to the multi-use HUB. This objective will be achieved by allowing the HUB building to be the tallest building on the Spaceport site. Buildings that range in height from 4-6 stories are to be located within the walkable campus core and lower story buildings to be located surrounding the walkable core.

Visual corridors: Open air, “windows” through buildings or between buildings which facilitate views from selected areas to the open green space. The base of the visual corridors are to be on the ground level, with upper limits providing unobstructed view to the sky.

Massing and orientation: Building fronts to face the main boulevards, and parking to be screened or hidden from street views, especially from the main boulevards.

Figure 2.5 Views

Figure 2.6 Parking Garage Green Screen

Figure 2.7 Parking Lot Screened View Section

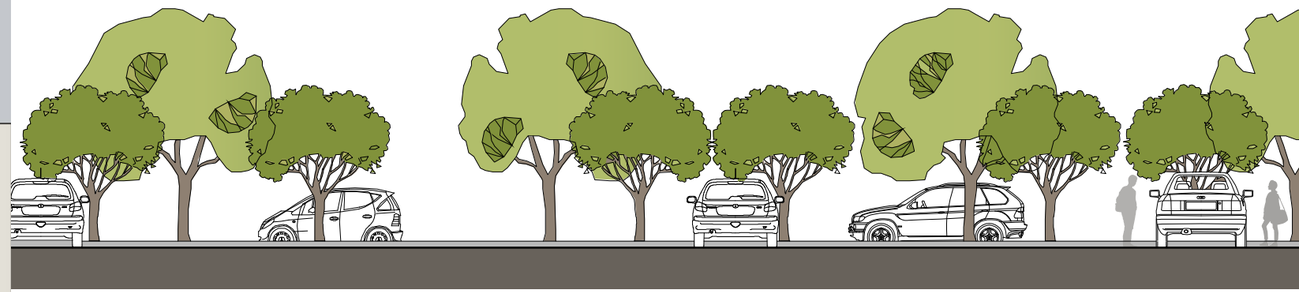
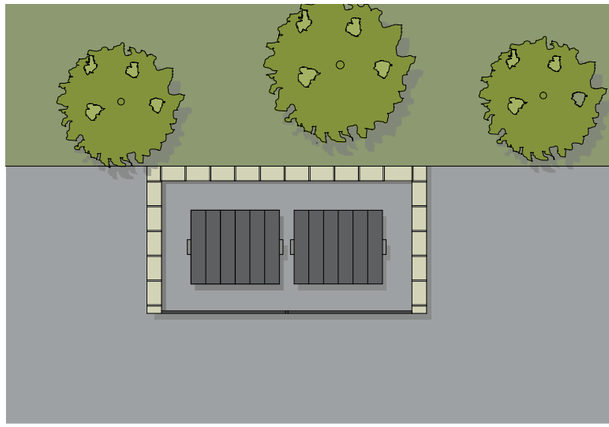


Figure 2.8 Parking Lot Screened View Plan

Figure 2.9 Screened Dumpster Plan



SCREENING

(MANDATORY)

Landscape and architectural treatment such as hedges or decorative fencing is recommended to screen views of undesirable objects such as parking lots, dumpsters, mechanical equipment and the like.

Examples of treatment are documented on this page and can vary to include shrubs, green walls, native grasses or lower, middle level trees.

Screens can also include decorative perforated metal or louvers as shown in the dumpster screen.

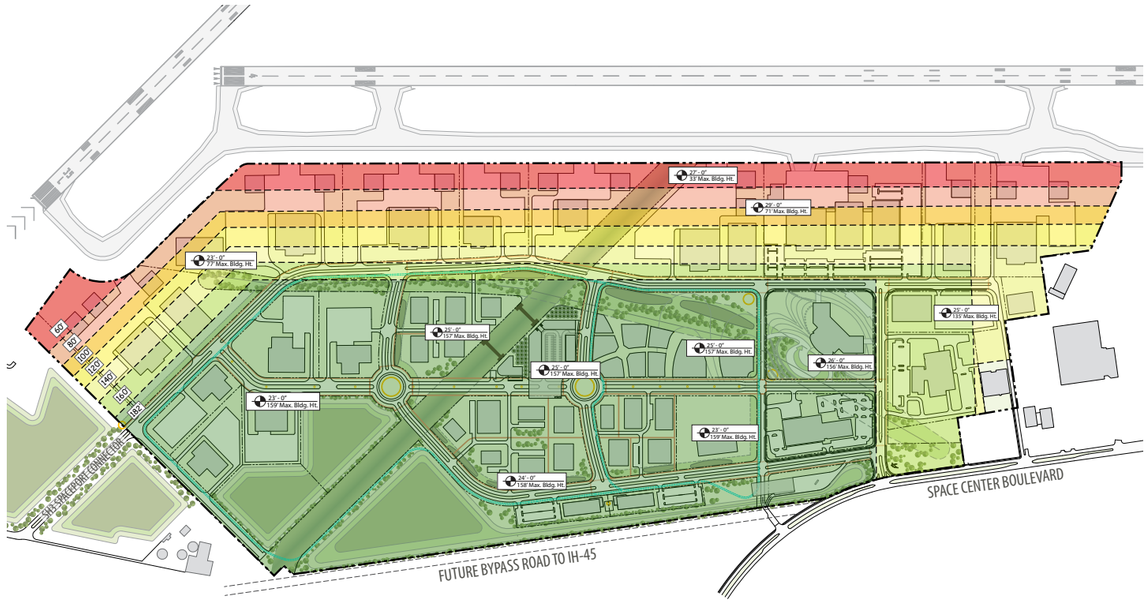
Figure 2.10 Screened Dumpster Elevation

Figure 2.11 AOA Fence

Contact HAS for up to date specifications for required AOA Fence for Airside parcels.

All public facing security fences should be wrought iron and black in color.

Figure 2.12 Maximum Building Heights



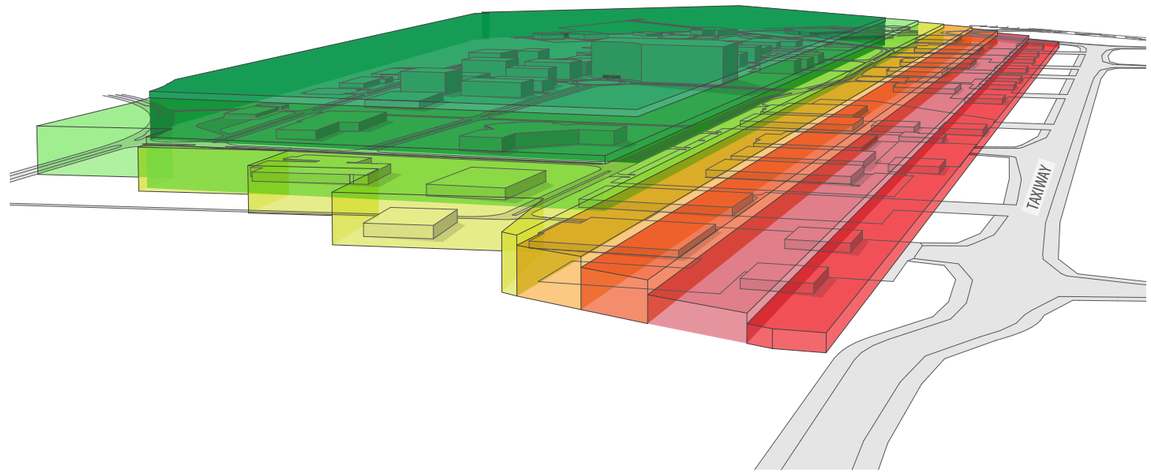
The maximum building heights within each colored area is the zone height less the actual ground elevation.

For example, if the ground elevation is 27', then the maximum building height in the green area would be 182' - 27' = 155'.

LEGEND

- *60' Max. Building Height*
- *80' Max. Building Height*
- *100' Max. Building Height*
- *120' Max. Building Height*
- *140' Max. Building Height*
- *160' Max. Building Height*
- *182' Max. Building Height*

Figure 2.13 Maximum Building Heights



BUILDING HEIGHT LIMITS

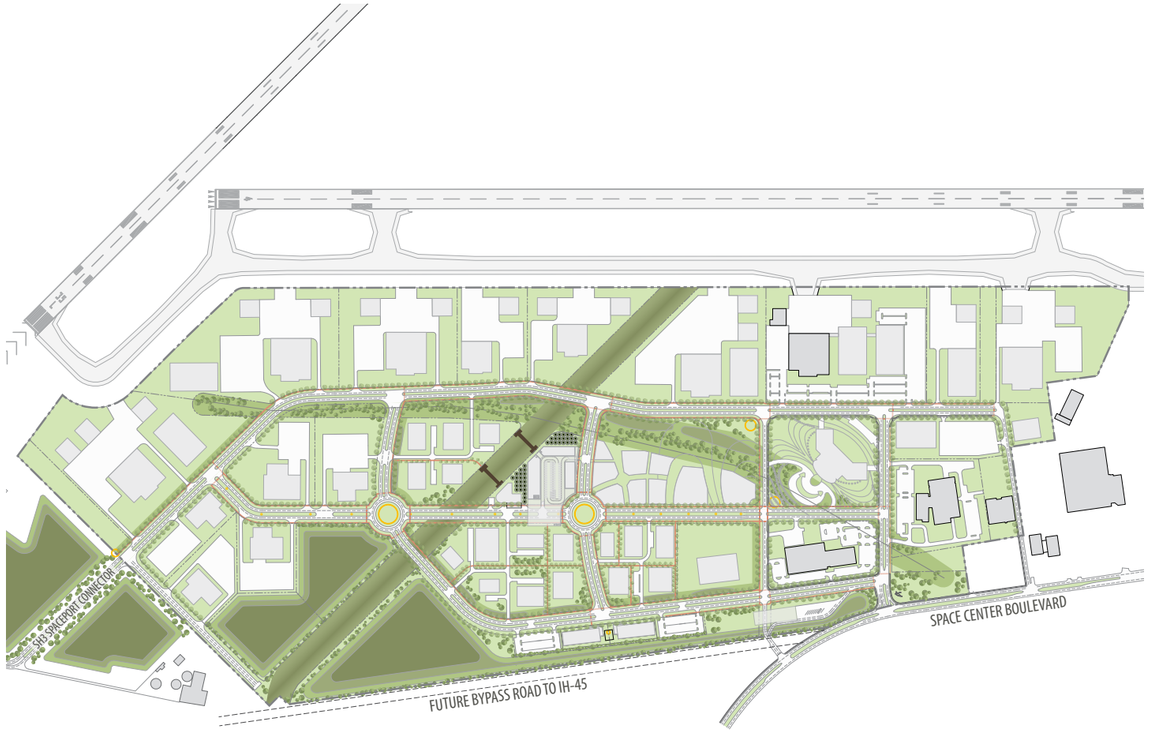
(MANDATORY)

Building heights on the spaceport are controlled by FAA regulation. The diagrams above describe the height limitations by different colors. Heights range from 33 feet (red) along the Airside, whereas the landside building heights vary. Maximum building height allowed in the core area is approximately 157 feet. Parcels north and south of Intuitive Machines complex are limited to a height of 135 feet.

The allowable building heights within the green zone are also conducive for the Mixed-use HUB to be the tallest building on campus as mentioned previously.

Height limitations are color coded for easy reference.

Figure 2.14 Open Spaces



OPEN SPACES

To achieve a high-quality site ambiance, mature lower, middle, and upper story vegetation treatment is required. The objective is to consolidate the parcel residual open space into a central greenbelt area accessible from adjacent parcels, resulting in a “park like” setting.

The multi-use path as shown in Figure 2.13 allows for pedestrian and bicycle usage. Additional trails will be added along the high bank of drainage channels and within the fault hazard open space zone.

PAVED SURFACES

(MANDATORY)

Paved surfaces play an important role and contribute to the character of the development. These impervious surfaces cause water runoff and raise the ambient temperature. Poured in place concrete or asphalt should be used only in areas where functionally required.

PAVED SURFACE MATERIALS

Paved surfaces may be created by use of poured in place reinforced concrete, modular concrete or brick pavers or pre-approved materials similar in nature. Curbs and gutters shall be integrated on all driveways and access roads. Paving surfaces should be placed on subgrade prepared in response to the existing soil conditions to withstand necessary weight.

The surface of parking areas for a limited number of cars may utilize pervious surface material to prevent or limit stormwater runoff or pooling. Whereas, driveways and heavy traffic corridors should be paved with reinforced concrete.

PARKING

(MANDATORY)

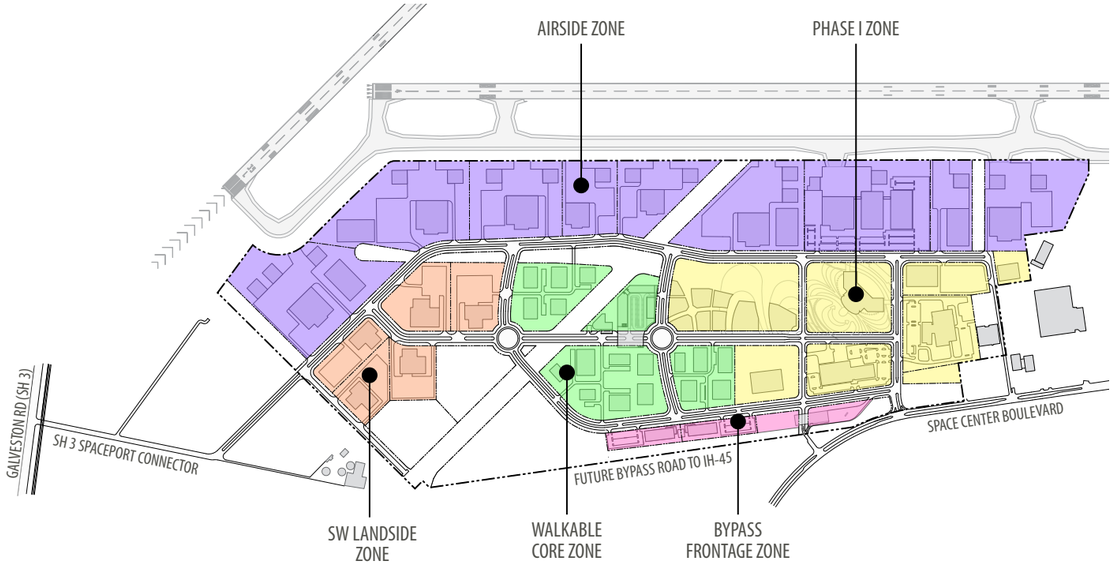
PARKING CAPACITY REQUIREMENTS

The Houston Municipal Code, Chapter 26 Article VIII, Off-Street Parking and Loading, requires provision of sufficient off street parking and loading facilities at all times the buildings are in use or occupied. A review of the code mentioned is recommended. Shared parking per Chapter 26 Article VIII, Section 26-500 and 26-503, is encouraged.

ACCESSIBLE PARKING

Parking lot design must comply with state and federal parking regulations for accessibility. Placement of accessible parking spaces must ensure the shortest accessible route to an accessible facility entrance. Use of International Symbol of Accessibility must identify accessible parking spaces, including signs designating van-accessible parking spaces, stating “van-accessible”. Accessible parking spaces, aisles, and routes must be well maintained and kept free of obstructions. For current state and federal minimum standards of the number of accessible parking spaces required for a building’s parking lot, refer to the Texas Accessibility Standards (TAS) and the Americans with Disabilities Act (ADA).

Figure 2.15 Parking areas will vary depending on the design sectors



PARKING LAYOUT

Location of parking areas on the parcel is recommended to be in response to the parcel location on the Spaceport site (Figure 2.14), separation of passenger cars from delivery vehicles is encouraged, while reducing functional conflict.

Figure 2.16 Airside parking lots

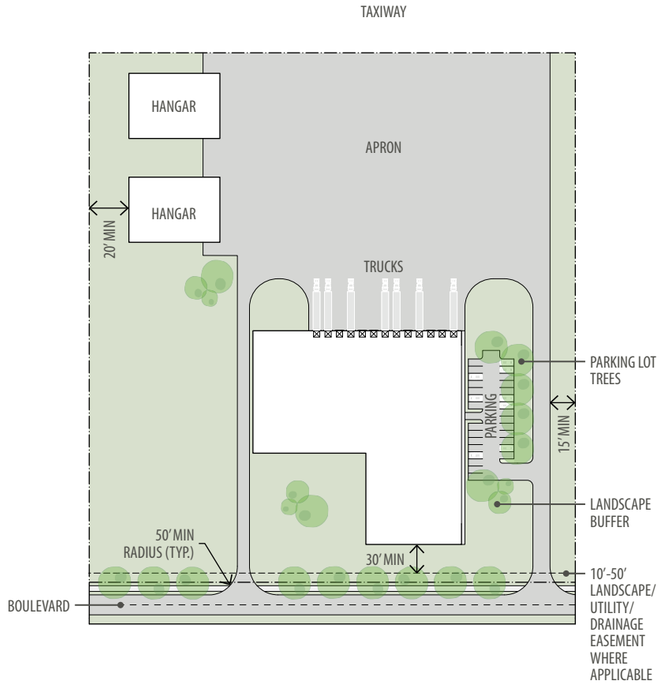
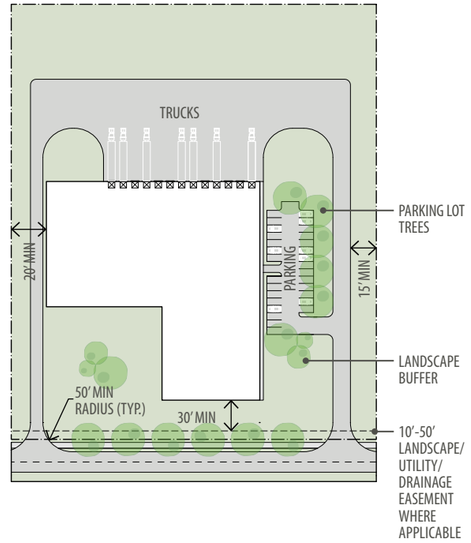


Figure 2.17 Landside parking lots



AIRSIDE LOTS

Parking in airside developments shall be located away from the runway side of the parcels, and should be accessed from the alternate access road. Landscape buffers shall be provided between the parking lots and the access road (see Landscape Section).

LANDSIDE LOTS

Parking in landside developments shall be located on the sides of the building, facing adjacent lots, or on the back of the parcel.

WALKABLE CORE

Parcels located within the walkable core section of the campus are encouraged to utilize the central parking garage (Mixed-use HUB). Limited, additional surface parking is planned in the common lots, along service/fire truck access roads. These surface parking lots may be open to the sky or covered, when covered, solar panels on the roof are encouraged.

PEDESTRIAN ENVIRONMENT

(MANDATORY)

All pedestrian routes, including sidewalks, paths, and trails shall be clearly denoted with landscaped edges and protection from vehicular traffic. A landscaped edge between pedestrian routes and vehicular traffic shall be used to provide a buffer as well as additional area for planting. Pedestrian routes shall be paved with reinforced concrete, brick, or concrete pavers. Routes should be well lit to enhance night time views of the landscape and to ensure security and safety for users. Lighting and landscaping along landscape edges shall not allow for visual obstructions that would inhibit drivers' view of other vehicles. The continuity of pedestrian systems shall be maintained by ensuring pedestrian routes connect to routes within the site and those beyond the site area. Dead-end sidewalks are discouraged. Where possible shade shall be provided along pedestrian paths through the use of street trees, built structures, or building features. Sidewalks shall be designed to accommodate shade trees to enhance comfortable walkability.

Continuity between hardscape elements, such as sidewalks, crosswalks, intersections, and driveways, shall be maintained to create a safe pedestrian and vehicular user experience.

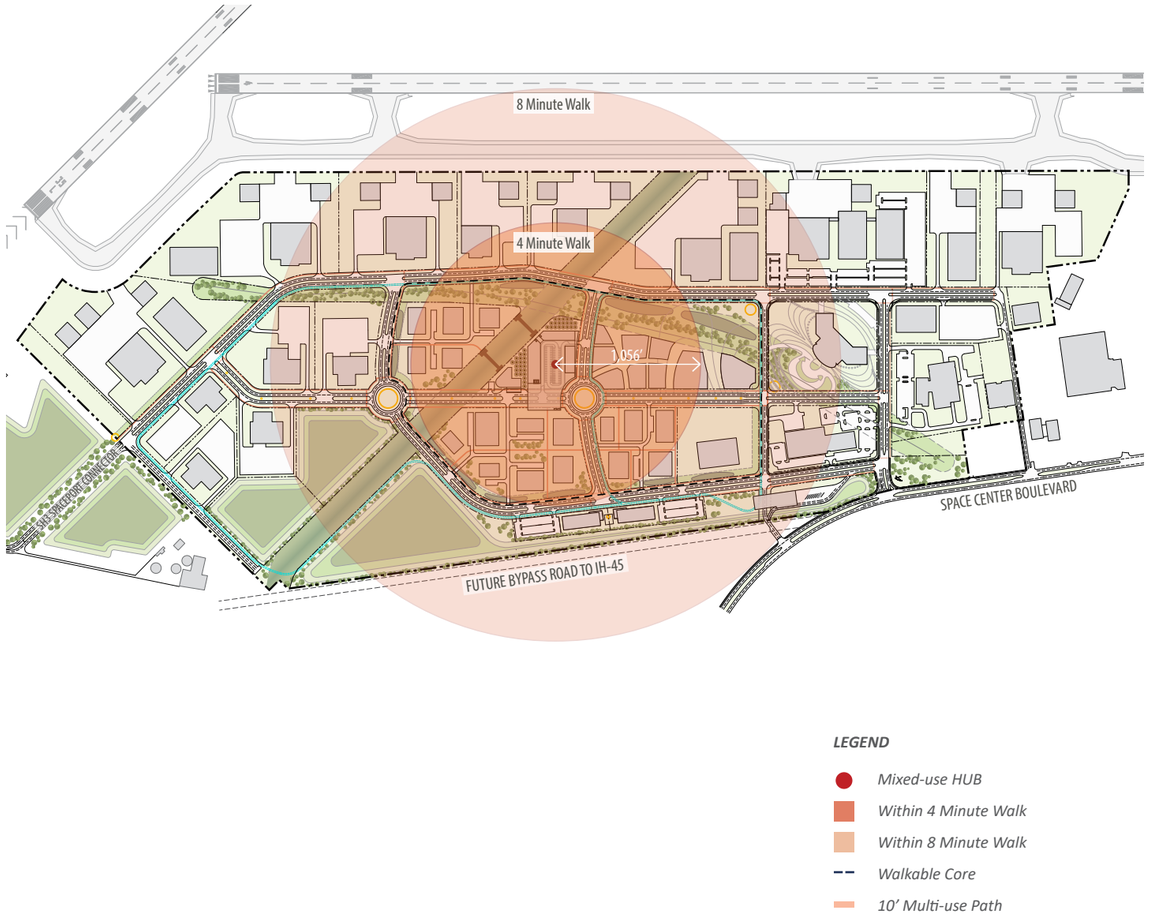
Plazas and other public gathering places on the site shall be pedestrian friendly in scale and character. In pedestrian oriented developments, hardscape features shall be enhanced to compliment the human scale of the development.

PAVEMENTS FOR MICROMOBILITY VEHICLES

(MANDATORY)

Where provided, bike and scooter passages shall be adequately marked and designed free of hazards to ensure minimal conflict with vehicular traffic. The continuity of the bike and scooter network shall be ensured through connections with pathways within the site and those extending beyond the site. Where possible bike and scooter pathways shall be provided with adequate shade through use of planting of street trees, built structures, or building features.

Figure 2.18 Walking Distances



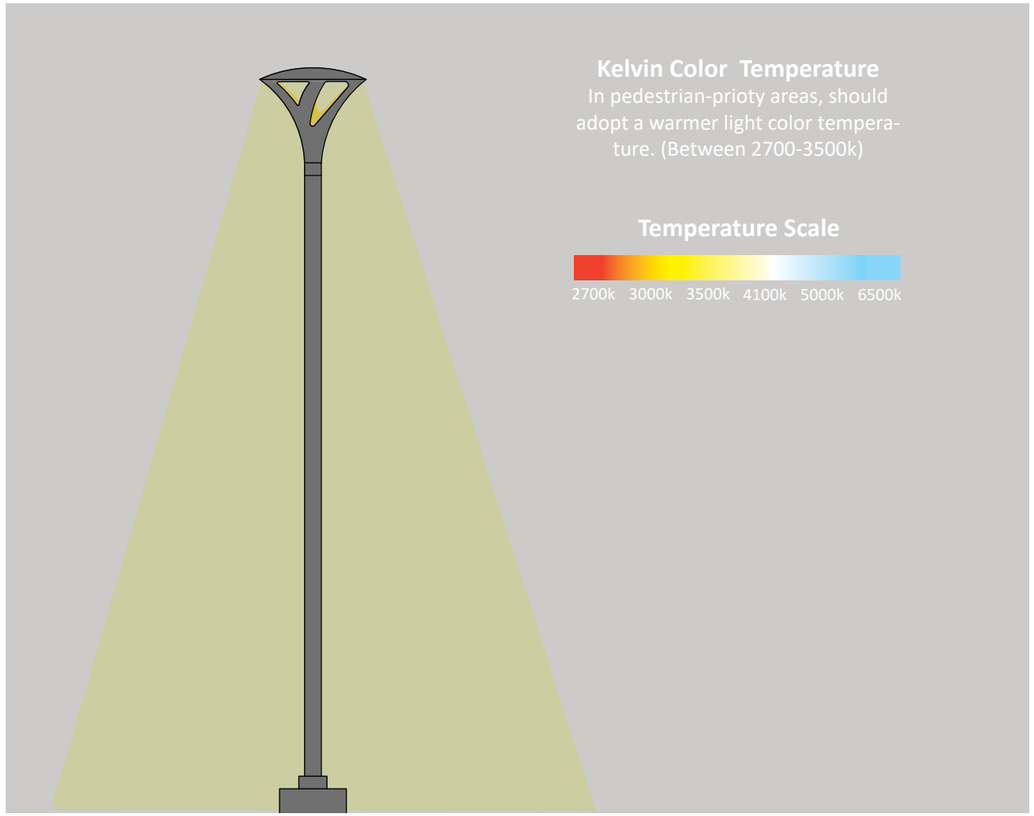


Figure 2.19 Kelvin Color Temperature

SITE LIGHTING

(MANDATORY)

The Spaceport is located on Ellington Airport thus a few additional requirements are to be followed which are documented later in this chapter. Campus wide lighting and sources of lighting should be uniform in character and light quality. Although the fixture does not need to be exactly the same, five key elements should be considered when selecting a fixture: luminaire, glare, distribution, color temperature and horizontal illuminance. The color of the light poles as well as the Kelvin color temperature produced by the source should be consistent.

PARKING AREAS AND DRIVEWAYS

All parking areas and driveways should be uniformly well lit. Poles should be powder coated black in color and should be up to 30' tall (maximum). The light source should be directed downward (full cut-off). The kelvin temperature of the light fixture should be 4000K.

Uniform lighting promotes sense of safety and visibility.

Lighting to emphasize pedestrian paths and building entrances.

Figure 2.20 Parking Lot Lighting

Figure 2.21 Street Lighting

STREET LIGHTING

Street lighting throughout the Spaceport are required to match in-place Phase I lighting standards (Dual headed standard cobra fixture within the medians) (Figure 2.20).

RECOMMENDED PARKING AREA LIGHTING FIXTURE

Prevail Discrete Series

Cooper Lighting Solutions, LLC
www.cooperlighting.com

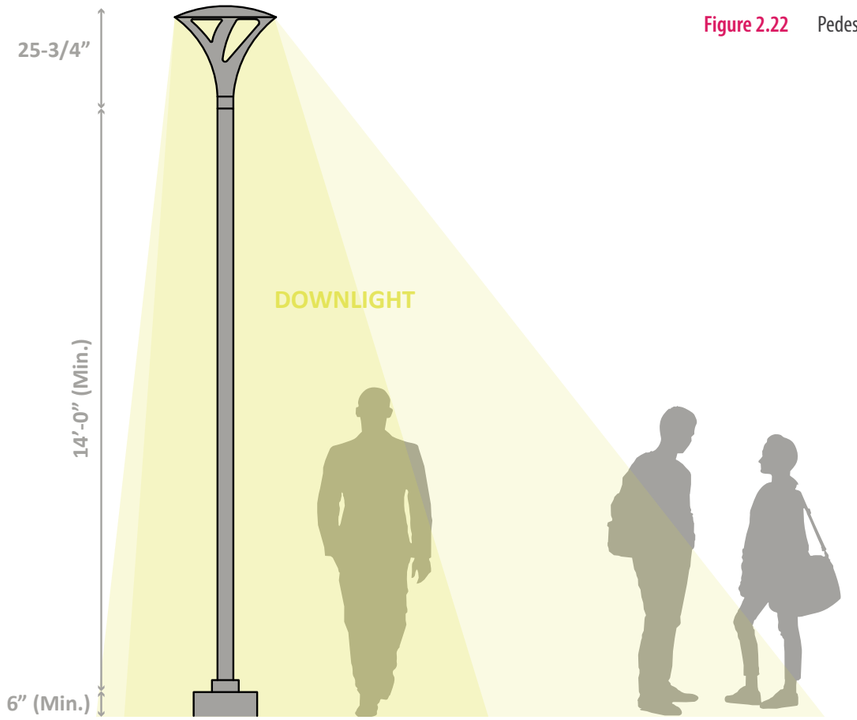


Figure 2.22 Pedestrian Lighting

RECOMMENDED PEDESTRIAN LIGHTING FIXTURE

Invue ARB Arbor Post Top

Invue ARX Aluminum Round Straight Pole

Cooper Lighting Solutions, LLC
www.cooperlighting.com

PEDESTRIAN LIGHTING

All pedestrian light poles should maximum 14 feet high (pole height), powder coated metallic grey or silver, with maximum distance of 75 feet spacing between poles (or based on photometric). The light source should be shielded and directed downward (full cut-off). The kelvin temperature of the light fixture should be 4000K. Pedestrian lights should not produce any glare visible to the naked eye.

PATHWAY LIGHTING

All pathway light fixtures should be powder coated metallic grey or silver and should be set outside the standard 10 feet walkway width, so as to not impede the flow of traffic or to be tripping hazard. An extra 1 foot wide concrete band should be placed on either side of the sidewalk , with an expansion joint to accommodate the pathway light fixtures if needed.

Figure 2.23 Pathway Lighting

Pathway fixture for pathway lighting should align along the pathway outside of clear pedestrian zone.

LANDSCAPE LIGHTING

Landscape lighting use is recommended when accenting specific areas of importance such as at entryways. The light source shall not be up lighted and must comply with FAA regulations.

BLUE LIGHT EMERGENCY SYSTEMS

Where necessary Blue Light Security fixtures should be used for pedestrian safety in larger surface parking lots; on each floor of the multi-use HUB garage, and other pedestrian routes as needed.

Pathway lighting can be used to provide emphasis to key pathways or to provide accent to building entrances, and location of other amenities such as benches or bike racks.

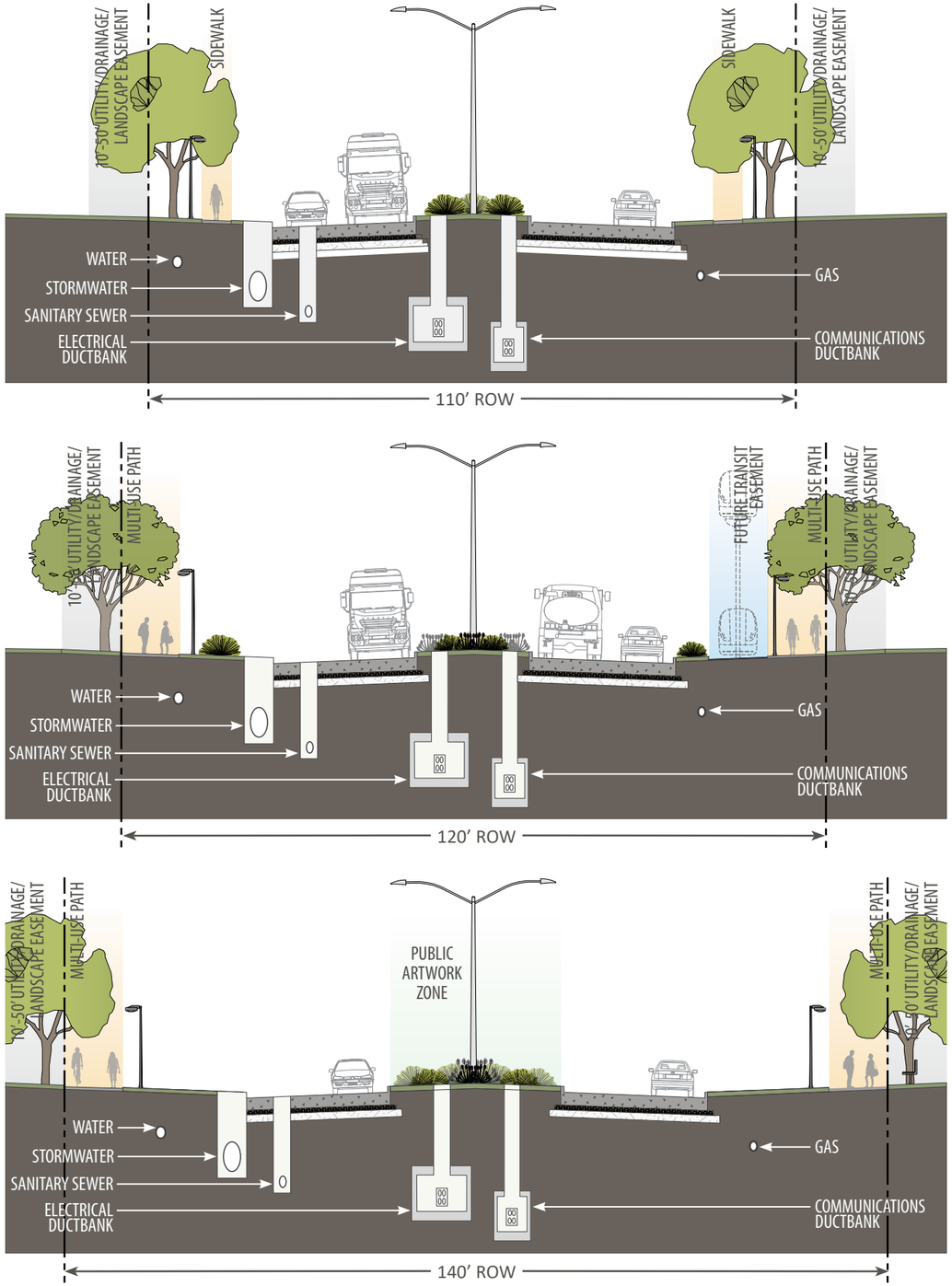
Figure 2.24 Blue Light Tower Emergency Phone
www.caseemergencysystems.com

RECOMMENDED PATHWAY LIGHTING FIXTURE

Lo-Glo Path Light

Landscape Forms, Inc.
www.landscapeforms.com

Figure 2.25 ROW - Cross Sections

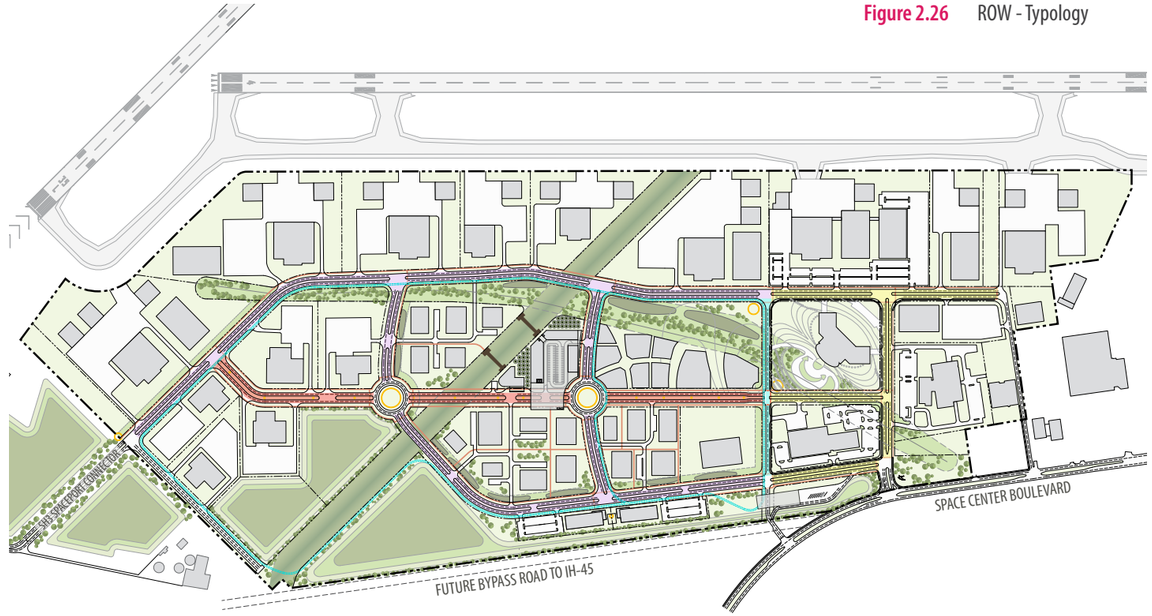


UTILITY SYSTEMS

Described in the following pages are various utility corridors, in-place at the Spaceport, as well as utility corridors that are planned to meet the needs of future land use plan.

The plan below documents the different Rights of Way (ROW) for the various access roads within the Spaceport. As shown in the cross sections, all major utilities are located within the street ROW.

Figure 2.26 ROW - Typology



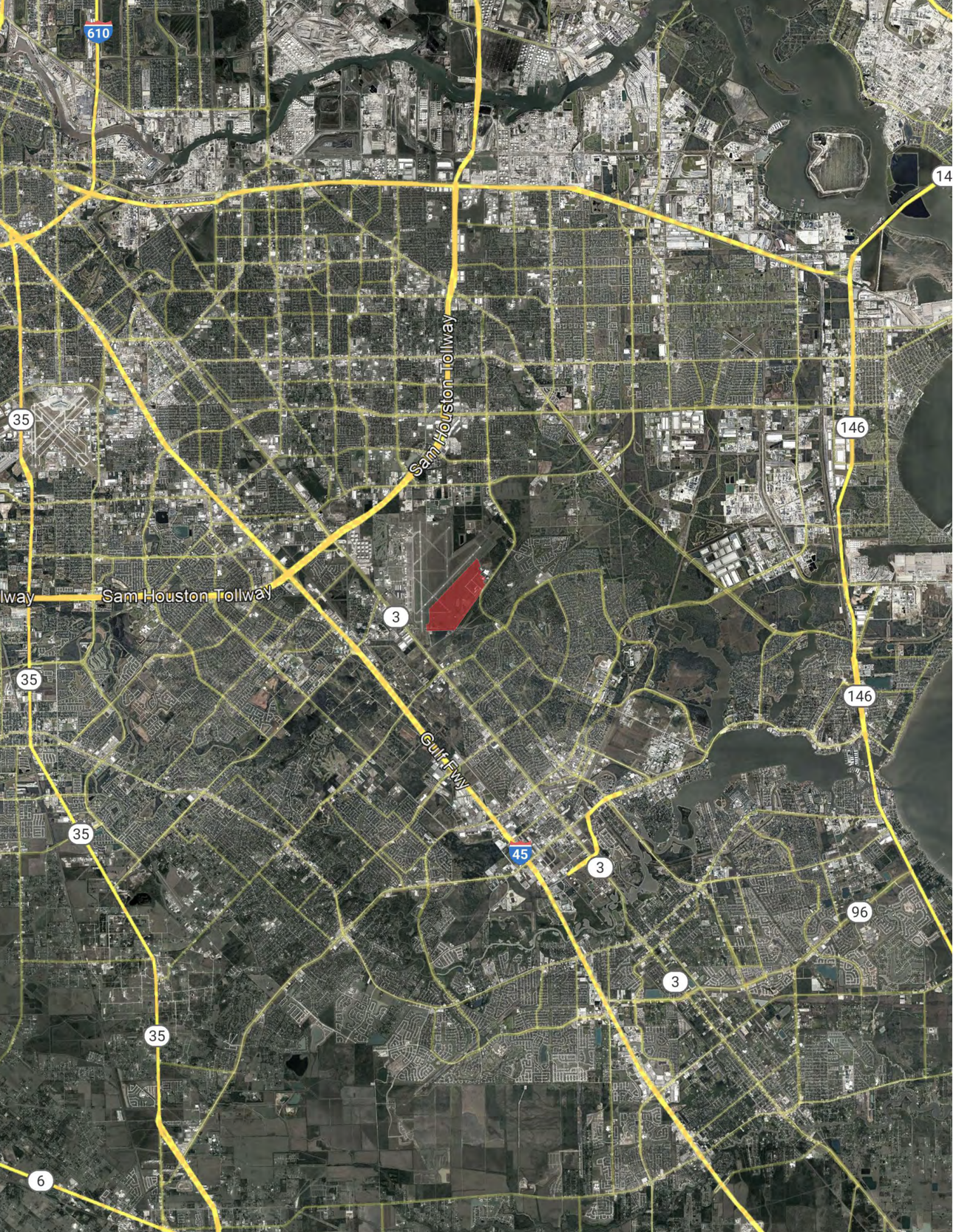
CROSS SECTIONS NOTES

TYPICAL MINIMUM COVER

1. Water cover = 4' minimum
2. Electrical ductbank = 4' minimum (10' easement)
3. Telecom ductbank = Below electrical ductbank

GENERAL NOTES

1. Vertical separation distance between crossing utilities = at least 12" except for water and sanitary sewer which must be in accordance with COH and/or TCEQ standards, whichever is more stringent.
2. Water line must not be in the same elevation as stormwater and sanitary sewer line.



TRAFFIC MOVEMENT

DESIGN CRITERIA/STANDARDS

The goal of this planning level analysis is to determine the roadway capacity needed to accommodate the anticipated traffic demand that will be generated by the proposed development plan.

LOCATION/ACCESS

The proposed site for the Houston Spaceport is located in southeast Houston, Texas, south of Sam Houston Tollway (Beltway 8) and east of I-45. The Spaceport will provide site access points along two existing roadways: Space Center Boulevard and SH 3 (Galveston Road). Space Center Boulevard would provide three (3) access points along the south and east sides of the site. SH 3 would provide one (1) access point along the west side.

The descriptions of the external study roadways are as follows:

Spaceport Center Blvd is a northbound-southbound 4-lane arterial with two travel lanes in each direction that are separated by a median. The posted speed limit is 40 miles per hour. Space Center Boulevard is heavily utilized by local traffic and residential areas located south and east of the site.

SH 3 (Galveston Rd) is a northbound-southbound 4-lane arterial with two travel lanes in each direction that are separated by a median. The posted speed limit is 50 miles per hour. SH 3 runs parallel to I-45 and provides access to I-45 and Beltway 8, two major thoroughfares near the site.

The internal study roadways are generally bi-directional with two travel lanes in each direction, separated by a center median. Median openings are provided intermittently.

Figure 2.27 Vehicular Access

CAPACITY ANALYSIS METHODOLOGY

A traffic capacity analysis was performed to determine if the proposed internal roadway network presented in the Land Use Plan would be able to accommodate the anticipated traffic to be generated by the proposed site facilities. Furthermore, a roadway link capacity analysis is a comparison of actual of forecasted traffic volumes to the theoretically optimum roadway capacity. Traffic volumes vary throughout the day. Examining these variations in traffic volume is important because roadway design is based on the demand of peak-hour traffic, when the volume is highest. Traffic volumes also vary along segments of a single roadway. This means that the capacity needs of a roadway (the number of lanes, per instance) may vary, depending on proximity to traffic generators. The analysis was performed for the planned roadways within Spaceport using the AM Peak Hour and PM Peak Hour site-generated volumes.

The methodology for the capacity analysis is based on thorough analyses of existing traffic and the anticipated travel patterns along the roadways within the site and in the vicinity of the site. The following tasks were completed as part of this study:

- Trip generation for the planned buildings within Spaceport were estimated through correspondence with the Client and using the 10th Edition of the Institute of Transportation Engineers' (ITE) Trip Generation Manual.
- Trip distribution for the Spaceport land uses was estimated on the basis of historical and anticipated traffic patterns.
- Traffic volumes were estimated using traffic generated by the PTV Vistro model (Version 2020).

- Capacity of roadway links were analyzed using City of Houston's Major Thoroughfare and Freeway Plan Policy Statement.

TRAFFIC ESTIMATION

For the purpose of this planning-level traffic study, capacity analysis was only performed on the roadways within the proposed development. It is assumed that the site roadways will be utilized only by Spaceport personnel after construction; therefore the traffic along these corridors will only consist of site-generated trips. No existing or background traffic data will be utilized.

Trip Generation

The amount of traffic generated by the development is based on the land uses included in the proposed development plan. Inbound and outbound trips ("site generated trips") were estimated using the trip rates provided in ITE's Trip Generation Manual, 10th Edition for each building based on type, magnitude, and applicable Land Use Code. Trips were estimated for weekday AM Peak and PM Peak Hours traffic.

Traffic Distribution and Assignment

The site-generated traffic was distributed both internally (within the site roadway network) and externally (to the external roadways providing access to the site).

External Traffic Distribution

Figure 1 presents the general traffic distribution patterns for the proposed development. Traffic distribution include 35 percent from/to North SH 3, 25 percent from/to South SH 3, 20 percent from/to East spaceport Boulevard and 20 percent from/to West Spaceport Boulevard. Project traffic volumes both entering and exiting the project site have been distributed and assigned to the adjacent street system based on the following considerations:

- Review of historical traffic counts pulled from TxDOT STARS II at key locations along the roadways in the vicinity of the proposed site (Space Center Boulevard and SH 3),
- The site's proximity to major traffic thoroughfares (I-45 and Beltway 8),
- Expected localized traffic patterns based on adjacent street channelization and residential areas, and
- Ingress/egress availability at the project site.

The entering and exiting site-generated trips for each scenario are summarized in Table 2.1.

Figure 2.28 External Site Traffic Distribution

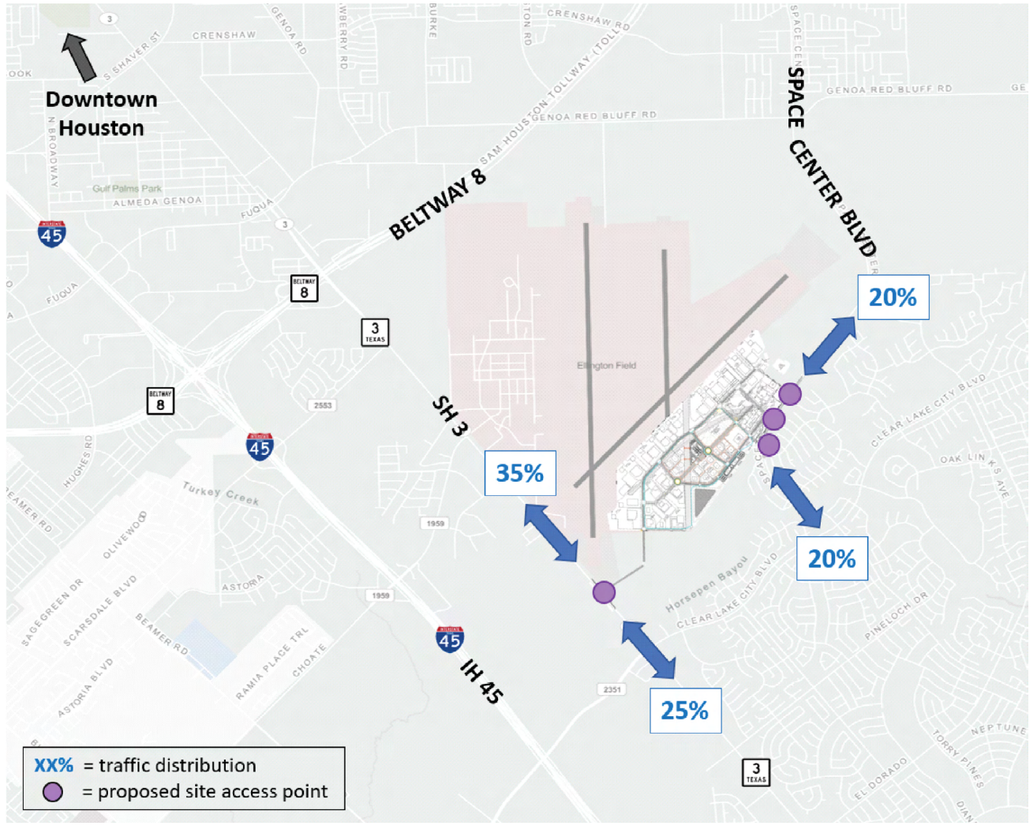
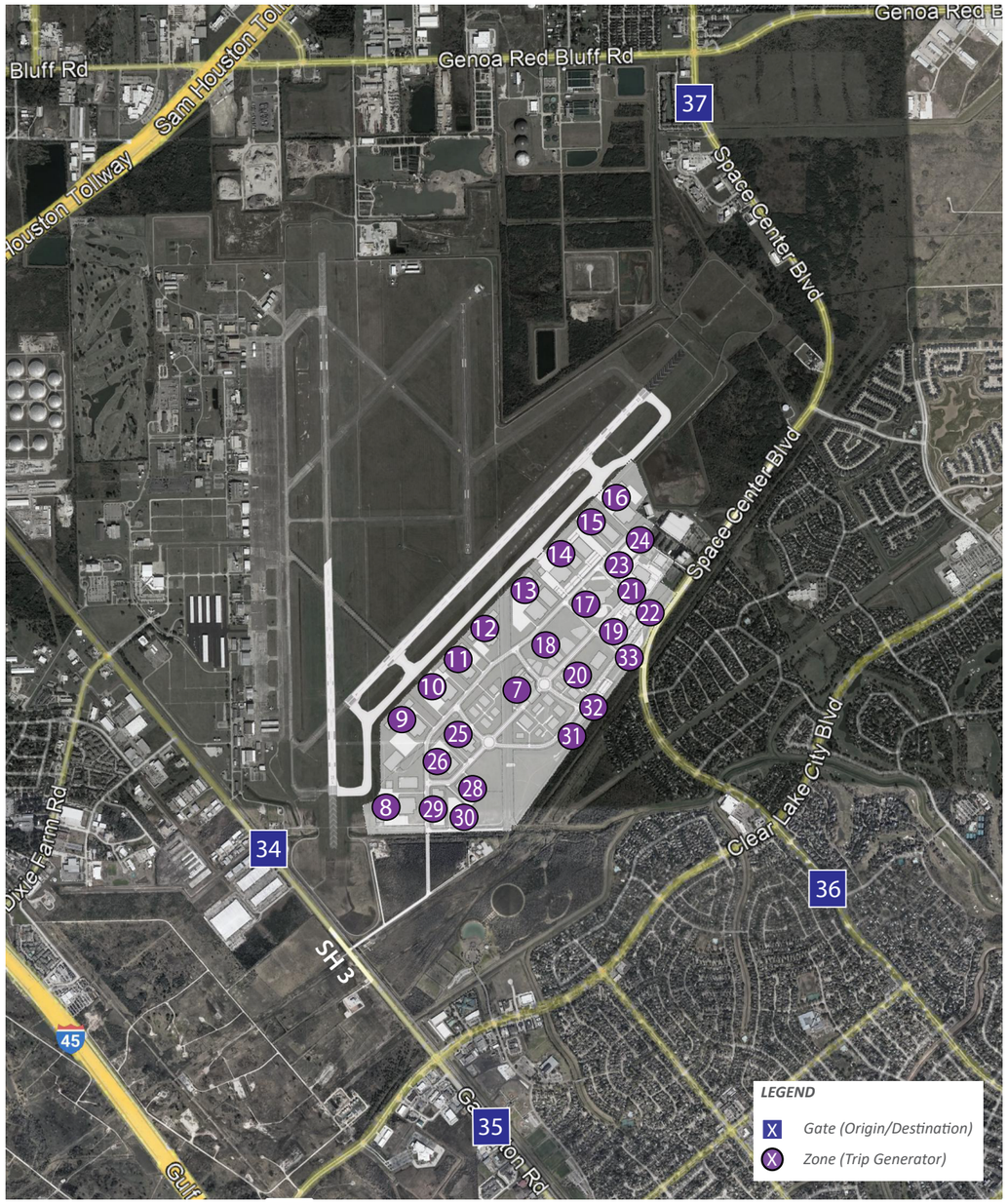


Table 2.1 Houston Spaceport Trip Generation Summary

Origin /Destination	AM Peak		PM Peak	
	Enter	Exit	Enter	Exit
North SH 3	925	361	467	958
South SH 3	661	258	333	684
West Space Center Blvd	529	206	267	547
East Space Center Blvd	529	206	267	547
Total	**2644**	**1030**	**1333**	**2737**

Figure 2.29 Vistro Trip Generator Model Preview



Internal Traffic Assignment

Assigning trips determines the amount of traffic on routes within the internal site network. To determine the origin and destination of the site-generated trips along the study roadways, traffic models were developed using PTV Vistro for the AM Peak Hour and PM Peak Hour. The Vistro models were used to distribute the trips between origins and destinations by dividing the proposed site plan into 33 "zones" representing parcels that would generate traffic. The specific routes used by the site-generated trips were assumed based on trip distribution and the driving behavior of a typical driver considering factors such as ease of access and conflicting traffic while making route selections. The external traffic distributions determined previously were coded into Vistro as the trip termini to help guide the route decisions. A preview of the model is shown in Figure 2.28.

After all optimal routes are coded into Vistro, the peak hour flow along each roadway link can be determined. The peak hour flow represents the total number of vehicles that are anticipated to travel along that segment during the perceived peak hour.

Roadway Capacity Analysis Results

The effectiveness of the roadway in maintaining an acceptable standard of traffic flow, given its design capacity, is evaluated in terms of its Level of Service (LOS). LOS ratings use an alphabetic scale with "A" as most free-flowing and "F" as having severe congestion. LOS D or better is considered acceptable. The LOS is calculated by taking the peak hour flow and dividing by the number of lanes of the roadway, and then applying the results to the following scale recommended by the City of Houston Planning and Development Department to assign the LOS. The following volume thresholds summarized in Table 2.2 can also be used as a guideline to ensure adequate number of lanes is planned for a corridor to meet acceptable traffic operations.

Table 2.2 City of Houston Level of Service

Level of Service (LOS)	Vehicle Trips Per Lane
A	0-99
B	200-349
C	350-499
D	500-649
E	650-799
F	800 or more

For this capacity analysis, the LOS for each roadway link was determined to understand how each individual segment is expected to handle the anticipated site-generated traffic. The total peak hour flow for each roadway link was pulled for each direction between intersections from the Vistro ISTRO models. The peak hour flows were then divided by the respective total number of lanes proposed for that link to determine the number of vehicle trips per lane and corresponding roadway link LOS. The LOS and hourly traffic volumes for each roadway link is illustrated in Figure 2.29 and Figure 2.30 for the AM peak and PM peak, respectively.

Figure 2.30 Roadway Link LOS and Volumes-AM Peak

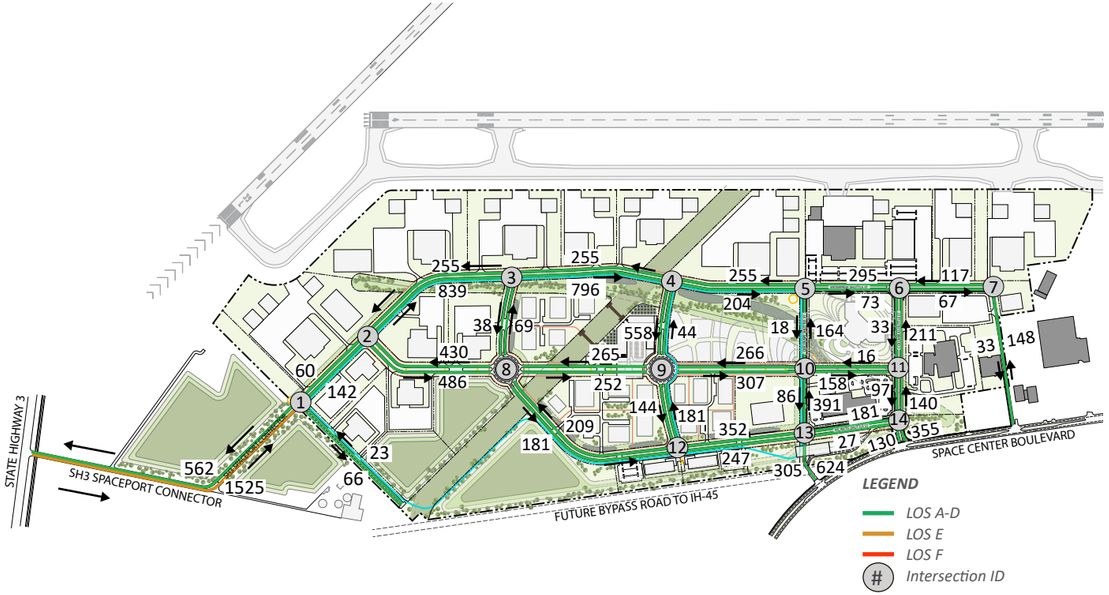
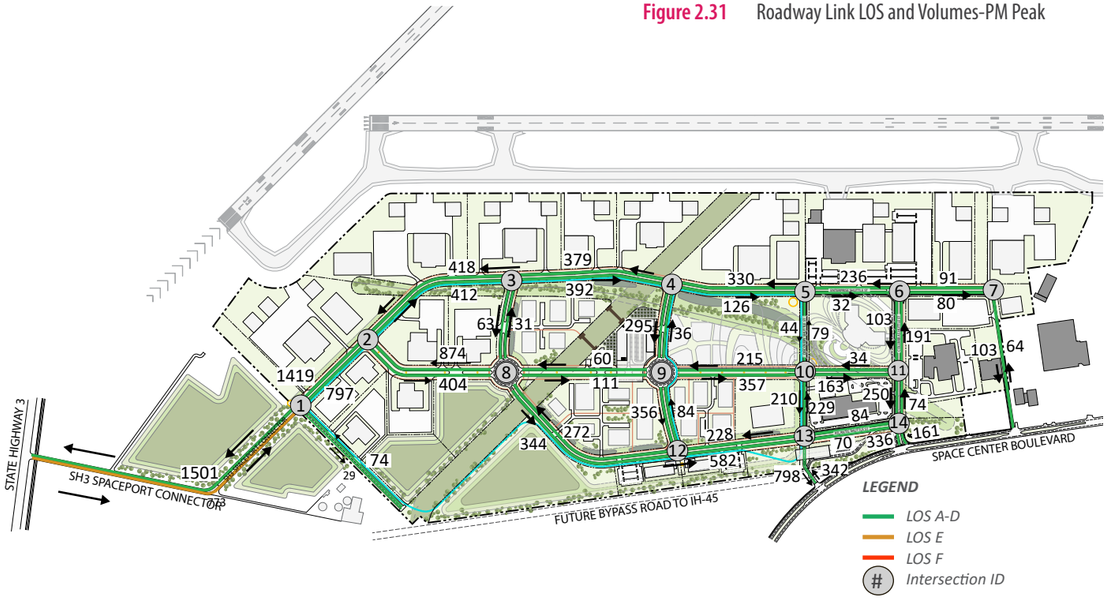


Figure 2.31 Roadway Link LOS and Volumes-PM Peak



The analysis indicates that all roadway links operate with acceptable LOS except for the two segments between the SH 3 access point and Intersection #2. These segments operate with LOS E in the eastbound direction during the AM peak hour and in the westbound direction during the PM peak hour. This is because all trips that enter Spaceport through the single access point along SH 3 must travel along these two segments before diverting onto various cross-streets within the site. Similarly, all trips that would like to exit Spaceport through the SH 3 access point must first funnel into these two segments. Both segments include two travel lanes in each direction. It is recommended that an additional travel lane is provided in each direction between the SH 3 access and Intersection #2 to accommodate more capacity and provide smoother traffic operations.

CONCLUSION

The capacity analysis concludes the roadways, as proposed in the Land Use Plan, will all operate under acceptable traffic operations except for the two segments that funnel traffic in and out of the single SH 3 access point. Turning lanes at intersections leading to and from SH 3 access are recommended. It is recommended that a detailed traffic analysis is performed at the intersections within the site and at the access points connecting to the external public roads is conducted. A detailed traffic analysis will provide additional insight on the number of lanes, lane geometry and, control type (unsignalized, signalized, roundabout) needed at each intersection and whether some intersections warrant a signal installation.

ENVIRONMENTAL

Environmental Conditions and mitigation authorized under the June 22, 2015 Record of Decision: As prescribed by 40 CFR § 1505.3, the FAA shall take steps as appropriate to the action, through mechanisms such as the enforcement of licensing conditions, and shall monitor these as necessary to ensure that HAS implements measures with respect to mitigation and/or avoidance of impacts as set forth in Chapter 4 of the Final Environmental Assessment under the various impact categories. These mitigation and avoidance measures include: Implementing best management during construction, including with regard to the unanticipated discovery of cultural resources. Handling hazardous materials, hazardous wastes, and solid wastes in accordance with all relevant federal, state, and local regulations pertaining to these substances. Review of readily available GIS data [USFWS National Wetland Inventory, FEMA flood, land use, USGS, Potential Archeological Liability Map (PALM), current and historic aerial photography]

HAZARDOUS MATERIALS

Activities associated with the operations or construction of any facilities which would require the handling of hazardous materials, hazardous wastes, and solid wastes would be undertaken in accordance with all relevant federal, state, and local regulations pertaining to these substances. Spill Prevention, Control, and Countermeasures (SPCC) plans, if required, shall be included as an element of the design and submitted to HAS for review and approval.

SPCC plans will be required for the storage of oil (defined as, but not limited to: petroleum, fuel oil, oil refuse and sludge, animal fats, oils or greases, vegetable oils, and other oils and greases including synthetic and mineral oils) in an combined above ground storage greater than 1,320 gallons (stored in 55-gallon drum or larger), or an underground storage capacity greater than 42,000 gallons, with is a reasonable expectation of a risk of discharge into an adjacent waterway potentially leading to a navigable waterway.

WATER QUALITY AND WATERS OF THE U.S.

Implementation of water-related best management practices through operations and construction permits are required to prevent impacts to groundwater resources. Stormwater pollution prevention plans (SW3P) and best management practices would be required during construction. No disturbance has been permitted or authorized within jurisdictional wetlands or other waters of the US. Anticipated site wastewater load must be coordinated with HAS.

FLOODPLAINS

The proposed projects shall be located outside of the 100-year current year 100-year floodplain. No design shall be authorized which may impact the base flood elevation.

UNANTICIPATED DISCOVERIES

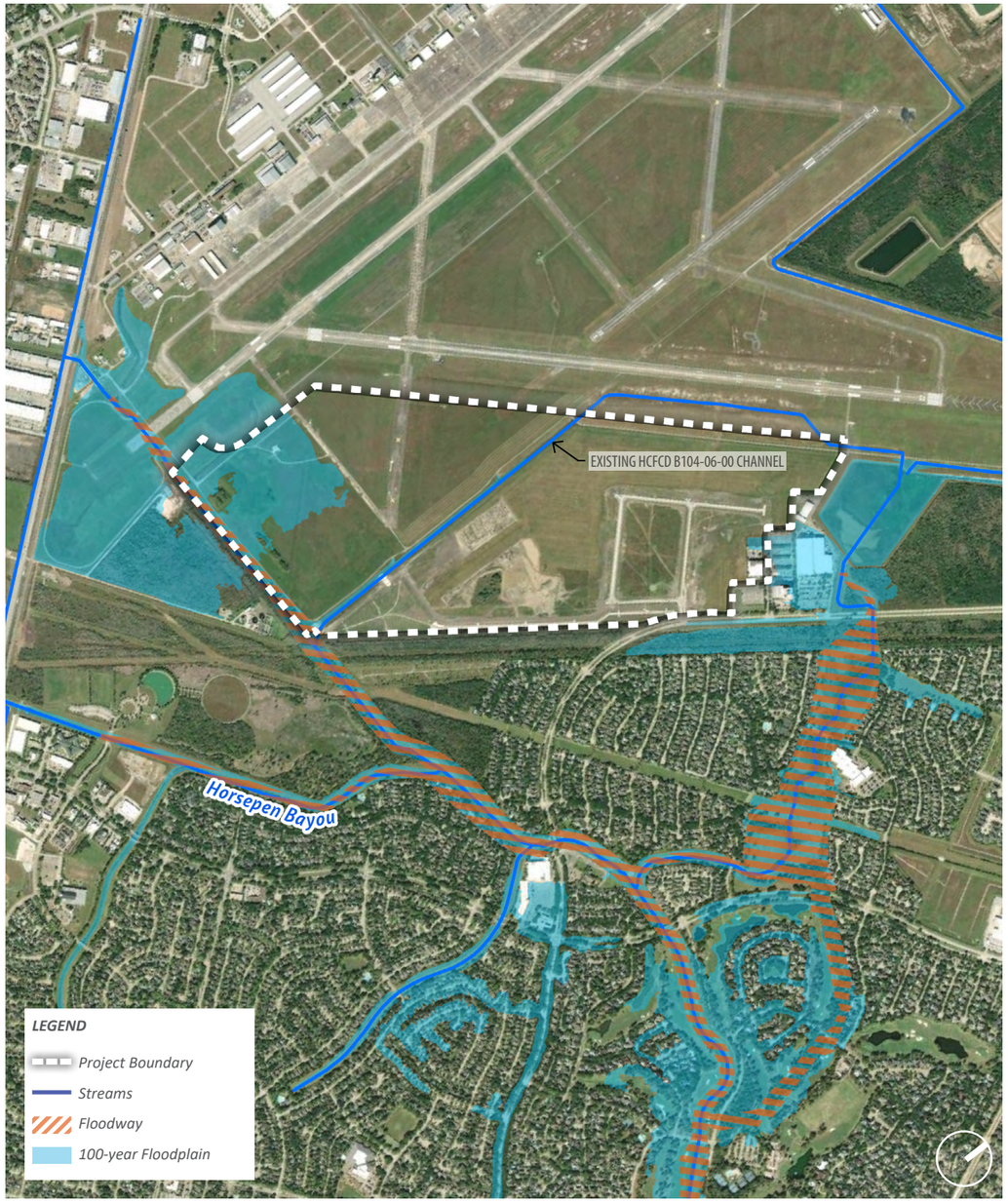
No impacts to cultural resources are anticipated during any phase of the project development. If cultural resources are discovered during construction, the owner shall direct the contractor to cease work immediately and notify HAS.

SENSITIVE LAND PROTECTION

The fault hazard band should be protected. Any elements that are constructed within the fault hazard band should be approved by ARC.

The existing HCFCD B104-06-00 channel should be improved and maintained.

Figure 2.32 Existing Streams, Floodplain, and Floodway



ELECTRICAL

ELECTRICAL POWER SERVICES

Utility power will be provided to each building from CenterPoint Energy (CenterPoint) utility transformers with underground duct-banks from the transformers to each building's main switchgear located inside the building.

Customer utilization voltages supplied from utility service transformers are typically voltages of 277/480 volts and 120/208 volts for most loads. Higher utilization voltages of 4160 volts or 12,000 volts can be provided where required for larger horsepower motors and other specialized equipment.

The utility transformer yard for each building will include utility transformer(s) and utility switch(es) as needed to meet the building loads.

Utility transformers and switches will be pad-mounted with underground secondary feeders to the building main switchgear and underground primary feeders from the utility distribution circuit duct-bank and manhole system.

The secondary duct-banks and feeders will be constructed and installed by the user.

The primary duct-banks in the utility transformer yard and from the utility transformer yard to the street duct-bank system will be constructed by the user.

Primary duct-banks and manholes will be constructed in accordance with CenterPoint standards by the user but the conductors in the primary duct-banks will be installed and terminated by CenterPoint with service installation charges to the user as part of the users service agreement with CenterPoint.

The duct-bank system routed along the major streets will be constructed by the Houston Airport System with installation charges to the users but the conductors in the duct-banks will be installed, spliced and terminated by CenterPoint. Where conductor installation charges are required, these charges may be passed on to the users with their facility installation and/or operation charges.

CenterPoint service transformers and secondary outdoor panels will be provided to power street lighting. Street lighting transformers shall either be included in HAS metered services or included in CenterPoint street lighting charges to be determined with HAS. Street lighting will be photocell controlled for operation from dusk to dawn.

HAS security gates will be powered from HAS outdoor panels supplied from metered service with CenterPoint service transformers.

Sidewalk lighting on HAS managed spaces will be powered from HAS outdoor panels supplied from metered service with CenterPoint service transformers.

Sidewalk lighting on user managed buildings, site plans and parking areas will be powered from the building electrical distribution.

Sidewalk lighting will be photocell controlled for operation from dusk to dawn.

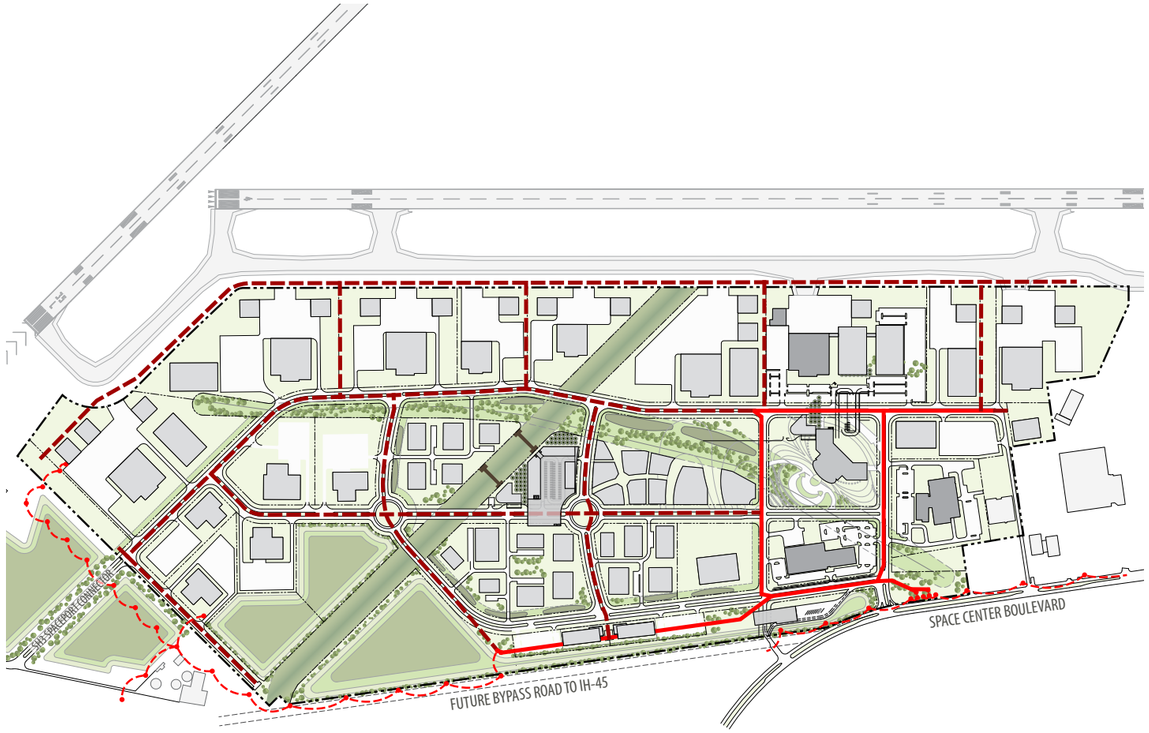
DESIGN CRITERIA/STANDARDS

Infrastructure for primary duct banks will comply with CenterPoint standards and HAS standards:

The duct-banks used for the primary service from the transformers to the utility distribution sources will require easement agreements.

The easements will be a minimum of a 10 feet centered on the duct-bank with 5 feet from the centerline. The easements will include a clearance of 5 feet from manholes or larger where required by CenterPoint.

Figure 2.33 Utilities - Electrical Lines



Other utilities will cross the duct-banks at 90 degree angles and shall be installed a minimum of 1 foot vertical distance from the duct-bank.

Duct-banks will be installed with 6” PVC Schedule 80 conduits with minimum horizontal radius of 20 foot or larger where required by CenterPoint and minimum vertical radius of 5 foot or larger for vertical conduits into switches and transformers.

Duct-bank depths will meet CenterPoint cover requirements.

Duct-bank depths will be coordinated with CenterPoint to maintain the ampacity requirements for the conductors.

Duct-bank identification and warning markings will meet CenterPoint and HAS requirements.

Infrastructure for duct bank manholes will comply with CenterPoint standards and HAS standards:

Manholes will be located to minimize bends between manholes to 270 degrees except where specifically approved by CenterPoint for 360 degrees of bends between manholes.

Manholes will be located at 500 foot maximum spacing between manholes.

Conduits will slope to each manhole from highpoints between the manholes to facilitate drainage.

Manhole entry and exit conduits for the main duct-banks will be configured out of opposite ends of each manhole in the direction of the main duct-bank orientation.

Manhole entry and exits conduits for duct-banks to the transformer yards in the land development parcels will exit the same end of the manhole as the primary circuit conduit entries and exits.

The sides of the manholes perpendicular to the manhole entry and exits will be reserved for cable supports and will not be used for entries and exits.

Manholes will include capped and sealed stub outs for future extensions to supply the land development parcels. Where the duct-bank is located on one side of the street the stub outs will also be extended to the other side of the street past the sidewalks and capped and marked for future extension. Where the duct-bank is located in the median on major thoroughfares, stub outs will be extended to both sides of the street past the sidewalks and capped and marked for future extension.

Manholes will include block-outs with a minimum of four to six conduits for each proposed building indicated on the land use plan for the parcels to allow for typical 4 conduit duct-banks to each building and more if required by the building loads.

Manholes and manhole covers will be rated for traffic requirements per CenterPoint and HAS standards.

The electrical installation for primary duct-banks, manholes and utility transformer yards shall comply with CenterPoint standards. Primary duct-banks, manholes and utility transformer yards shall also comply with HAS standards except where CenterPoint standards conflict.

Infrastructure for secondary duct banks will comply with HAS standards:

Duct-bank depths will meet HAS cover and marking requirements.

Duct-bank depths will be coordinated with the conductors to maintain the ampacity requirements to match the building switchgear.

Site utility transformer yards:

The electrical installation of utility transformer yards for power to the buildings and site equipment will comply with CenterPoint and HAS standards.

Enclosures will be provided with ventilation air openings and distance from transformers and utility switches as required.

Site and building electrical installation:

The electrical installation for site and building electrical installations shall comply with HAS standards

Standby generators:

If the building requires standby generators for automatic or manual transfer to a backup source the generator shall be provided by the user.

Standby generators will be provided with environmental fuel, oil and radiator leakage monitoring and containment to meet HAS standards.

Standby generators will be provided with emissions treatment to meet TNRCC and HAS standards. Emissions ratings and testing and maintenance plan shall be submitted to HAS for approval.

Standby generator transfer equipment will comply with HAS and CenterPoint standards.

Utility service incoming circuits:

The utility service incoming circuits to the underground ductbank system shall be underground on the site property and elsewhere where required by HAS for the aesthetic appearance of the site and site entrances from public ways.

Future substation:

The future utility substation will require easements for the utility substation and permanent access roads to the utility substation.

The future utility substation incoming transmission circuits will require both easements on site and acquisition of land off site with easements.

The incoming transmission lines may require underground pathways were required for coordination with the site runways and the appearance of the site from public ways.

The future substation will require easements and ductbanks for power from the substation to ductbanks providing power to the complex.

LOCATION/ACCESS

Utility transformer yards:

Utility transformer yards will be located behind the buildings and positioned so the equipment is not visible from streets, walkways and occupied spaces inside buildings.

Utility transformers will be located behind brick enclosures where required to meet the requirements for limited visibility.

Enclosures will be provided with ventilation air openings and distance from transformers and utility switches as required

Gates and doors will be provided to meet CenterPoint access requirements.

Gates and doors will be powder coated decorative wrought iron and shall be positioned to limit visibility of the gates and transformers from streets, walkways and occupied spaces inside buildings.

Utility transformer enclosure locations will include utility meters with doors provided for access by the utility company meter readers.

Standby generators:

Standby generators will be located behind the buildings and positioned so they are not visible from streets, walkways and occupied spaces inside buildings.

Standby generators will be located behind brick enclosures where required to meet the requirements for limited visibility.

SITE POWER

The Phase 1 development duct-banks consist of 9 (3x3) 6” conduits for the major duct-bank loop which is routed in the Phase 1 zone.

Phase 1 development supplies the duct-bank loop from 4 (2x2) 6” conduits on Space Center Boulevard on the North end of the development. Two of the conduits are active with the two circuits added as part of Phase 1 to supply the duct-bank from the CenterPoint Clear Lake substation.

CenterPoint data indicates that the majority of the capacity available from the 2 circuits is dedicated to the construction of the current phases of development for the initial three projects including Axiom Phase 1, Collins, and Intuitive Machines.

CenterPoint is investigating to determine if additional capacity can be made available from existing circuits by redistribution of loads on existing circuits. The Clear Lake substation supplies the two circuits added for phase 1 and the circuits serving the NASA buoyancy lab (3 x 3000 KVA transformers), the Boeing building, the Ellington Field antenna array and other loads. Initial reports from CenterPoint indicate that pathways from the Clear Lake substation to the site are constrained by the available easements.

The Phase 1 development duct-bank loop is also supplied from 4 (2x2) 6” conduits on Space Center Boulevard on the South end of the development for future circuits to be routed from the CenterPoint Ellington substation. Additional circuits from the CenterPoint Ellington substation will be required to support the power requirements for the next phase of development.

The Ellington substation circuits will require easements to the site from the Ellington substation located near State Highway 3 and Dixie Farm Road.

The capacity available from the Ellington substation will be constrained by the easement pathways and the corresponding limit on the addition of circuits.

Projections for the site development indicate that the future development will require the future addition of a substation to serve the site.

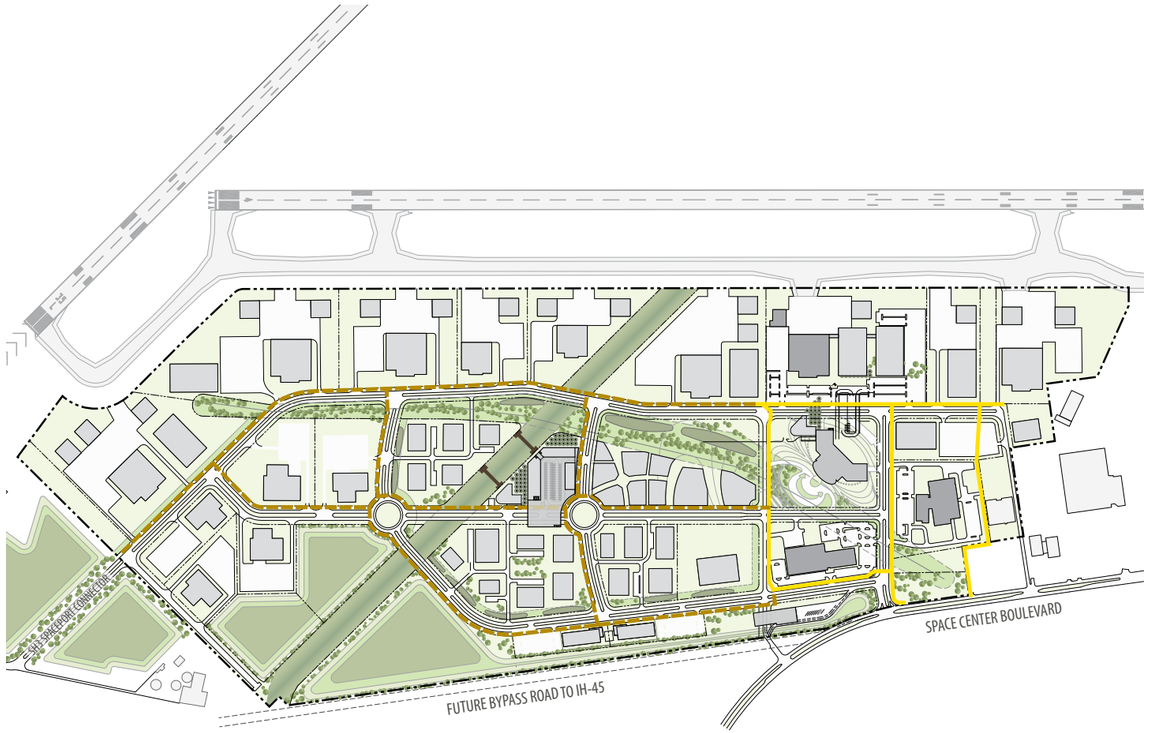
The initial site development has demonstrated a significant variation in calculated loads densities in volt amps per square foot depending on the load within the manufacturing and research buildings with the initial three developments requiring between 12 and 60 VA per building gross square foot for their initial phases of construction. The load densities for the site will also depend on the type of building. The land use planning projects future building types for assembly & manufacturing, hangars, research & development offices and laboratories, educational, retail, hotel, food & beverage and parking garages. Preliminary estimates indicate that the 30 parcels with the full build-out could require up to 150 to 250 megawatts for up to 7 million square feet of building space depending on the load density requirements for the individual buildings.

The land development includes a proposed location for a future substation that CenterPoint Energy planning department will review and advise for location requirements. The future substation will require future easements for transmission lines to interconnect the substation to transmission line circuits. Transmission line circuits will connect the substation to two nearby substations to integrate the substation into the transmission network. Substation incoming circuits are part of a transmission ring networked to for system reliability.

Future duct-banks shall be routed from the future substation to supply new duct-banks for the site development and to intercept the existing duct-banks to supply new development. Multiple ductbanks will be routed on the complex along major streets to serve the buildings. For zones with higher concentrations of assembly and manufacturing buildings, duct-banks may be routed on both sides of the zone and both sizes of streets where necessary to meet the load requirements. Existing circuits will be reconnected to the new substation where necessary.

Where required for reliability, automatic transfer operator switches (ATO) could be added ahead of transformers to supply transformers from redundant primary circuits supplied from either two substations or from redundant primary circuits supplied from two busses in one substation subject to availability and funding from the user.

Figure 2.34 Utilities - Gas Lines



GAS

The natural gas service line shall be extended from gas main to a gas meter/regulator assembly for each building provided by the local gas company. The location coordinated with the local gas company and the Architect. The operating pressure of the gas meter/regulator assembly shall be 5 psi.

Joseph'Joe'Maas(Joseph.Maas@CenterPointenergy.com, 713-207-4260) from CenterPoint engineering, who informed that CenterPoint installed and designed the gas lines for the Spaceport Phase 1 site development project. In addition, Brian Moncel (Brian.Moncel@CenterPointenergy.com, 713-941-0216) will need to be informed of the proposed development as the gas service coordinator, Brian will bridge the gap between marketing and engineering.

DESIGN CRITERIA/STANDARDS

Provide gas metering as necessary.

LOCATION/ACCESS

The gas meter shall be located on the exterior of each building, within the road right-of-way or as designated by CenterPoint Energy.

NATURAL GAS COORDINATION WITH CENTER POINT ENERGY

Engineering consultant shall perform the below task when ready for gas service:

1. Call Customer Service at 713-393-0130 to create a case address that will require a meter. Your City Permits/inspections will need to match the address on the case. Please include unit/suite numbers, if applicable.

2. Site Plan (with cross streets) indicating the location of the meter. If this is not a new building, please provide a map with cross streets as reference.

3. Recorded Survey Plat.

   Note: Any service that requires a 3rd party easement and/or main extension will take an additional 6 to 8 weeks to prepare easement (not including construction time frame). Construction time frame will start once easements have been executed and returned by all parties.

4. Copy of Plumbing Diagram with a detailed list of all gas equipment with BTU input of each gas appliance and total BTU load for each address/suite. (Please only include data sheets and brochures if they specifically state the required pressure and BTU loads.)

   Note: If your load is over 10 MCF within the City of Houston or 5 MCF outside of the City of Houston, it will require a pressure study by Center Point Energy engineering department. This could take an additional 2 – 4 weeks (not including construction.

5. Required Delivery Pressure. Center Point Energy offer 4 oz, 2 psi, or 5 psi.

   Note: All strip centers will be installed @ 2 psi.

6. Current stage of project and the date when you will need gas service.

7. Returned and signed Construction Conditions form. This document will be sent via DocuSign to your email address.

   Note: The work order cannot be started until one form per address is signed and returned with any necessary payments or easements.

WATER

A system for the provision of water to the public for human consumption and for fire protection systems through the pipe system into the buildings.

LOCATION/ACCESS

A domestic water service line shall be installed from the domestic water main to a point 5 feet outside the building. A reduced pressure zone backflow preventer in accordance with the Clear Lake City Water Authority (CLCWA) and City of Houston (COH) cross-connection control requirements shall be installed at the service riser outside the building.

Meter and meter box for the tenant site must be situated within a dedicated easement as dictated by the COH Infrastructure Design Manual (IDM). Sizing of the meter and meter box must be in accordance with AWWA standards and/or CLCWA/COH as applicable.

Either a double check valve backflow preventer or reduced pressure principle backflow preventer will be installed on the fire service line outside the building along with a fire pump if needed. The backflow preventer may be installed outside the building along the firewater line.

DESIGN CRITERIA/STANDARDS

The water meter and pit will be designed by the Civil Engineer in coordination with the Plumbing Engineer for compliance with building requirements.

Provide a double check backflow preventer when domestic service is connected to the service water main.

Domestic water booster pumps may be anticipated to be required to ensure a working pressure of 35 psi at the most remote flush valve as determined by AWWA standards

A firewater line shall be installed from the domestic water main within the right-of-way (ROW) as dictated by HAS BSG.

Potable water and firewater line meters and backflow preventers must be from the COH approved list and situated in the ROW easement.

Availability of potable water and firewater service must be through an approved Clear Lake City Water Authority (CLCWA) capacity letter with proof of impact fees paid.

The availability request will be procured from:

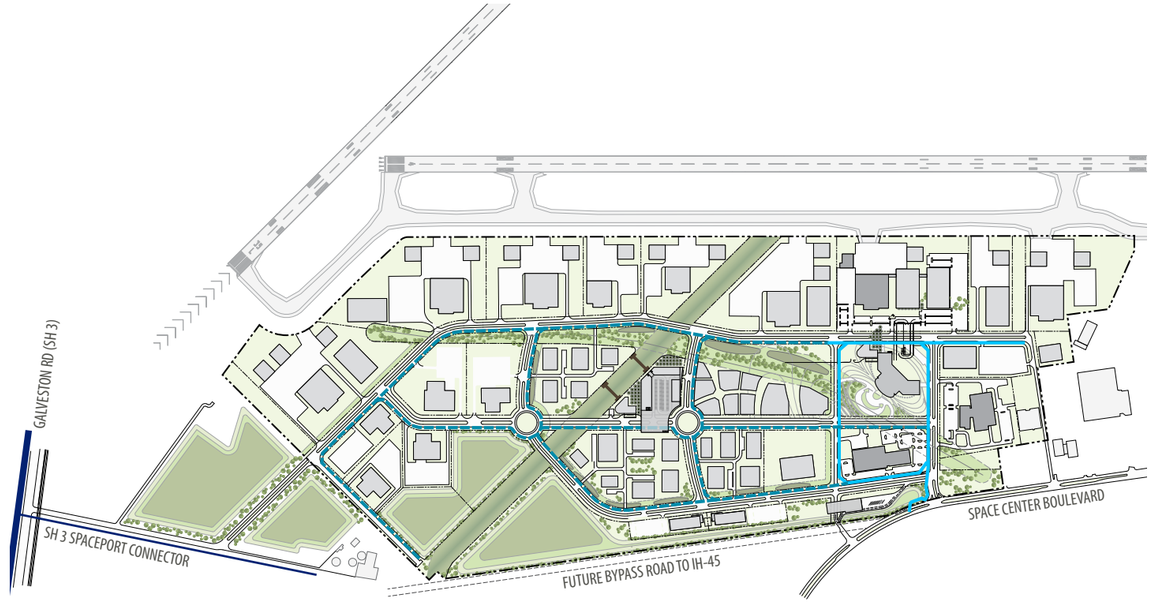
- CLCWA, 900 Bay Area Blvd., Houston TX 77058, Phone number: 281-488-1164
- CLCWA New Development Packet must be requested and completed for approval by CLCWA prior to issuance of capacity letter.

The design of potable water and firewater line with appurtenances must follow the latest COH IDM standards.

Through HAS and CLCWA collaboration, a redundant potable water and sanitary sewer connection must be provided through the existing COH potable water and sanitary sewer system located southwest of the site. This connectivity will ensure continuous availability of potable water and sanitary sewer in the event the CLCWA supply becomes off-line.

Procurement of utility availability from the COH is required to accommodate the redundancy requirements for the Spaceport Site.

Figure 2.35 Utilities - Water Lines



LEGEND

- *Existing Underground Water Pipe*
- *Future Underground Water Pipe*
- *Existing 6-inch Underground Potable Water Pipe Distribution Main (Asbestos Concrete material, Owned and Maintained by COH)*
- *Existing 42-inch Underground Potable Water Pipe Transmission Main (Steel Reinforced Pipe material, Owned and Maintained by COH)*

Figure 2.36 Utilities - Sanitary Sewer Lines

LEGEND

- *Existing Underground Sanitary Sewer Pipe*
- *Future Underground Sanitary Sewer Pipe*
- *Existing 6-inch Underground Sanitary Sewer Force Main (PVC material, Owned and Maintained by COH)*
- *Existing 16-inch Underground Sanitary Sewer Force Main (Unknown material, Owned and Maintained by COH)*
- *Existing 78-inch Underground Sanitary Sewer Large Diameter Main (Monolithic Reinforced Concrete material, Owned and Maintained by COH)*
- *Existing 14-inch Underground Sanitary Sewer Force Main (Ductile Iron material, Owned and Maintained by COH)*
- *Existing 30-inch Underground Sanitary Sewer Large Diameter Main(PVC material, Owned and Maintained by COH)*
- *Existing 30-inch Underground Sanitary Sewer Large Diameter Main (RCP material, Owned and Maintained by COH)*

SANITARY SEWER

A system for the provision of sanitary sewer service to the public through the sanitary sewer pipe system into the buildings.

DESIGN CRITERIA

New sanitary sewer connection to the public sewer system from the building will be designed by the Civil Engineer and must follow the latest COH IDM standards and HAS Sanitary Sewer Design Standards.

Sanitary sewer piping from plumbing fixtures in buildings and sanitary sewer piping systems from the premises shall be connected to the public sanitary sewer.

A grease water system must be provided for buildings that have food establishments where fats, oils, and grease are utilized or present. The grease water system must be connected to the sanitary sewer system.

Sanitary sewer availability letter is jointly procured with the potable water and firewater availability required through an approved Clear Lake City Water Authority (CLCWA) capacity letter with proof of impact fees paid for tenants.

The availability request is procured from:

- CLCWA, 900 Bay Area Blvd., Houston TX 77058, Phone number: 281-488-1164
- CLCWA New Development Packet must be requested and completed for approval by CLCWA prior to issuance of capacity letter.

LOCATION/ACCESS

Sanitary systems shall be extended from a point 5 feet outside of the building to the new sanitary sewer. Double clean-outs will be provided on the exterior of the building or utility access holes on the grease/oil separator when applicable. One or multiple sanitary sewer service lines may be provided to the buildings based on the building facility requirements.

The public sanitary sewer system proposed in the Spaceport road right-of-way (ROW) shall connect to the existing public sanitary sewer located in the Space Center Blvd public ROW in accordance with CLCWA requirements and recommendations.

STORM WATER

A system for the provision of stormwater drainage service to the public through utilization of regional detention ponds and stormwater conveyance systems governed by conditions provided by the Harris County Flood Control District (HCFCD) / Clear Lake City Water Authority (CLCWA), and City of Houston (COH) Infrastructure Design Manual, respectively.

DESIGN CRITERIA

Stormwater Design and applicable water quality measures must be in accordance with Chapter 9 (Stormwater Design Requirements) of the latest City of Houston (COH) Infrastructure Design Manual.

In accordance with the Ellington Airport Drainage Report, tenant on-site detention ponds are not required. (Subject to review and update, please contact BSG for up to date information.)

Civil engineer of record must provide seal/signed engineers letter stating site storm design is in compliance with the latest COH IDM Chapter 9 standards.

Project site underground storm sewer system must tie-in to a main conveyance system along the road right-of-way within the Spaceport site.

Drainage analysis including spillway conveyance of extreme event flow must be performed in accordance with the latest COH IDM Chapter 9 standards to verify stormwater capacity for the new site developments at the stormwater tie-in point. In accordance with the latest COH IDM Chapter 9 and CLCWA design requirements, the extreme event sheet flow direction must be identified in the construction drawings.

Detention pond design is governed by HCFCD and CLCWA based on their respective service area boundaries.

LOCATION/ACCESS

Stormwater service connection shall be extended from a point 5 feet outside the building to a new underground stormwater management system including connectivity to the building roof drains. Roof drain connection to the site stormwater system must be located underground.

Regional detention ponds are situated within the Spaceport site to provide the required detention requirements according to HCFCD and CLCWA requirements.

OFFSITE PARCELS

The HAS Building Services Group (BSG) has full jurisdiction for all developments within EFD, while off-site parcels may fall within jurisdictions for COH, HCFCD, and/or Texas Department of Transportation (TxDOT).

Developments within EFD are governed by the BSG Tenant Improvement Program (T.I.P.) process, the permit review process, as part of the project evaluation process.

Geographical location of off-site parcels dictate the stormwater guidelines to follow, compliance with the jurisdictional policies is paramount in order to maintain to prevent drainage impacts to existing waterways.

Horsepen bayou is owned and maintained by HCFCD. Off-site parcels that discharge into Horsepen bayou are expected to comply with HCFCD drainage standards including potentially providing a watershed drainage analysis and performing a drainage impact analysis. These analyses are as directed by HCFCD in order to eliminate impacts to the Spaceport site drainage system.

Figure 2.37 Utilities - Storm Water Lines

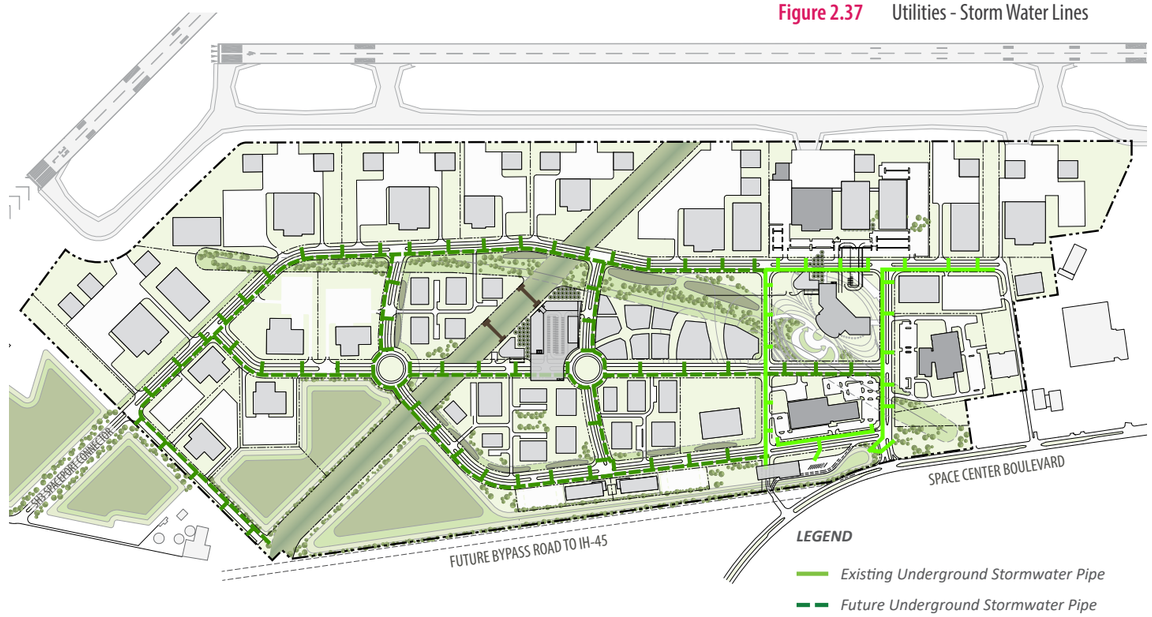


Figure 2.38 Future Detention

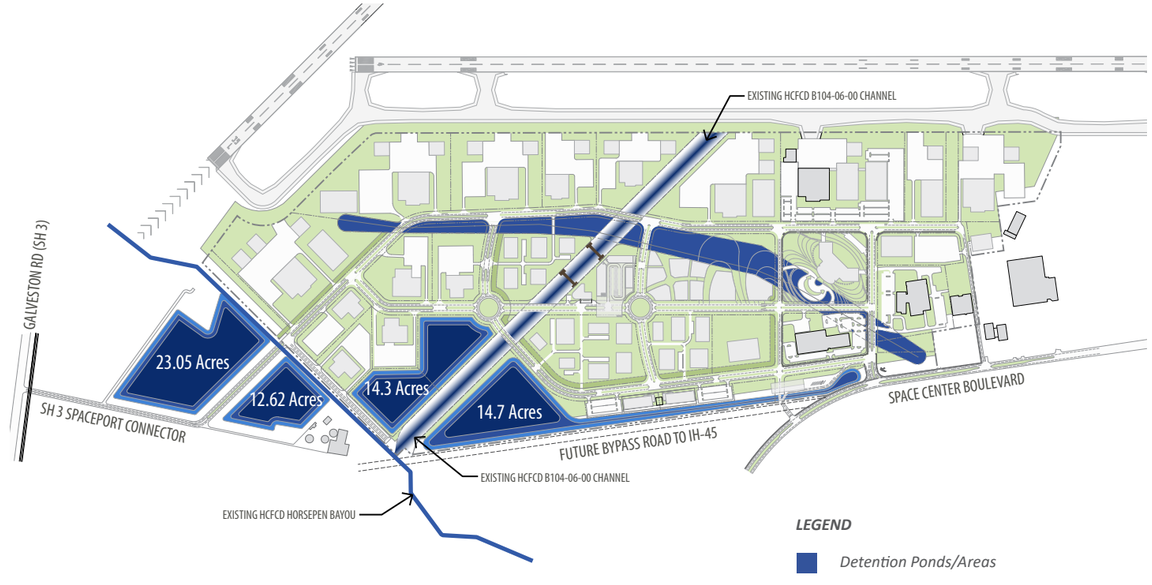
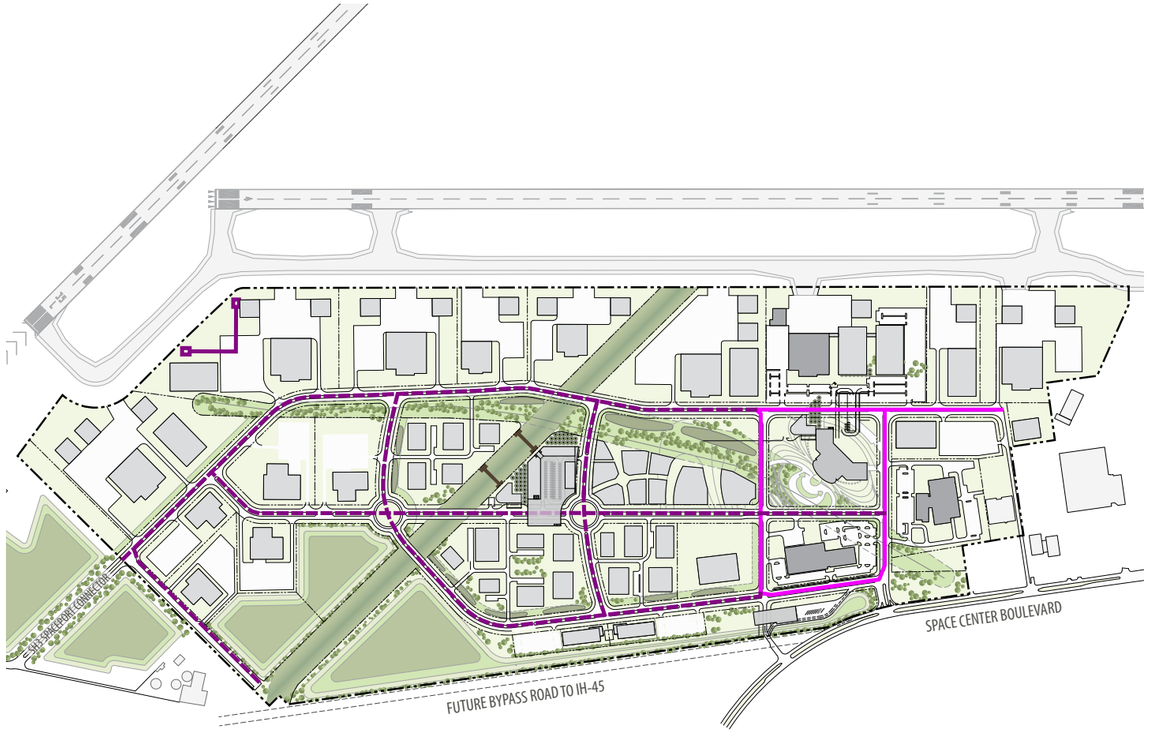


Figure 2.39 Utilities - Telecommunication Lines



LEGEND

- *Existing Underground Communications Ductbank*
- *Future Underground Communications Ductbank*

TELECOMMUNICATIONS

SM/MM Fiber Requirements (City, Client, Carriers) A conventional fiber network will be extended from Building C through new duct bank along the primary street corridors. Building C will serve as the local network management hub for connectivity and services that are subscribed from the HAS IT Network.

Structures and Infrastructure Corridors. New maintenance holes and other structures will be located, in general, behind the sidewalk or curb line along primary roads as depicted on the overall utility layout drawings. In the event that the new building is across the street from the assigned maintenance hole, a conduit stub-out will be provided to the building side of the street. This plan will facilitate access to the new duct bank system, and will eliminate the need to tunnel or trench across the new street paving and ROW. Each building is expected to provide a hand-hole within 5 feet of the limits of the foundation. The connecting conduits between the hand-hole and the HAS Infrastructure maintenance hole (or provided stub-out) is the responsibility of the tenant building owner, and will be part of the future building design. Maxcell innerduct is specified as approved conduit liner for all connections into the HAS IT Network infrastructure.

Viability of existing plant and support facilities. Existing infrastructure supporting the current HAS facilities are not to be utilized for Phase I or Phase II construction and improvements. Legacy plant and facilities do not have the capacity to support the new development areas. New infrastructure from Building C to the Phase I and Phase II areas will be provided and available for all new facilities.

DESIGN CRITERIA/STANDARDS

Outside Fiber Plant layout, terminations. Assigned maintenance hole connections will be managed and scheduled by HAS IT Network personnel. A table of Fiber OSP connection locations will be provided to the construction teams for each building.

Expanded Outside Copper Plant capacity. Fiber bandwidth is the only medium expected to be installed and available for the HAS IT Network. Limited copper plant supports some HAS facilities on the property but will not be distributed through the new infrastructure duct bank for Phase I or Phase II.

Transition from OSP to building interconnects. Splice cases for fusion splicing will be provided in the maintenance hole assigned to each building. Conduits must be extended from the hand-hole entrance at each building to the maintenance hole (or stub-out) by the building contractor. Conduits from the hand-hole to the building entrance will serve as the transition from OSP to ISP. Entrance to the building infrastructure is expected to be made via foundation penetrations in the vicinity of the Telecommunications Room IAW BICSI standards.

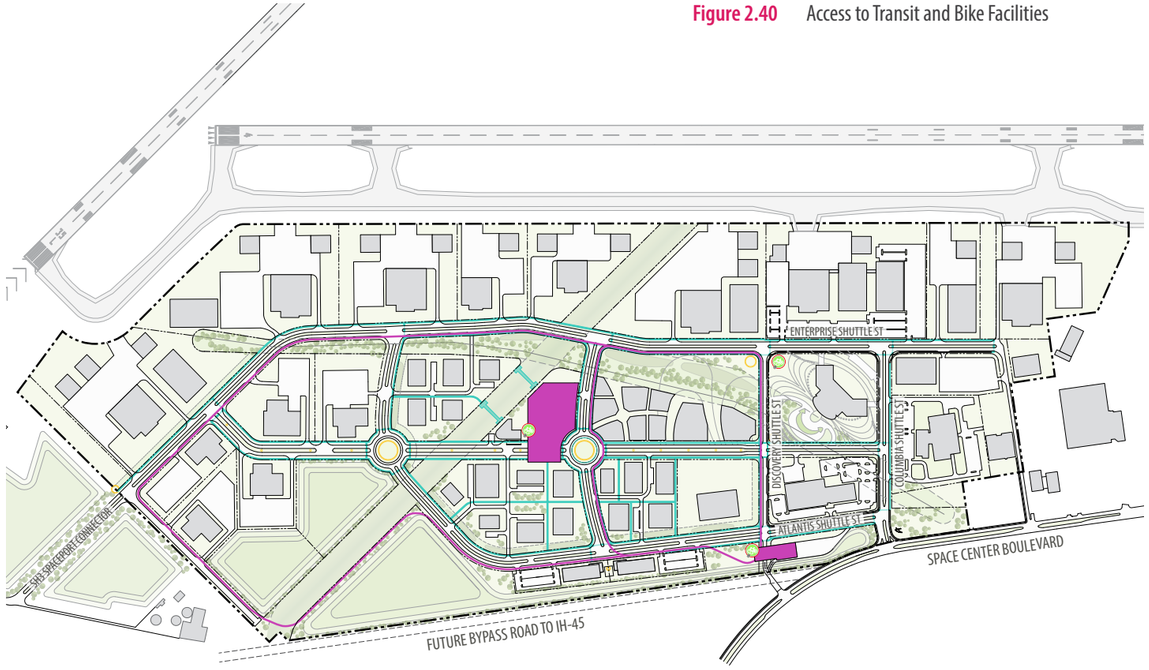
Carrier interconnects / Service Locations. Independent Carrier connections may be contracted separately from services provided by HAS IT Network. Any private carrier connections must be coordinated and planned with HAS services.

LOCATION/ACCESS

Physical Security infrastructure will be a component of the new network construct: cameras, access control and gated entries at a minimum.

Coordinate all cybersecurity requirements through HAS IT Security and COH IT Security.

Figure 2.40 Access to Transit and Bike Facilities



LEGEND

- *Future Transit Easement*
- *Transit Related Structure*
- *Multi-use Path (Pedestrian/Bicycle/Scooter/etc.)*
- *Potential E-Bike or Similar Charging Station*

Example of potential future transit within the Spaceport campus.

Personal Rapid Transit
Image courtesy www.METRINO-PRT.com

ALTERNATATIVE MODES OF TRANSIT

ACCESS TO QUALITY TRANSIT & REDUCED PARKING FOOTPRINTS

Buildings should be oriented and designed with access to the pedestrian and future transit loop (refer Figure 2.38). The future transit loop may be an at grade system or possibly elevated, similar to the SkyTran system under development.

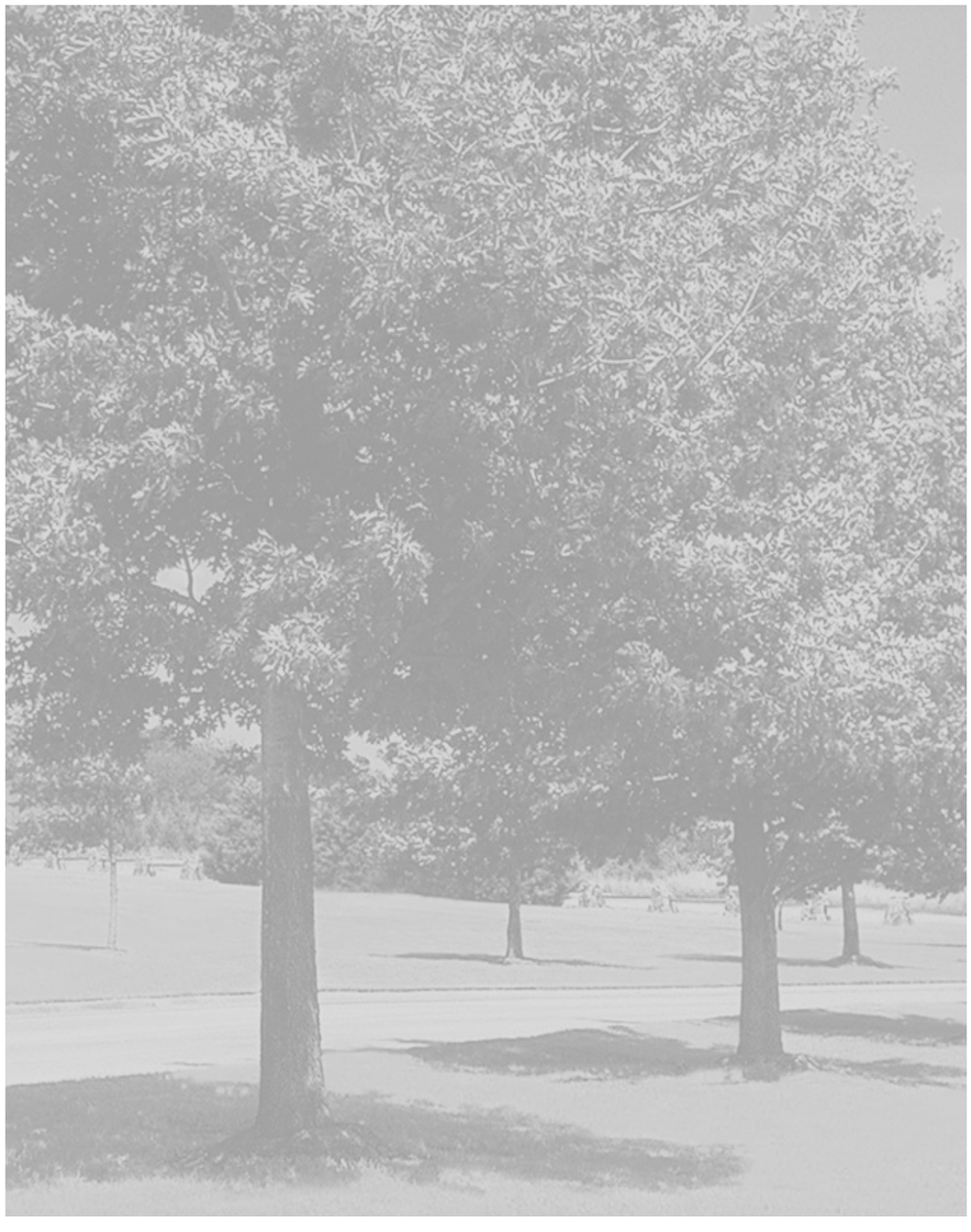
Buildings should also try to maintain a reduced parking footprint by utilizing the garage as well as the future planned transit HUB located off of Atlantis Street.

ACCESS TO BICYCLE FACILITIES

B-Cycle Stations should be considered near the transit HUB, the parking garage, and other destination nodes around the Campus.

See Page 106 for additional information on recommended bike racks.

Image courtesy Houston BCycle | Photo Credit: Doogie Roux



03

Landscape Treatment

MANDATORY

LANDSCAPE TREATMENT
MANDATORY

DESIGN TREATMENT REQUIREMENTS

Described in this chapter are the standards related to ground plane treatment on the Spaceport. HAS is responsible for management and growth of 3 Houston Airports and has on staff a team of horticulture experts that must be consulted when implementing treatment suggested below.

NATURAL GROUPINGS

Landscape design solutions suggested for sites on the Spaceport should emphasize and utilize existing natural features to preserve its existing natural character. The preservation of significant geologic and topographic features as well as existing plants or plant groupings is encouraged. New plants should be planted in groupings rather than in uniform lines.

PLANTING BEDS

Planting beds are to be located along the internal traffic circulation of the development and shall be a minimum of 10 feet wide and planted with native grasses, shrubs, and trees (see Tables 3.1-3.4). These plants and other non-natural elements, such as rocks, should be grouped to facilitate maintenance. Mulches applied to the soil surface reduce evaporation, moderate temperature, and control the growth of weeds and erosion of soil. All plant beds should be dressed with wood mulch, gravel, or other appropriate ground cover. Local rocks and gravel should be used where possible.

TURF

Ground cover should be used wherever possible instead of grass in order to lower maintenance cost and reduce the need for mowing. Plantings in turf areas shall maintain a minimum spacing of 36 inches from obstacles to facilitate mowing. Narrow strips, steep slopes, and other areas difficult to maintain should not incorporate turf. Obstruction present within mowed turf areas should be contained within a concrete mow strip, gravel area, or planting area to allow for ease of maintenance. Sod should be used in lieu of seed, which can attract birds and are subject to erosion.

Figure 3.1 Landscape buffer (cars)

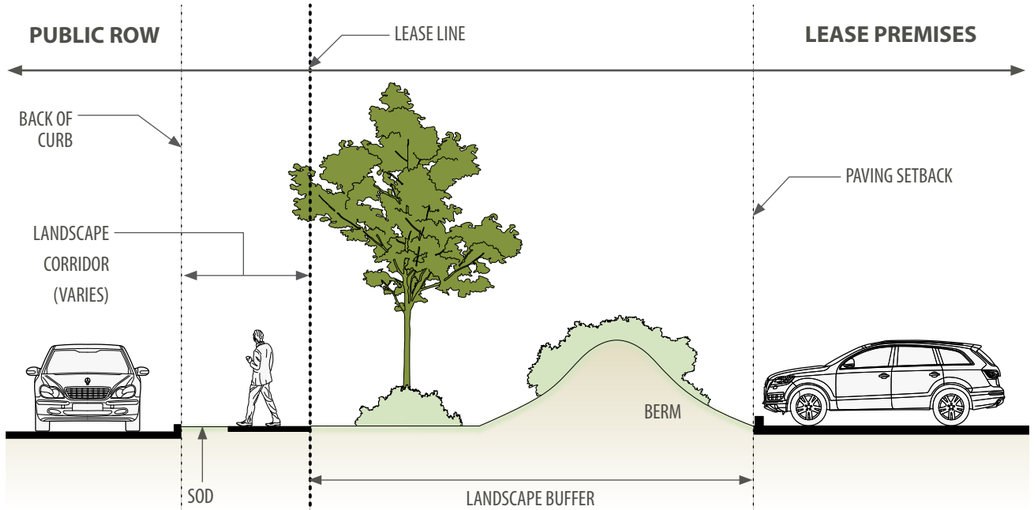
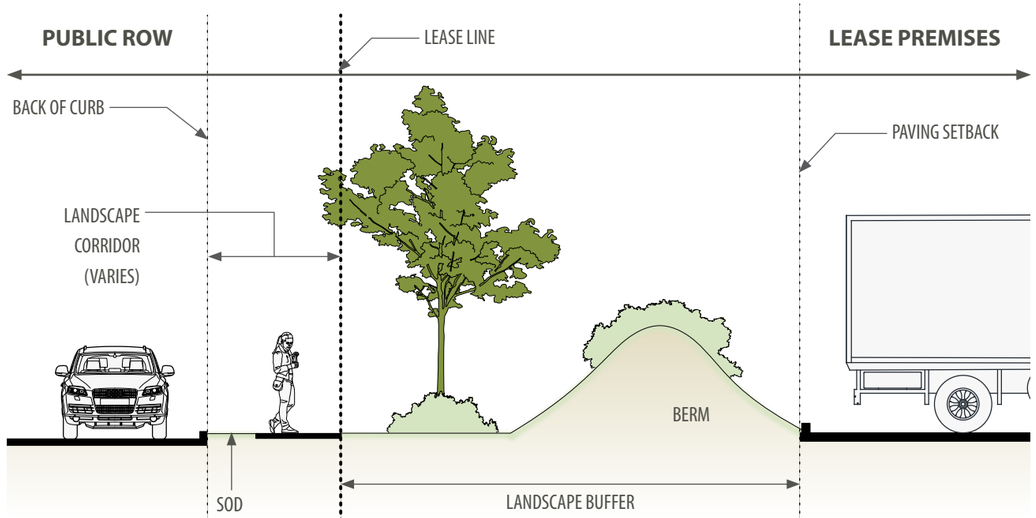


Figure 3.2 Landscape buffer (trucks)



LANDSCAPE BUFFER

To improve the aesthetic appeal, landscape buffers are suggested to screen visual nuisances, or for environmental purposes such as stormwater collection, noise abatement, or increasing shade effects. These areas are an important component for the creation of the street character. Landscape buffers located within the leased premises and these landscaping improvements shall be provided and maintained by the leaseholder. Landscape buffers should be high enough to provide adequate screening to cars or trucks in the parking lots that require such features (Figure 3.1 and 3.2).

High-profile entries and other critical areas shall require a higher level of design treatment than less critical areas such as side yards or secondary entries. Landscape on leased premises shall provide smooth transition to existing landscape in setbacks and adjacent properties.

Landscape elements shall not infringe on the ability of vehicle operators to see approaching vehicles from either a roadway or driveway at an intersection

STREET TREES

The City of Houston Tree and Shrub Ordinance provides minimum requirements for street trees, parking lot trees, and shrubs. (See: Code of Ordinances, Chapter 33, Article V, Division 2).

The following standards, adopted from this ordinance, shall be required on the site:

- One street tree shall be planted for every 30 feet of road frontage. These trees shall be placed at least 20 feet apart without extreme spacing variation, excluding when site conditions or driveways limit spacing.
- Each parking space shall be within 120 feet of a tree, as measured from the center of the trunk to any point on the parking space surface. One tree shall be planted for every ten parking spaces.
- A minimum of 75% of shrubs shall be planted along the perimeter of a parking lot, with the remainder planted along or within the perimeter. Ten shrubs shall be planted for every required tree.

The placement of street trees shall provide unifying character to the streetscape. Street trees shall be placed within setbacks in frontage areas. Natural arrangements of repeated tree species should be used along streets. Trees should not be located closer than 10 feet from obstacles.

Table 3.1 Grasses

GRASSES

Scientific Name	Common Name	Maximum Mature Growth Size (W X H)	Comments
Muhlenbergia capillaris	Gulf Muhly	35 x 35in	Native
Miscanthus sinensis	Dwarf Miscanthus	18 x 36in	
Liriope muscari ‘Variegata’	Variegated Liriope	15 x 15in	
Liriope muscari ‘Big Blue’	Big Blue Liriope	18 x 18in	
Liriope genus	Liriope		
Pennisetum setaceum ‘Rubrum’	Purple Fountain	48 x 60in	
Cynodon dactylon	Bermuda Grass		Ground cover
	Black Star Gravel		
Miscanthus sinensis ‘Adagio’	Adagio Miscanthus	48 x 60in	
Pennisetum alopecuroides ‘Hameln’	Hameln Pennisetum	30 x 30in	
Dietes bicolor	Bi Color Iris	36 x 48in	
Dianella tasmanica ‘Variegata’	Variegated Flax Lily	12 x 42in	

PLANTS

HAS PLANT LISTS

Listed on the following pages are the HAS adopted Plant List with scientific name, common name, approximate growth size, and comments (native, drought-resistant).

Figure 3.3 HAS Grass Varieties


Gulf Muhly


Bermuda Grass


Dwarf Miscanthus


Black Star Gravel


Variegated Liriope


Adagio Miscanthus


Big Blue Liriope


Hameln Pennisetum


Liriope


Bi Color Iris


Purple Fountain


Variegated Flax Lily

Table 3.2 Shrubs

SHRUBS

Scientific Name	Common Name	Maximum Mature Growth Size (W X H)	Comments
Wedelia acapulcensis var. hispida	Zexmenia	24 x 24in	Native
Salvia leucantha	Mexican Bush Sage	72 x 72in	
Ruellia brittoniana ‘Katie’	Dwarf Katy Ruellia	24 x 8in	
Ligustrum sinense ‘Sunshine’	Sunshine Ligustrum	48 x 72in	
Agapanthus	African Lily		
Crinum augustum	Crinum Lily - Queen Emma	36 x 72in	
Trachelospermum asiaticum	Asiatic Jasmine	36 x 12in	Good ground cover
Plumbago auriculata	Blue Plumbago	10 x 10ft	
Nerium oleander	Dwarf Oleander	72 x 72in	
Russelia equisetiformis	Firecracker Plant	60 x 60in	
Podocarpus Macrophyllus	Japanese Yew	20 x 40ft	
Loropetalum chinese	Lorapetalum	72 x 72in	
Schefflera arboricola ‘Trinette’	Variegated Arboricola	4 x 8ft	Good hedge
Alpinia zerumbet ‘Variegata’	Variegated Gingers	48 x 48in	
Ligustrum genus	Privet		Good hedge or screen
Lantana camara ‘New Gold’	New Gold Lantanas	48in x 12in	
Tradescantia pallida	Purple Queen	18 x 18in	Good ground cover
	Knock Out® Roses	48 x 48ft	
	Drift® Roses		
Bletilla striata	Ground Orchids	12 x 18in	
Tulbaghia violacea	Society Garlic	48 X 36in	
Duranta repens ‘Cuban Gold’	Cuban Gold - Duranta	30 x 24in	
Leucophyllum frutescens	Texas Sage	5 x 6ft	
Asparagus densiflorus	Foxtail Ferns	36 x 36ft	
Ligustrum japonica	Japanese Privet	8 x 12ft	
Rhaphiolepis indica	Indian Hawthorn	6 x 6ft	
Leucophyllum candidum ‘Silver Cloud’	Silver Cloud Texas Sage	48 x 48in	
Ligustrum japonicum ‘Texanum’	Waxleaf Ligustrum	6 x 10ft	
Rhaphiolepis indica ‘Clara’	Clara Indian Hawthorn	48 x 48in	
Nerium oleander ‘Petite Pink’	Petite Pink Oleander	6 x 6ft	
Hamelia patens var. glabra	Dwarf Firebush	4 x 4ft	
	Drift® Red Roses	30 x 18in	
Muhlenbergia genus	Muhly Grass	36 x 48in	

Figure 3.4 HAS Shrub Varieties


Zexmenia


Asiatic Jasmine


Variegated Arboricola


Drift® Roses


Mexican Bush Sage


Blue Plumbago


Variegated Gingers


Ground Orchids


Dwarf Katy Ruellia


Dwarf Oleander


Privet


Society Garlic


Sunshine Ligustrum


Firecracker Plant


New Gold Lantanas


Cuban Gold - Duranta


African Lily


Japanese Yew


Purple Queen


Texas Sage


Crinum Lily - Queen Emma


Lorapetalum


Knock Out® Roses


Foxtail Ferns

Japanese Privet

Dwarf Firebush

Indian Hawthorn

Drift® Red Roses

Silver Cloud Texas Sage

Muhly Grass

Waxleaf Ligustrum

Clara Indian Hawthorn

Petite Pink Oleander

TREES

Scientific Name	Common Name	Maximum Mature Growth Size (W X H)	Comments
Quercus texana	Texas Red Oaks	60 x 75ft	Native
Quercus fusiformis	Texas Live Oaks	100 x 50ft	Native
Pistacia chinensis	Chinese Pistache	35 x 35ft	
Ulmus americana	American Elm	50 x 80ft	
Ulmus alata	Winged Elm	40 x 50ft	
Acer rubrum	Red Maples	50 x 70ft	
Lagerstroemia indica	Crepe Myrtles	15 x 30ft	
Sabal mexicana	Texas Sabal Palms	13 x 59	Native, Ball & burlapped with 5ft clear trunk height
Phoenix dactylifera	Date Palm	40 x 80ft	Ball & burlapped with 5ft clear trunk height
Chamaerops humilis	Mediterranean Fan Palms	15 x 15ft	
Ilex x attenuata 'Eagleston'	Eagleton American Holly	14 x 20ft	
Ilex x 'Nellie R. Stevens'	Nellie R Stevens Holly	15 x 30ft	
Callistemon rigidus	Bottlebrush	10 x 20ft	

Table 3.4 Trees contd.

Scientific Name	Common Name	Maximum Mature Growth Size (W X H)	Comments
Magnolia grandiflora ‘Little Gem’	Little Gem Magnolia	15 x 25ft	
Magnolia virginiana	Sweet Bay Magnolia	35 x 35ft	
Magnolia grandiflora ‘D.D. Blanchard’	DD Blanchard Magnolia	35 x 50ft	Can be sued to provide shade
Platanus mexicana	Mexican Sycamore	30 x 50	
Quercus virginiana	Southern Live Oak	80 x 50ft	
Quercus shumardii	Shumard Oak	60 x 115ft	
Ulmus parvifolia sempervirens	Chinese Elm	60 x 50ft	
Quercus virginiana ‘High Rise’	Live Oak ‘High Rise’	40 x 60ft	
Taxodium distichum	Bald Cypress	25 x 70ft	
Lagerstroemia indica x fauriei ‘Tuscarora’	Tuscarora Red Crepe Myrtle	15 x 15ft	
Quercus nuttallii	Nutall Oak	50 x 60ft	
Ulmus parvifolia	Lacebark Elm	45 x 50ft	
Lagerstoemia indica ‘Basham’	Basham Pink Crepe Myrtles	20 x 30ft	

Figure 3.5 HAS Tree Varieties

Texas Red Oaks

Crepe Myrtles

Texas Live Oaks

Texas Sabal Palms

Chinese Pistache

Date Palm

American Elm

Mediterranean Fan Palms

Winged Elm

Eagleton American Holly

Red Maples

Nellie R Stevens Holly

Bottlebrush

Little Gem Magnolia

Sweet Bay Magnolia

DD Blanchard Magnolia

Mexican Sycamore

Southern Live Oak

Shumard Oak

Chinese Elm

Live Oak 'High Rise'

Bald Cypress

Tuscarora Red Crepe Myrtle

Nutall Oak

Lacebark Elm

Basham Pink Crepe Myrtles

PLANT SIZING AND QUANTITIES

Trees: Trees should be selected from the approved plant list in Table 3.4 and 3.4. Multiple sizes and species of trees should be used to discourage homogeneity and enhance the aesthetics of open spaces and street frontage. Placement and spacing of trees shall be appropriate for the species and size at maturity. Trees placed along public street frontage shall be placed in a denser pattern and the rest of the site.

Shrubs: Shrubs should be used in planting beds along street frontage to provide screening of parking lots, truck courts, etc. They should also be used to enhance entryways into the site and pedestrian paths. No one species should dominate the landscaped areas and selected shrubs should effectively address the use of screening or enhancement.

Groundcover: To reduce the use of manicured lawn, groundcover should be used in parking islands and planting beds. In large, landscaped areas, the mixing of groundcover with hardscapes and shrubs are recommended over the use of solely groundcover.

Lawn: All areas not paved, or planting beds shall be turf grass.

MAINTENANCE

An appropriate level of watering in a planted area reduces required maintenance. Over-watering contributes to rapid, weak plant growth, fertilizer leaching, insect, and disease problems, as well as weed growth. Diseased vegetation and vegetation that was proposed to be non-fruit bearing and is discovered to bear fruit shall be replaced by the Tenant with vegetation of a similar variety and size.

HARDSCAPE

Hardscapes reduce the amount of turf requiring irrigation and allow access to planted areas and can also help define traffic patterns, separate areas in the landscape, and provide visual interest. The placement of these elements should be carefully considered as these elements are typically installed early in the landscaping process. Pervious treatments like stone or brick/concrete pavers are preferable in hardscape designs as they can help reduce stormwater runoff.

PERVIOUS PAVERS

Pavers are typically made of precast concrete, brick, stone, or cobbles and are usually placed in interlocking patterns within a rigid frame on top of a sand bed or other drainage system. Additional sand or gravel fills the gaps between pavers, allowing water to flow through, pass the underlying subgrade, and enter the ground. Increased permeability is possible through the incorporation of small voids within the pavement surface itself. In addition to water infiltration, these pavers allow for enhanced airflow, producing a cooler surface than one created with impervious materials.

Variety in color, shape, size, and texture as well as their ability to support heavy traffic loads and weights make pavers a versatile surface treatment as they can replace conventional concrete paving in parking lots, roads, and sidewalks. Brick and stone pavers are appropriate for retail and plaza areas, while concrete pavers should be allowed only in roadway frontage areas.

MULCH

Sturdy mulch made of shredded bark from hardwood trees compacts over time, making it resistant to blowing or washing away. However, mulch is not desirable on sloped areas and some mulches float and can be easily washed away. Mulch is therefore a temporary erosion control measure that also controls weed growth and helps retain soil moisture.

Figure 3.6 Types of permeable pavement

DECOMPOSED GRANITE (DG)

DG is a naturally occurring gravel made from granite rock that has been broken down over time. Crushed stone screening is a manufactured version of DG that is also widely available. DG should be installed at a minimum of 2 inches compacted. This material packs well and creates pervious surface that is firmer than many other granite materials. Areas of high pedestrian traffic, including outdoor seating areas and walking paths or trails can benefit from DG. It can also be implemented in industrial truck courts instead of ground cover to reduce maintenance and irrigation.

GRAVEL

Gravel can be used to accent areas of the landscape and allows water to pass through to the ground below. Gravel should not be used in lieu of turf or ground cover.

TURF PAVERS

Consisting of concrete or plastic interlocking units that provide structural stability and a series of gaps planted with turf grass, turf pavers may reduce or eliminate the need for other stormwater management techniques.

IRRIGATION

A proper underground irrigation system should be installed across landscaped areas whenever possible. Reclaimed water shall be used as the main source of water for the irrigation system and low water (drip) systems are strongly encouraged to reduce water use. Irrigation systems shall comply with Texas Administrative Codes and be designed by a State of Texas Professional Engineer, Landscape Architect, or a Licensed Irrigator. Watering shall comply with the HAS Sustainability Management Plan.

The irrigation system should be efficiently designed, watering only as much as plants require to avoid excessive waste. The frequency and duration of watering shall be adjusted to changing seasons and weather patterns. Watering should only take place when the sun is low, temperatures are cool, and the winds are calm to reduce water loss to evaporation.

Technology like “smart” controller systems can help automate the process of irrigation using sensors to manage watering times and frequency based on environmental conditions.

DRIP/MICRO IRRIGATION

Slow watering like drip irrigation saves water and fertilizer by applying a slow drip of water to the base of plants. This reduces the chances of water evaporation and runoff and allows for customized irrigation where plants that need more water can be targeted without irrigation of an entire area.

Figure 3.7 Drip Irrigation

MAINTENANCE

Leaks and broken components of the irrigation system shall be repaired immediately to ensure the system is maintained in an operative and efficient state. Irrigation heads should be adjusted to prevent water loss through overwatering paved surfaces.

GRADING/DETENTION AND DRAINAGE

Natural and neutral colors should be used for retaining walls and other walls and should complement the character and architecture theme of the buildings. These standards should be adhered to by leased properties wishing to construct retaining walls or other freestanding walls.

Drainage should be included in all landscaped areas to avoid excessive runoff and pooling. Landscaped spaces should double as stormwater management areas that allow for water to naturally seep into the ground where possible.

To ensure proper drainage across the development, appropriate grading strategies should be used. Listed below are the criteria:

- The HAS requirements for roadway corridors should inform the driver of the slope used on the street.
- An underground stormwater collection system must be installed for drainage.
- Leased parcels should not be graded so that water has a concentrated flow onto an adjacent parcel.
- Existing topography should be utilized when grading where possible.

LOW IMPACT DESIGN (LID)

LID measures should follow guidelines provided by City of Houston Incentives for Green Development in developing site-specific LID features to promote a green stormwater infrastructure (GSI). The GSI technique allows the site to adapt features such as bioretention or rain gardens, green roofs, permeable pavement, rainwater harvesting, soil amendments, urban forestry, and vegetated filter strips. Developers for the site will be encouraged to apply for development permits that will allow the developer to proceed using an alternative set of rules which encourages the planning and design of site features in line with GSI guidelines.

LID integrates stormwater management into the urban environment to reduce pollution. When designing stormwater drainage that incorporates low impact strategies, the following should be considered:

- LID shall be incorporated to control stormwater at the source to approximate predevelopment runoff conditions.
- LID stormwater management plans shall not conflict with Federal of HAS regulations and/or policies.

It is recommended, but not mandatory, that on-site developments follow LID principles. Impervious surfaces, such as roadways and parking lots, contain pollutants that are conveyed through water runoff from rain and snow. These include metals, hydrocarbons, bacteria, and excess sediments. Low Impact Design (LID) is a set of design principles that incorporate stormwater management into the urban environment. It provides an alternative to stormwater treatment in large facilities through the incorporation of natural solutions, which aim to reduce overall water volume and prevent flooding. Additionally, LID solutions can improve the quality of water by filtering harmful pollutants found in urban runoff. Other general benefits of adopting

Figure 3.8 Parking lot swale

Figure 3.9 Cut curb swale design

Figure 3.10 Swale containing rocks

LID measures include increased public health, traffic calming, and greenery to reduce the urban heat island effect. More detailed information concerning LID requirements and the approval process can be found in **Harris County's LID Criteria for Storm Water Management.**

Specific strategies for FAA Compliant Low Impact Design may include the following:

- Limiting impervious cover
- Preserving existing natural areas to FAA compliant standards
- The addition of swales that meet FAA designs
- Rain gardens and collection barrels
- Adding permeable pavements for parking lots or trails

Natural features should be used whenever possible to replicate original drainage functions and increase ground permeability. This includes the incorporation of vegetation next to sidewalks, as well as parking lots and other impervious surfaces. A mixture of native species that are drought tolerant should be used. Adding mulch, sand, gravel, or rocks to green areas increases filtering ability. Cut curbs, catch basins, and underground pipes should be used to capture excess water in green areas and prevent it from pooling. For existing natural areas, buffer zones may be created as an additional layer of protection. The maintenance and preservation of these areas will ensure the restoration of pre-development hydrology on site, while targeting HAS' goals of future sustainability with FAA compliance.

STREET FURNITURE ELEMENTS

The following street furniture standards are described in the following pages:

- » Benches
- » Bollards
- » Waste Receptacles
- » Bike Racks
- » Planting Pots

STREET FURNITURE

The following set of criteria was established when selecting the following street furniture standards:

- Cost effective;
- Attractive;
- Safety & security;
- Low maintenance;
- Vandal resistant;
- Surface mounted;
- Locally manufactured;
- Sustainable;
- Universally accessible;
- Durable; and
- Visually compatible with overall theme.

Each street furniture type includes a set of performance standards to be followed as well as a recommended manufacturer.

Figure 3.11 Bench Plan

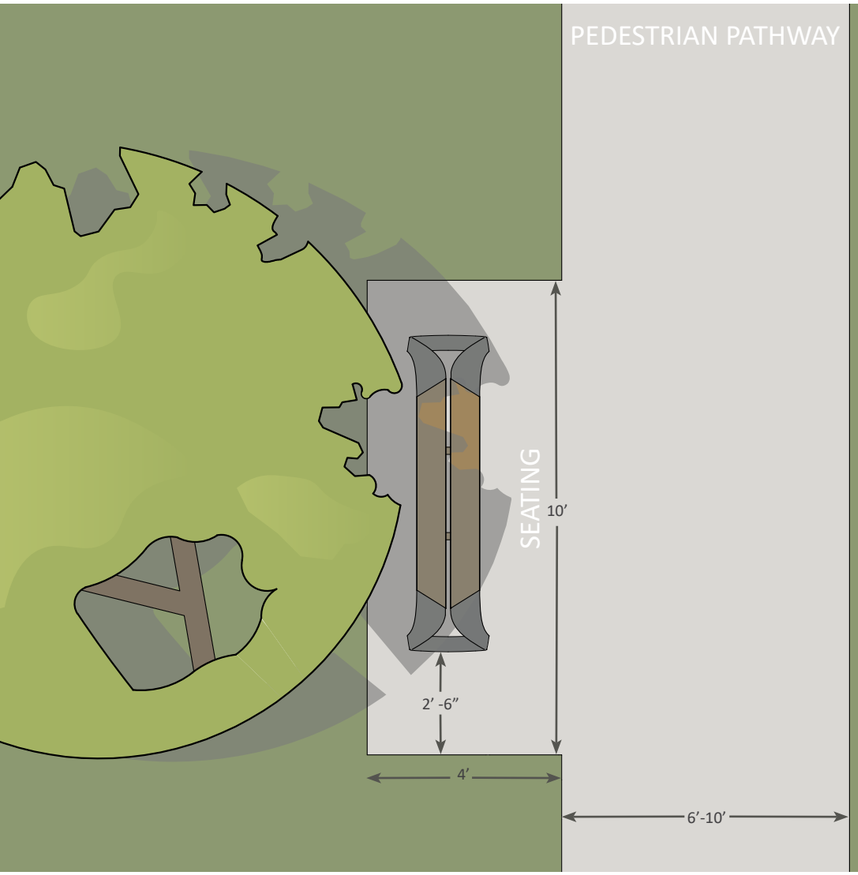
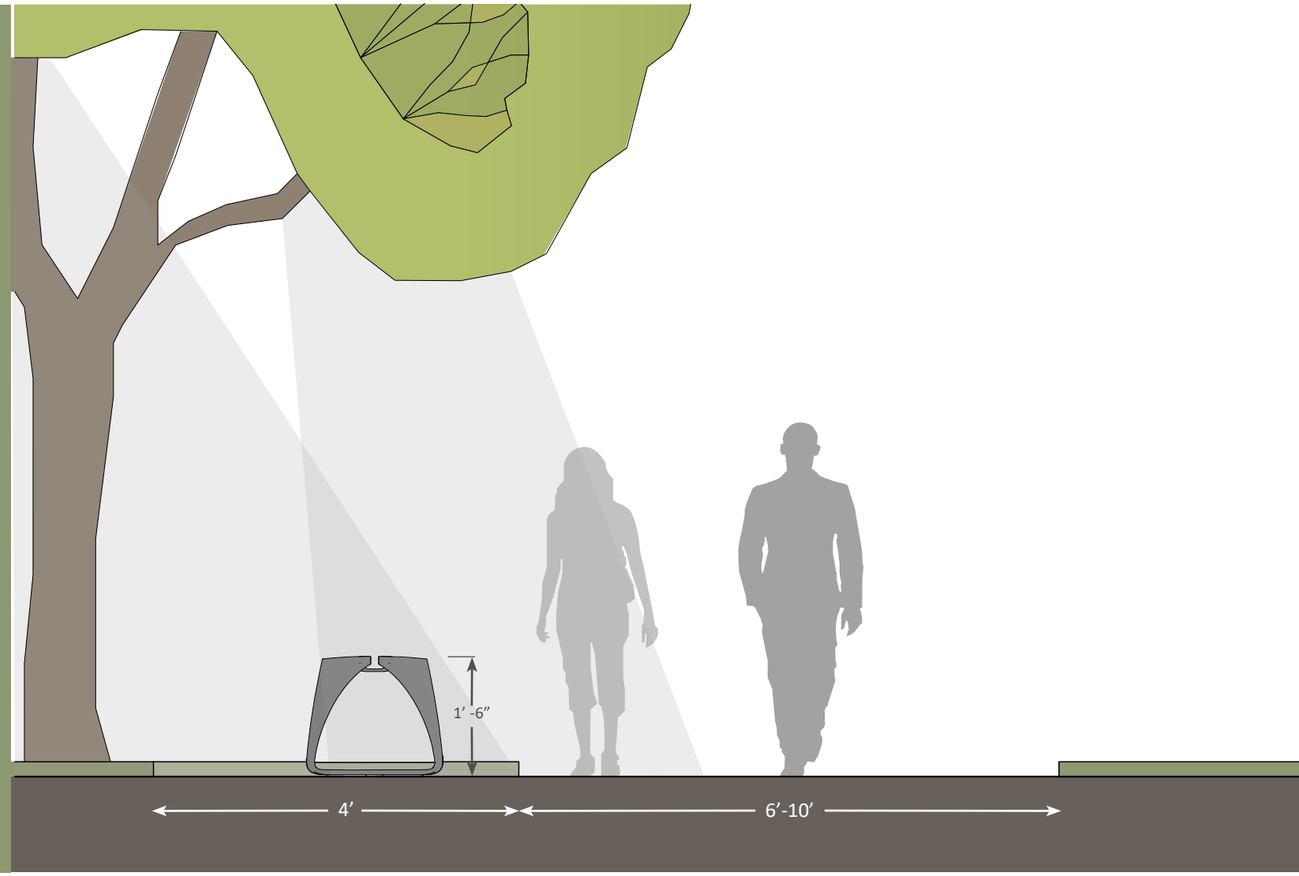


Figure 3.12 Bench Section



BENCHES

The purpose of placing benches is to provide for an adequate amount of durable seating places for different users and various pedestrian activities throughout the Spaceport.

Benches should be located adjacent to the pedestrian pathways so as to not impede the flow of traffic.

The materials used should have a minimum absorption characteristic for heat and cold, should be non-porous and should be splinter proof.

The benches should be durable, should have an anti-graffiti coating, anti-vagrant, and should be sloped to shed water.

The benches should be anchored into concrete and should be accessible.

RECOMMENDED BENCH

Rest Bench

Landscape Forms, Inc.
www.landscapeforms.com

Figure 3.13 Bollard Plan

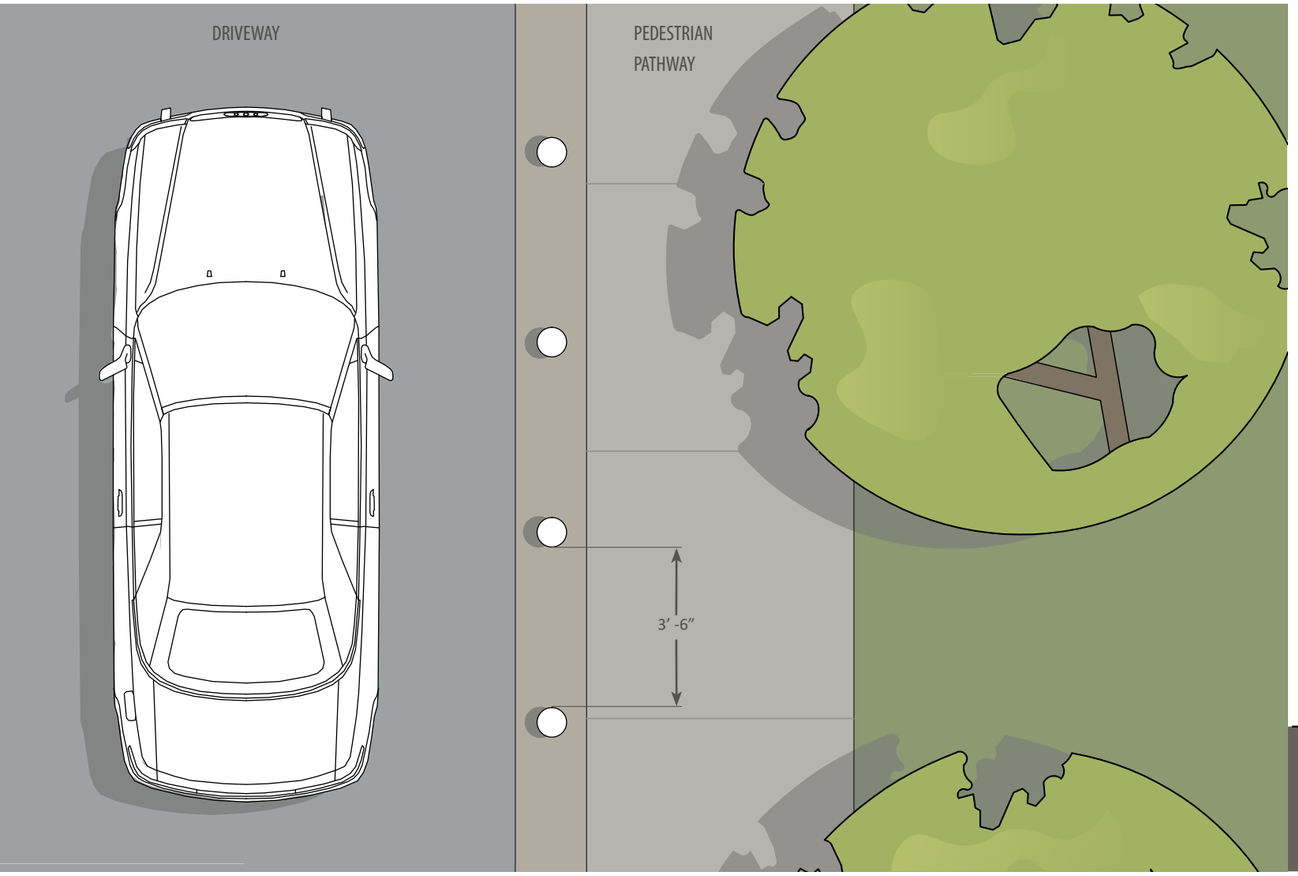


Figure 3.14 Bollard Section

BOLLARDS

Where necessary, the purpose of the bollards is to create a physical or visual separation between two areas.

Bollards should be coordinated with the paving and joint patterns.

Bollards may include a lighting fixture (see lighting guidelines).

Materials may include steel or aluminum.

Height and width of bollards should be designed according to their locations and function.

Removable bollards should be used as required. The required anchoring depth should allow for easy removal or in-ground storage. The diameter of the in-ground sleeves should be small enough for accessibility when bollard is not being used.

To provide a functional barrier, bollard spacing should not exceed 8’-0”.

RECOMMENDED BOLLARD

Stop Bollard

Landscape Forms, Inc.
www.landscapeforms.com

Figure 3.15 Waste Receptacle Plan

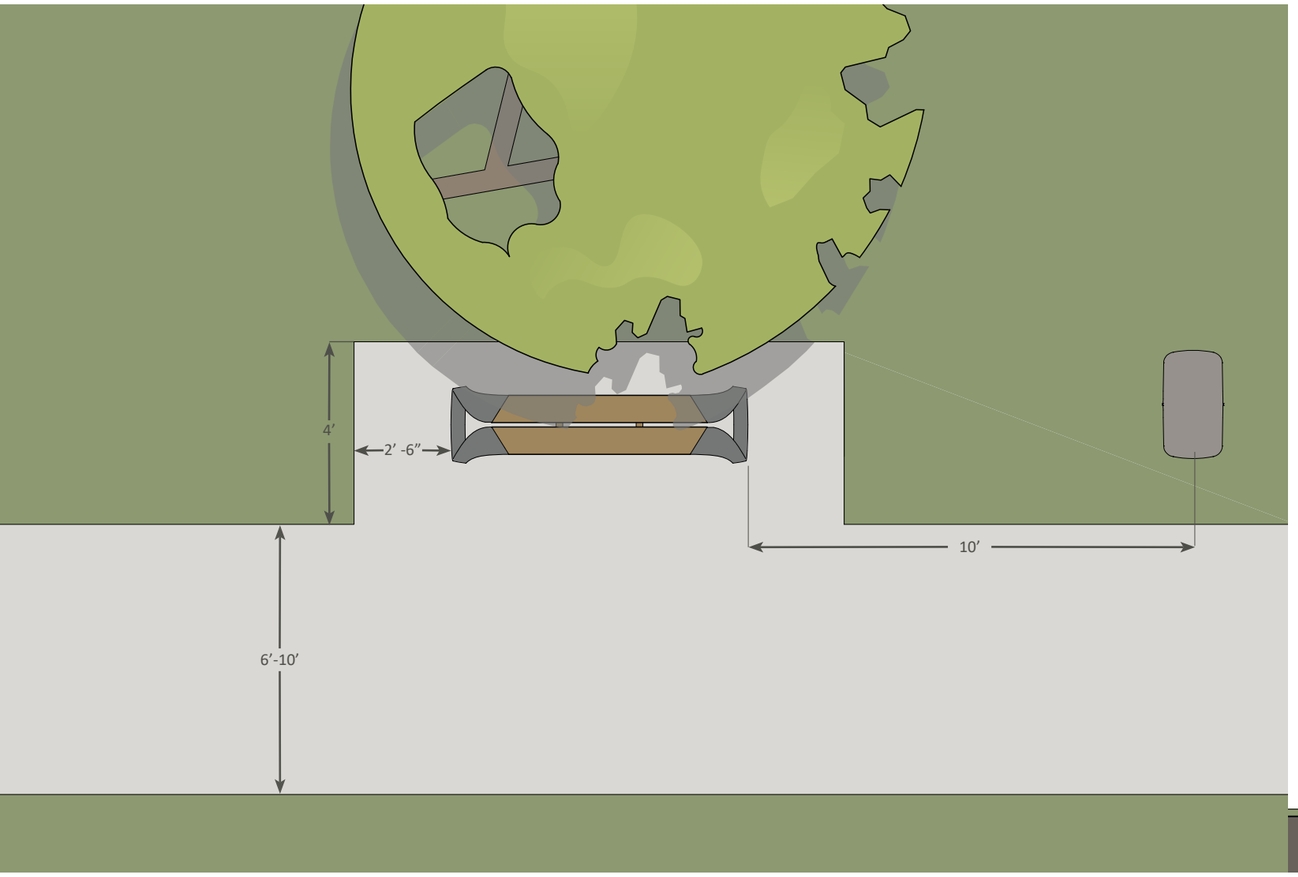


Figure 3.16 Waste Receptacle Section

WASTE RECEPTACLES

The purpose of the waste receptacles is to provide for a convenient and hygienic collection of trash.

The waste receptacles should be visually compatible with the overall theme of the other street furniture.

The waste receptacles should be located adjacent to the pedestrian pathways and near the benches, so it does not impede the flow of traffic. The waste receptacles should be a minimum of 10 feet away from benches.

The materials should have a minimum absorption characteristic for heat and cold, should be non-porous and should not splinter.

The waste receptacles should be durable, shall have an anti-graffiti coating, should open easily for emptying of the trash, and should be lockable to prevent theft.

The unit should be designed to protect against rainwater as well as wind from blowing the trash away from the receptacles.

RECOMMENDED WASTE RECEPTACLE

MultipliCITY Litter

Landscape Forms, Inc.
www.landscapeforms.com

Figure 3.17 Bike Rack Plan

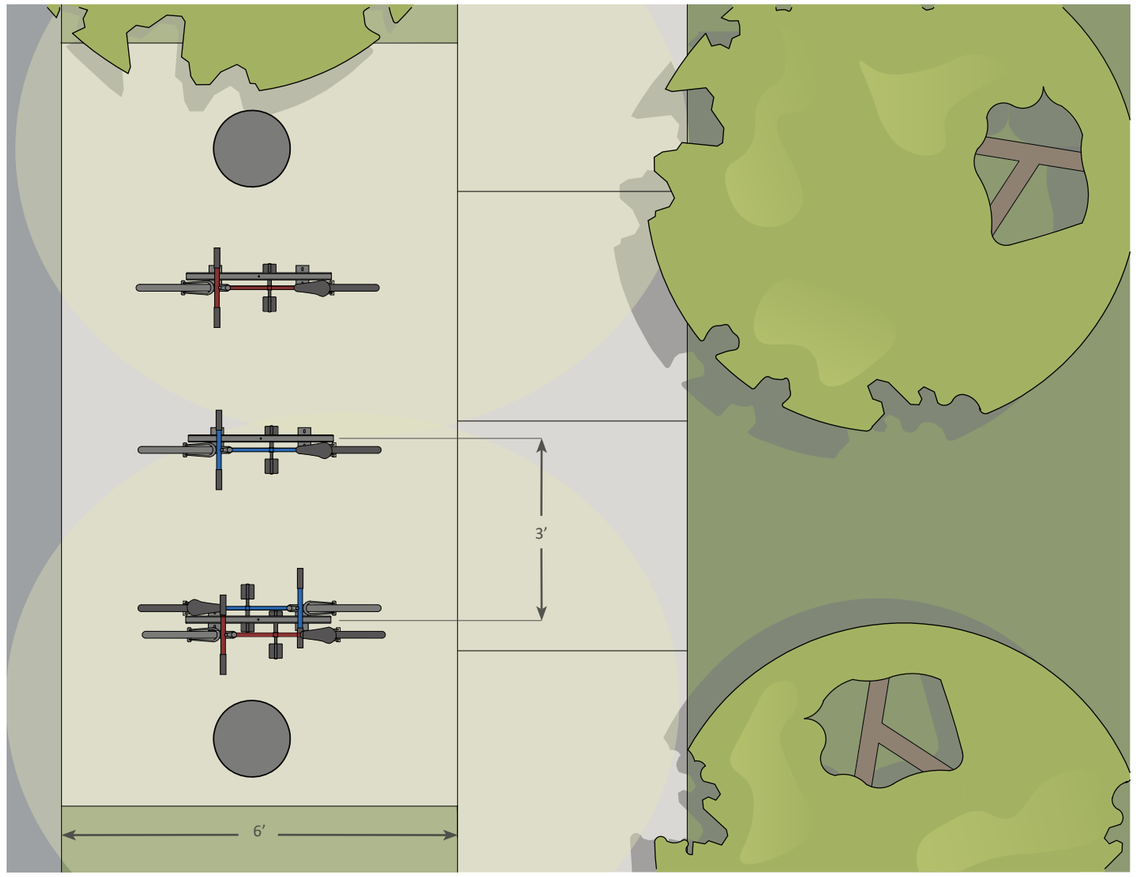


Figure 3.18 Bike Rack Section

BIKE RACKS

The purpose of the bike racks is to provide temporary storage of bicycles adjacent to the pedestrian path.

Bike racks should not impede the flow of traffic on the pedestrian pathways and should be located in well-lit areas that are clearly visible to prevent theft and vandalization.

Bike racks should be stacked at a minimum of 36” between each frame.

RECOMMENDED BIKE RACK

Dero Arc Rack

Dero HQ
www.dero.com

Figure 3.19 Planting Pots Plan

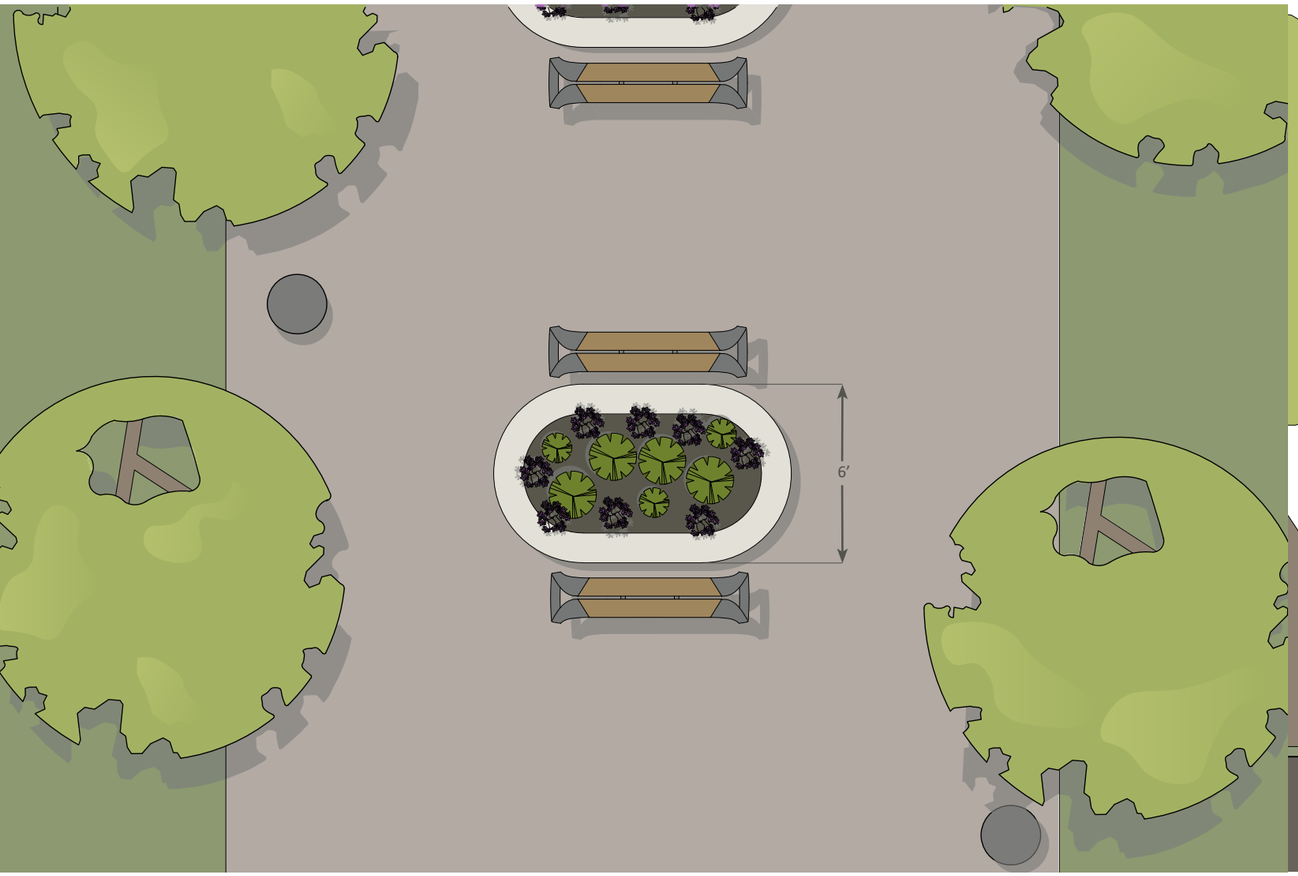
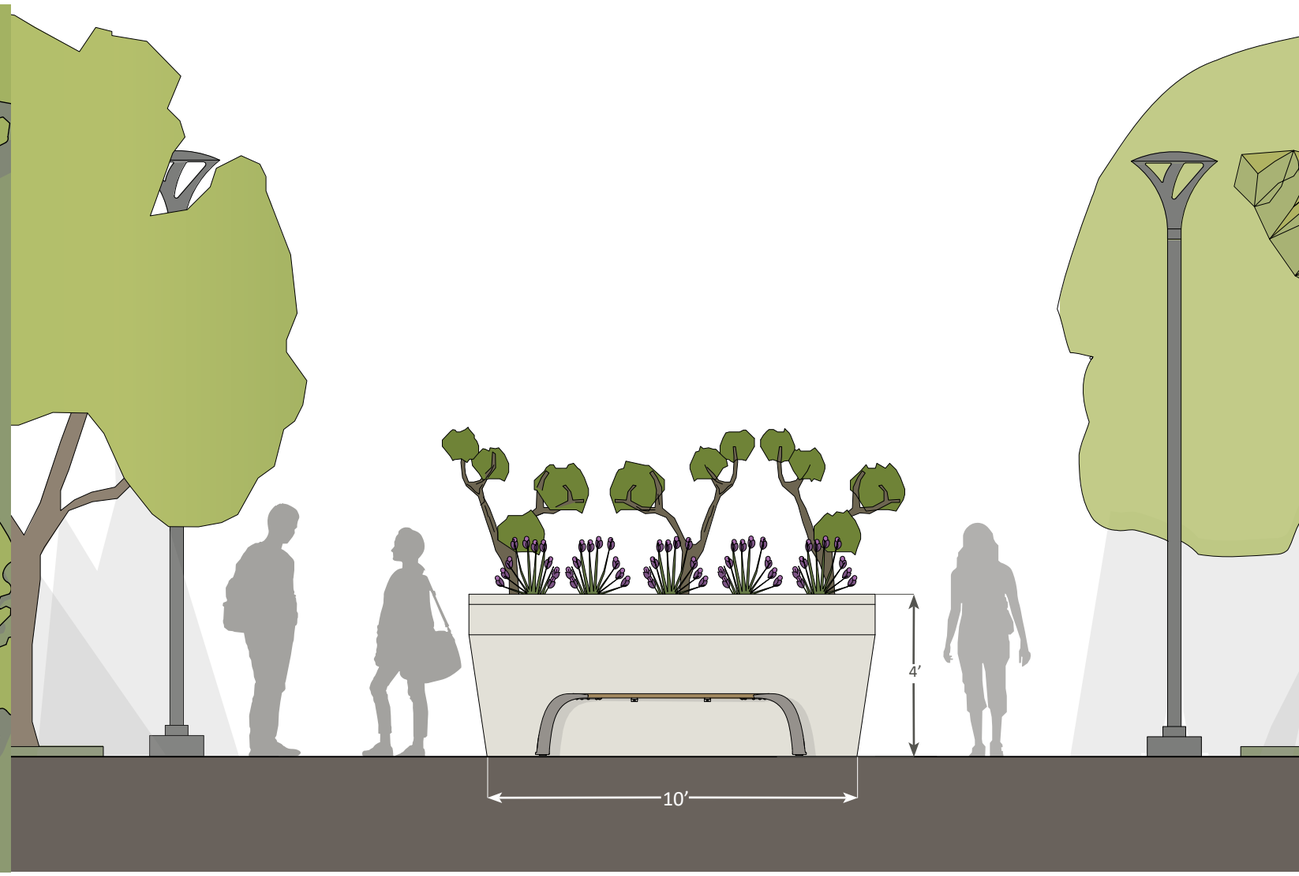


Figure 3.20 Planting Pots Section



PLANTING POTS

Planting pots should be used in cases where shrubs or ground cover need to be raised to protect them from damage in high traffic areas.

The shrub plantings should not obstruct the sight line for safety and security. The maximum height should be 4'-0" above grade.

All plantings in pots or raised planters should have an automated irrigation system and should be arranged so that neither pedestrians nor vehicles are affected.

Planting pots and soil must be designed to prevent standing water.

04

Building Design

MANDATORY

BUILDING DESIGN
MANDATORY

CONTEMPORARY THEME

The Houston Spaceport is envisioned to offer a futuristic ambiance with contemporary or modern buildings that address flexibility, convertibility, expansibility with high energy performance, low impact design, daylighting where possible, quality views to and from the building as well as life-cycle impact reduction.

VISUAL CONTINUITY BETWEEN BUILDINGS

To achieve the goal of material consistency and Campus-wide aesthetic cohesiveness, the skin of the buildings should be made out of materials such as steel, glass, and other contemporary materials.

FENESTRATION

Openings and windows are generally a key component to the overall design of a building and aide in natural daylighting of internal spaces.

Each building should have a ‘storefront’ entrance that is visible from the main roadway.

A major roadway building façade must have a minimum of 40% in the form of windows and openings.

All other building facades must have a minimum of 20% windows and openings.

False windows may be used only if the programmed space is sensitive to intrusion of natural light.

No awnings are to be permitted. If needed, horizontal window louvers are encouraged on the south side facing windows and vertical window louvers are encouraged on the east and west facing windows.

Figure 4.1 Glazing along a Major Roadway

PEDESTRIAN FOCUS

All buildings should be designed with a focus on encouraging pedestrian activity. All pathways should tie back into the Future Transit/Pedestrian Loop around the Central Core.

Refer to pedestrian lighting standards on page 42, seating areas on page 100, and waste receptacles on page 104 for related amenity standards.

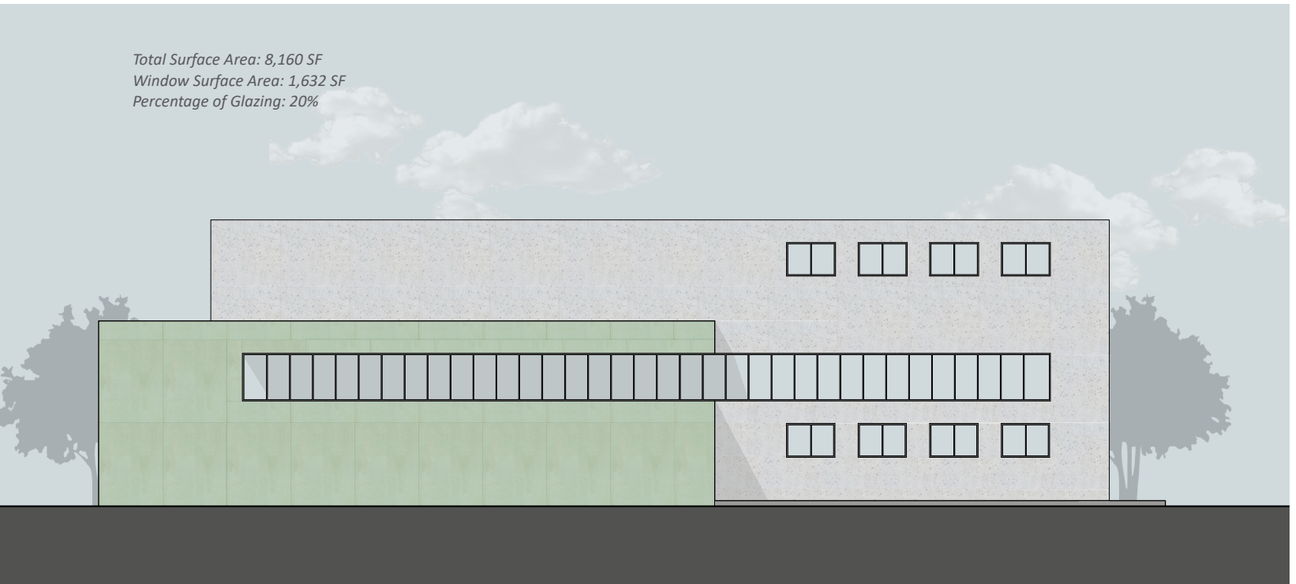


Figure 4.2 Glazing along all other Facades

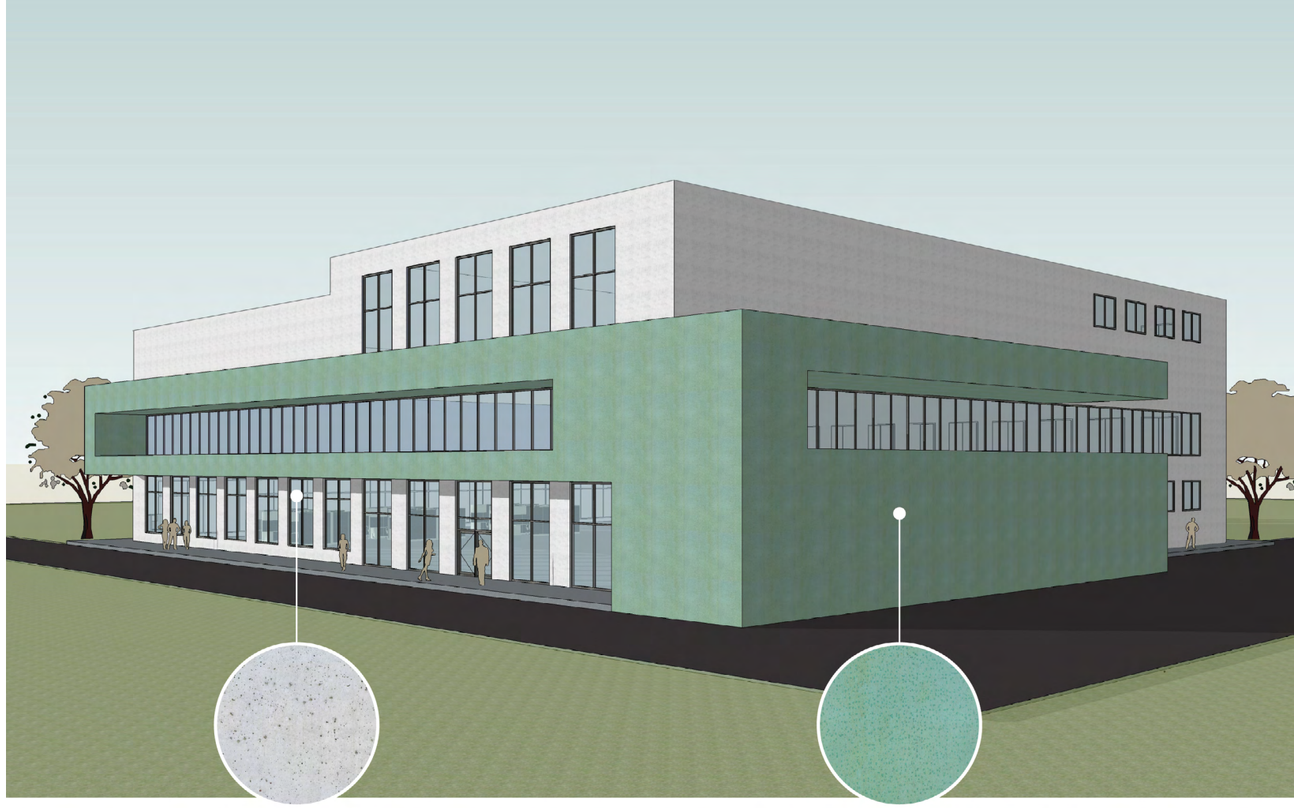


Figure 4.3 Building Materials

BUILDING MATERIALS

There should be a minimum of two building materials with a maximum of four colors. The building materials may vary as long as at least two building materials are used to avoid monotone style buildings.

It is not mandatory, but highly recommended that the raw materials used in the building are made of recycled content, when possible.

* Submission of a sample board containing materials and colors is required for approval by the Committee.

ROOF

Roofs shall not be reflective and must comply with the Houston Airport Design Standards as well as FAA Regulations.

Green roofs and rainwater harvesting are highly encouraged. Green roofs must be designed to be bird deterrent and must not retain water. Rainwater harvesting tanks must be screened and not viewable from the street or other pedestrian areas.

COLOR PALETTE

The building colors should be mono-chromatic, consistent, and predominantly neutral in color with a maximum of one accent wall. The accent wall may vary in color and shall be approved by the Committee.

Window frames should be a natural metal color which range from gray to bronze.

Window glass should be tinted without a mirror finish and with a maximum solar heat gain coefficient of 0.25. Color of tinted windows to be approved by the Committee.

*Color palette below is a sample of approved building colors. Additional colors may be approved by the Committee if they are neutral in color and are a similar variation.

** Submission of a sample board containing materials and colors is required for approval by the Committee.

Figure 4.4 Building Color Palette

Subdued Green Color | *Air Blue* | *Neutral Gray* | *Adagio* | *Gray Whisp*

Sea Salt | *Cape May* | *Light Gray* | *White Beige* | *Pastel Sand*

05

Signage/Wayfinding

MANDATORY

SIGNAGE/WAYFINDING
MANDATORY

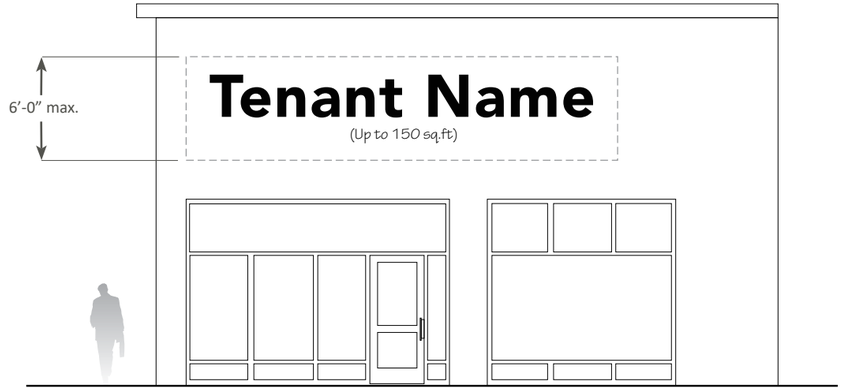


Figure 5.1 Building/Tenant Identification (Sign Type 7-ID.21)

BUILDING MOUNTED SIGNAGE

Signage attached on the face of the buildings must be architecturally compatible with character of the building and surrounding development. These signs are allowed to support wayfinding; therefore, signs must be oriented to achieve maximum visibility from the public roadway and should be placed in a manner that complements the architectural elements.

OCCUPANT IDENTIFICATION SIGNS

The building/tenant occupant(s) should be allowed to install their identification on the face of the building (refer to Figures 5.1 and 5.2) following these guidelines and with the approval of the Committee.

Identification signage must support wayfinding, not advertising.

All building-mounted signage should identify individual occupant names and/or logos only.

Individual letters shall project no more than eighteen inches from the wall to which they are mounted.

Signs shall be internally illuminated. No external lighting is permitted.

Signs shall be static (i.e. no movement or animated digital elements in the sign or the lighting design). Signs or lights shall NOT blink.

Signs must be mounted to a solid building surface and must NOT project above the roof line.

Sign height shall NOT exceed a maximum height of 6'-0" and shall NOT exceed 150 square feet.

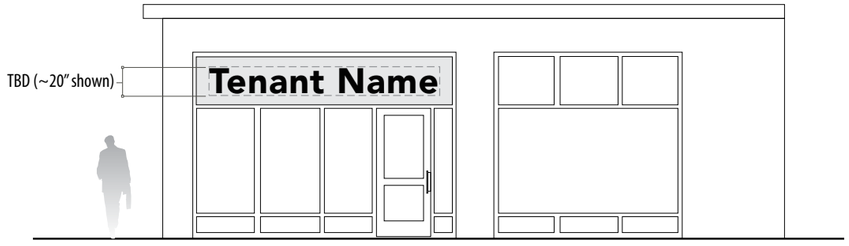


Figure 5.2 Tenant Identification (Sign Type 7-ID.22)

BUILDING ADDRESS SIGNS

Multi-tenant building facilities should establish a signage standard so that tenants within the same building or development district maintain consistent signage (size, location, design, etc.).

Tenant logo/type colors must be approved by HAS prior to fabrication. Tenant colors shall contrast 75% with applicable background.

The building's address numbers should be located at the main entry of the building where they are visible from the road in 14" high numbers (see Figure 5.3). Additional address numbers may be installed on the building facing the roadway. Address number color shall contrast 75% with background.

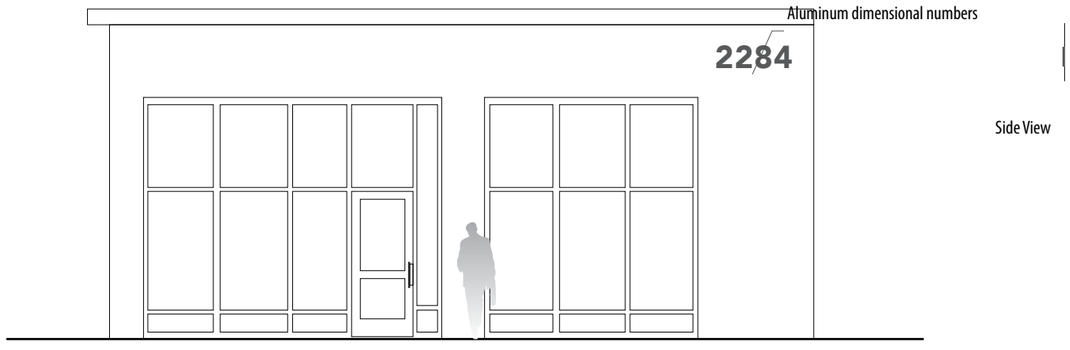


Figure 5.3 Building Address Numbers (Sign Type 7-ID.23)

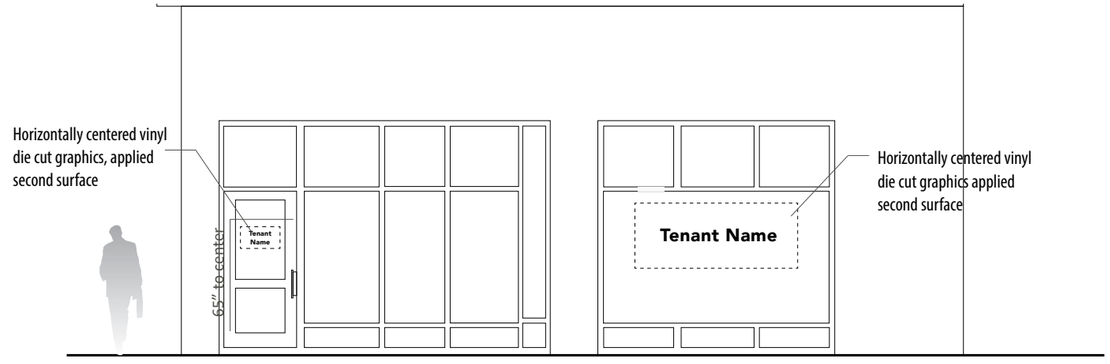


Figure 5.4 Entry Door / Window Signage (Sign Types 7-ID.71 & 7-ID.72)

ENTRY DOOR/WINDOW SIGNAGE

The tenant may apply vinyl die-cut graphics to the second surface (inside) of storefront glazing.

Window graphics should be centered horizontally in the window. All vinyl graphics are to be applied to the glazing by professional installers.

Window graphics are limited to one (1) square foot of sign area per one (1) lineal foot of store frontage.

Each door is permitted one (1) square foot of vinyl die-cut Sign area. The area must be centered 65" from grade or as otherwise directed due to door configurations.

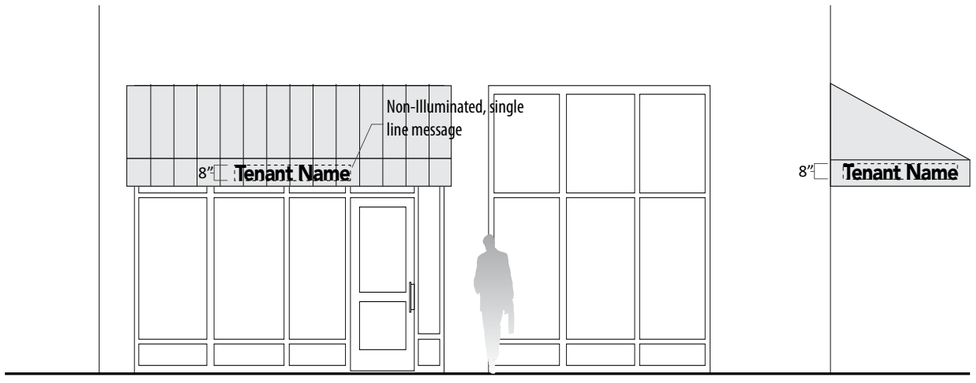


Figure 5.5 Awning Valance Signs (Sign Type 7-ID.75)

AWNING VALANCE SIGNS

Tenants may elect to include store name or logo on the valance panels of approved architectural awnings.

For text on valance panels, the letter height shall not exceed 8 inches or 65% of valance height whichever is smaller.

One line of text allowed.

Maximum sign width should not exceed 65% of valance width.

Internally illuminated awning signs will not be permitted.

Tenant logo/type colors must be approved by HAS prior to fabrication. Tenant colors shall contrast 75% with applicable background.

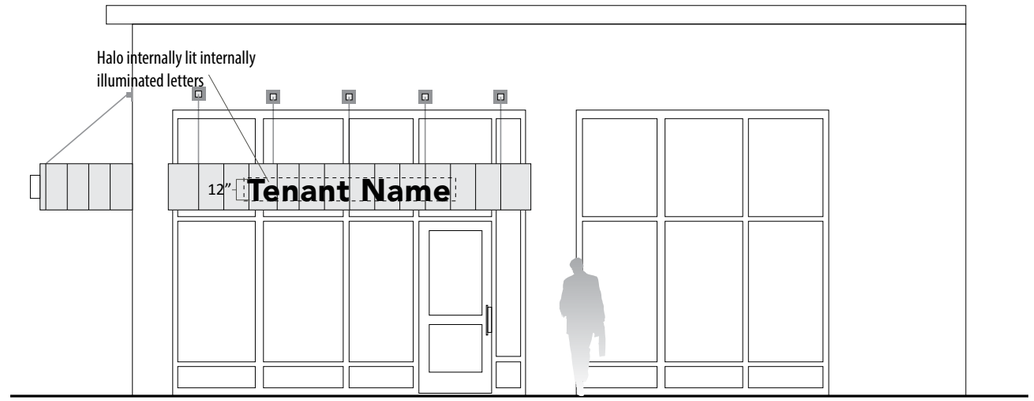


Figure 5.6 Awning Signs (Sign Type 7-ID.76)

AWNING SIGNS

Tenants may elect to include store name or logo on architectural awnings/canopies (see Figure 5.6).

For text on awnings, the letter height shall not exceed 12 inches or 65% of awning height, whichever is smaller.

One line of text allowed.

Maximum sign width should not exceed 65% of awning width.

Signs shall be internally illuminated.

Tenant logo/type colors must be approved by the Committee prior to fabrication. Tenant colors shall contrast 75% with applicable background.

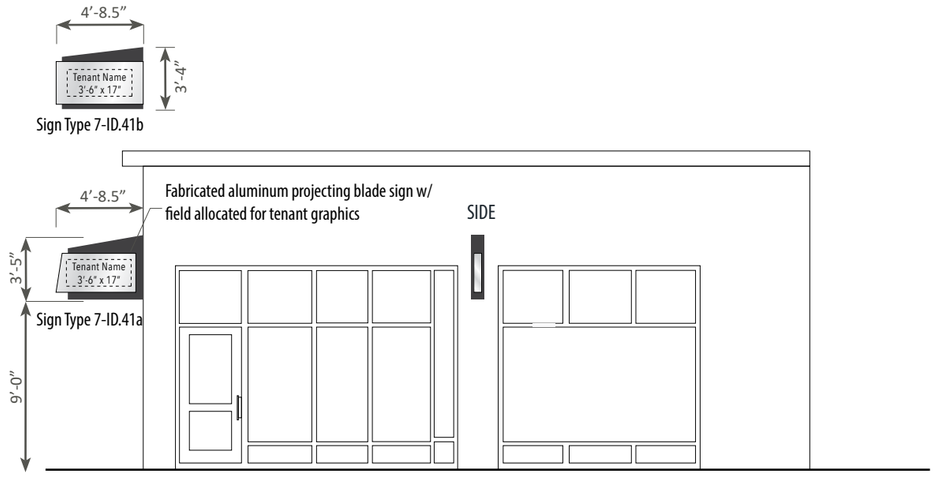


Figure 5.7 Projecting Blade Signs (Sign Type 7-ID-41)

PROJECTING BLADE SIGNS

Tenants with architectural canopies should install a minimum of one (1) suspended blade sign at the storefront of the building. Tenants with a corner location may elect to install one sign on each building facade for optimum exposure.

Minimum clear distance from the bottom of a projecting sign to a pedestrian or vehicular surface shall be 9'-0". When projecting awnings or entry canopies are present on the storefront, the mounting height of the sign should be selected to avoid being obscured by the awning or canopy frame.

Projecting signs may be externally or internally illuminated (approval by ARC) with appropriately designed lighting. Light boxes with acrylic faces are not permitted.

Projecting signs should not extend above the roof line of the supporting exterior wall.

Tenant graphics should only be placed on the approved graphic area of the standard blade sign type as shown in Figure 5.7.

Tenant logo/type colors must be approved by HAS prior to fabrication. Tenant colors shall contrast 75% with applicable background.

FREE-STANDING SIGNAGE

All tenant identification directional, or informational signage not attached to the building shall comply with standards established.

FACILITY SIGNS – CORPORATE, OFFICE, INDUSTRIAL & WAREHOUSE

HAS has established a freestanding standard building sign design for use throughout the airport at appropriate facilities such as, but not necessarily limited to: corporate offices, flex-offices, and warehouses to identify the tenant(s) of the facility. There are two options, including one option for multi-tenant facilities, and one for single tenant facilities.

The signs can be one or two-sided.

Tenant to seek approval from HAS to determine alternate available for use. If external lit sign is permitted, then ground mounted light fixtures should be utilized to achieve illumination of the entire structure and installed in the landscaping corridor perpendicular to the roadway.

Appropriate setbacks requirements must be approved by the ARC and/or the city of Houston.

The design, size, shape and materials of all signs are standardized.

Sign Face Paint Colors - Use Matthews Acrylic Polyurethane Paint or approved equal:

- Charcoal: MP-42359 - Vine Charcoal, satin finish
- Medium Gray: MP-28448 Umbra Gray Metallic, satin finish
- Light Gray: Matthews Acrylic Polyurethane to match PMS 427C, satin finish
- White: MP-N202 Matthews White, satin finish

Sign Face Vinyl - Use 3M or approved equal:

- White: Cut opaque vinyl 3M 7725-20
- Black: Cut opaque vinyl 3M 7725-22

Sign Face Typeface:

- ClearviewText Medium
- ClearviewOne Book Condensed

Multi-Tenant Facility Sign

The main facility name should be located in the provided text field.

Tenant names should be located on the tenant panels as text.

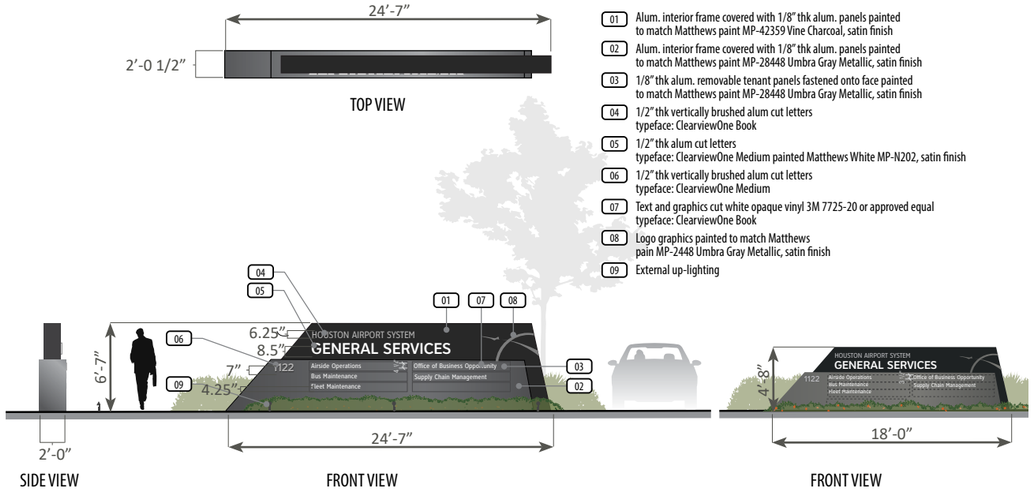


Figure 5.10 Standard Horizontal Monument (Sign Type 4-ID.51)

Figure 5.11 Small Horizontal Monument (Sign Type 4-ID.52)

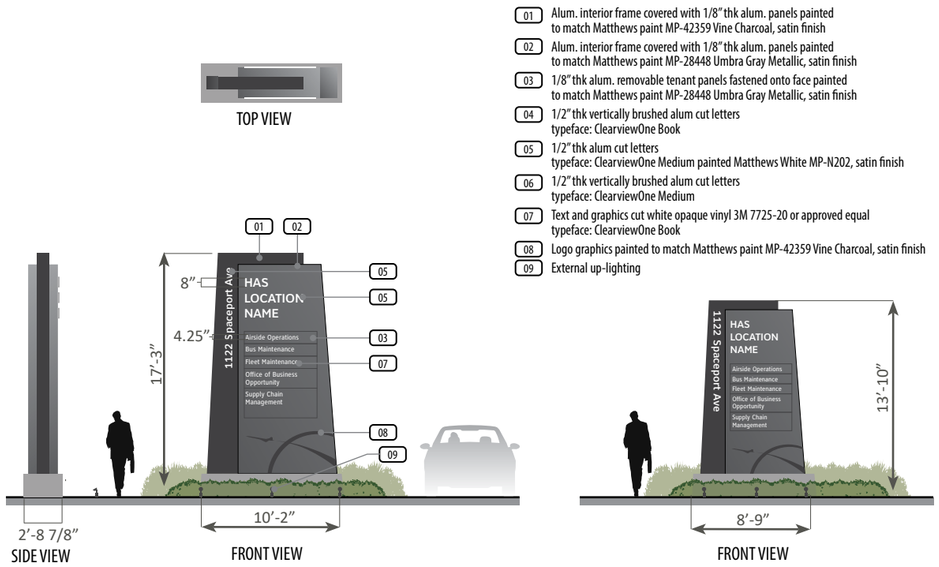


Figure 5.8 Vertical Monument Concept (Sign Type 4-ID.53)

Figure 5.9 Small Vertical Monument Concept (Sign Type 4-ID.54)

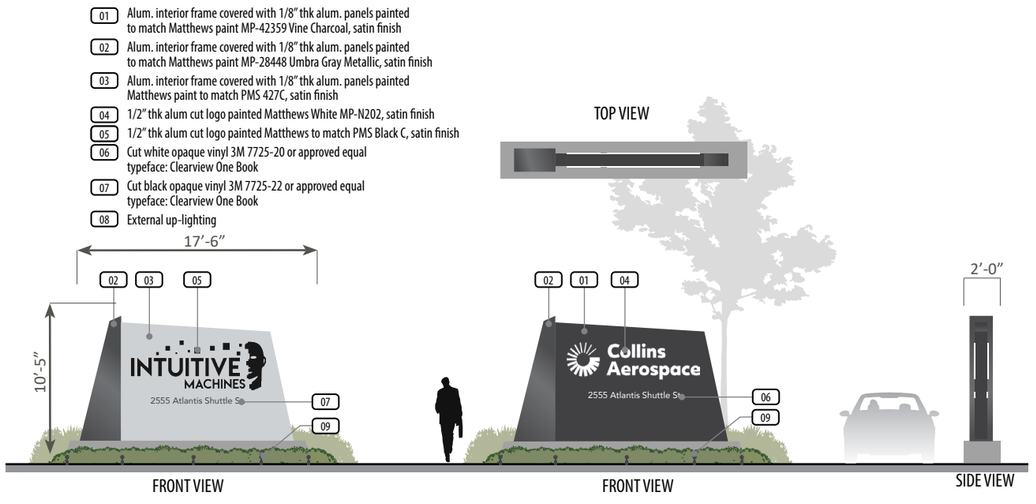


Figure 5.12 Single Tenant Monument ID (Sign Type 4-ID.55a)
(Light Background: Black/Color Logo)

Figure 5.13 Single Tenant Monument ID (Sign Type 4-ID.55b)
(Dark Background: White Logo)

Building address numbers should be located on the monument sign.

The HAS logo to be used is documented in the design standard drawings.

The sign structure should be surrounded by an 18-inch minimum planting consistent with the landscape section of this document.

Single Tenant Facility Sign

The tenant can select a light or dark background to work best with their logo/brand. Tenant logo/type colors must be approved by the ARC prior to fabrication. Tenant colors shall contrast 75% with applicable background.

The appropriate logo should be applied that displays the largest text height in the designated area. Logo should be sized with a minimum 9" margin on left and right and minimum 9" margin on top. Address should be place at least 7" below logo. All tenant logo spacing standards should be followed.

FACILITY SIGNS – RETAIL, HOSPITALITY & MIXED-USE

Signs for these uses and activities need special branding to achieve public awareness needs but are expected to establish aesthetic controls. This sign system will be required to illustrate a consistency with other building signage for uses such as retail, hospitality and mixed-use (building mounted letters or tenant storefront signs) and the architectural character of the development.

The signs may be one or two-sided.

All final tenant listings will be determined by the ARC.

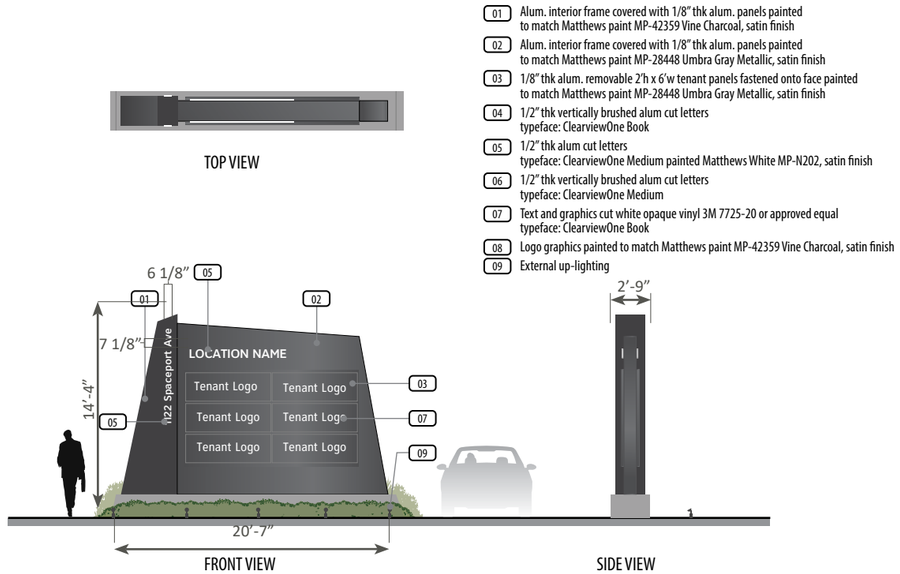


Figure 5.14 Horizontal Retail Monument Concept (Sign Type 4-ID.56)

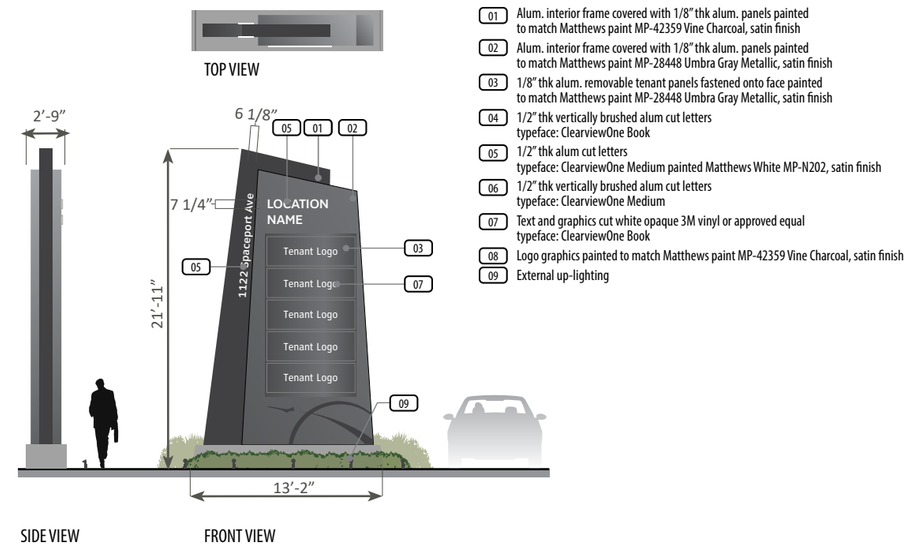


Figure 5.15 Vertical Retail Monument Concept (Sign Type 4-ID.57)

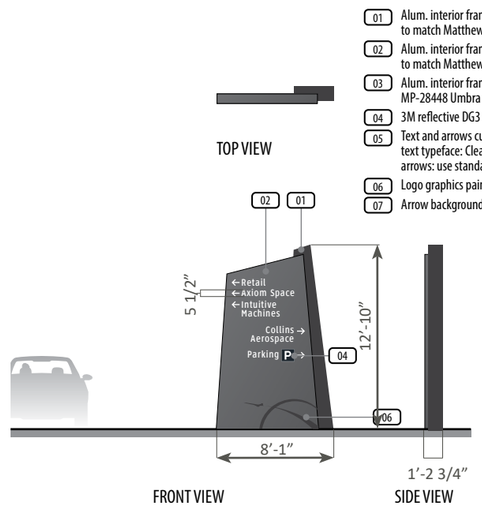


Figure 5.16 Primary Vehicular Directional (Sign Type 4-DR.51)

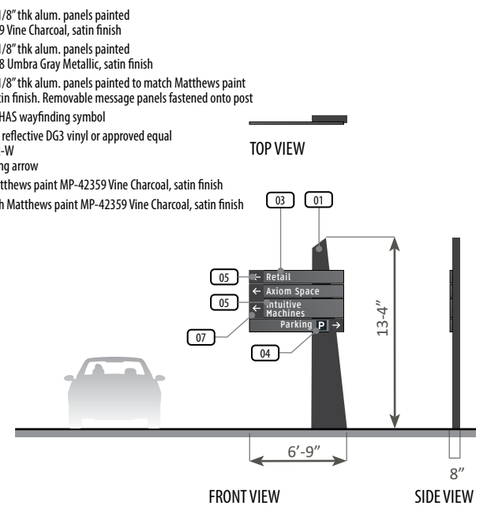


Figure 5.17 Secondary Vehicular Directional (Sign Type 4-DR.52)

The sign should be illuminated with ground mounted light fixtures, to achieve illumination of the entire structure, and installed in the landscaping corridor perpendicular to the roadway.

Appropriate setbacks determined by the ARC or the city of Houston.

The design, size, shape, and materials are standardized.

Sign Face Paint Colors - Use Matthews Acrylic Polyurethane Paint or approved equal:

- Charcoal: MP-42359 - Vine Charcoal, satin finish
- Medium Gray: MP-28448 Umbra Gray Metallic, satin finish
- Light Gray: Matthews Acrylic Polyurethane to match PMS 427C, satin finish
- White: MP-N202 Matthews White, satin finish
- Black: Matthews Acrylic Polyurethane to match PMS Black C, satin finish

Sign Face Vinyl - Use 3M or approved equal:

- White: Cut opaque vinyl 3M 7725-20
- Black: Cut opaque vinyl 3M 7725-22

Sign Face Typeface:

- ClearviewText Medium
- ClearviewOne Book Condensed

DIRECTIONAL SIGNAGE

On-site directional type signage should be consistent with the color palette of the building and monument signage. Vehicular directional sign family includes a Primary and Secondary sign type. The Primary sign type should be used near Spaceport entrances where more wayfinding destinations might be required. The Secondary sign type should be used at key locations to direct traffic to parking, facilities and retail areas. Regulatory signs (stop, yield, accessible parking, etc.) are exceptions and shall comply with AASHTO and Manual on Uniform Traffic Control Devices (MUTCD) standards. All large Spaceport bypass roadway signs should follow HAS airport roadway standards (Refer to HAS Series 4 Roadway standards)

All wayfinding destination messages will be determined by the Architecture Review Committee.

All directional signage shall be non-illuminated, and use reflect vinyl to provide nighttime visibility.

Appropriate setbacks determined by the ARC, or the city of Houston must be used.

The design size, shape and materials are standardized.

Sign Face Paint Colors - Use Matthews Acrylic Polyurethane Paint or approved equal:

- Charcoal: MP-42359 Vine Charcoal, satin finish
- Medium Gray: MP-28448 Umbra Gray Metallic, satin finish

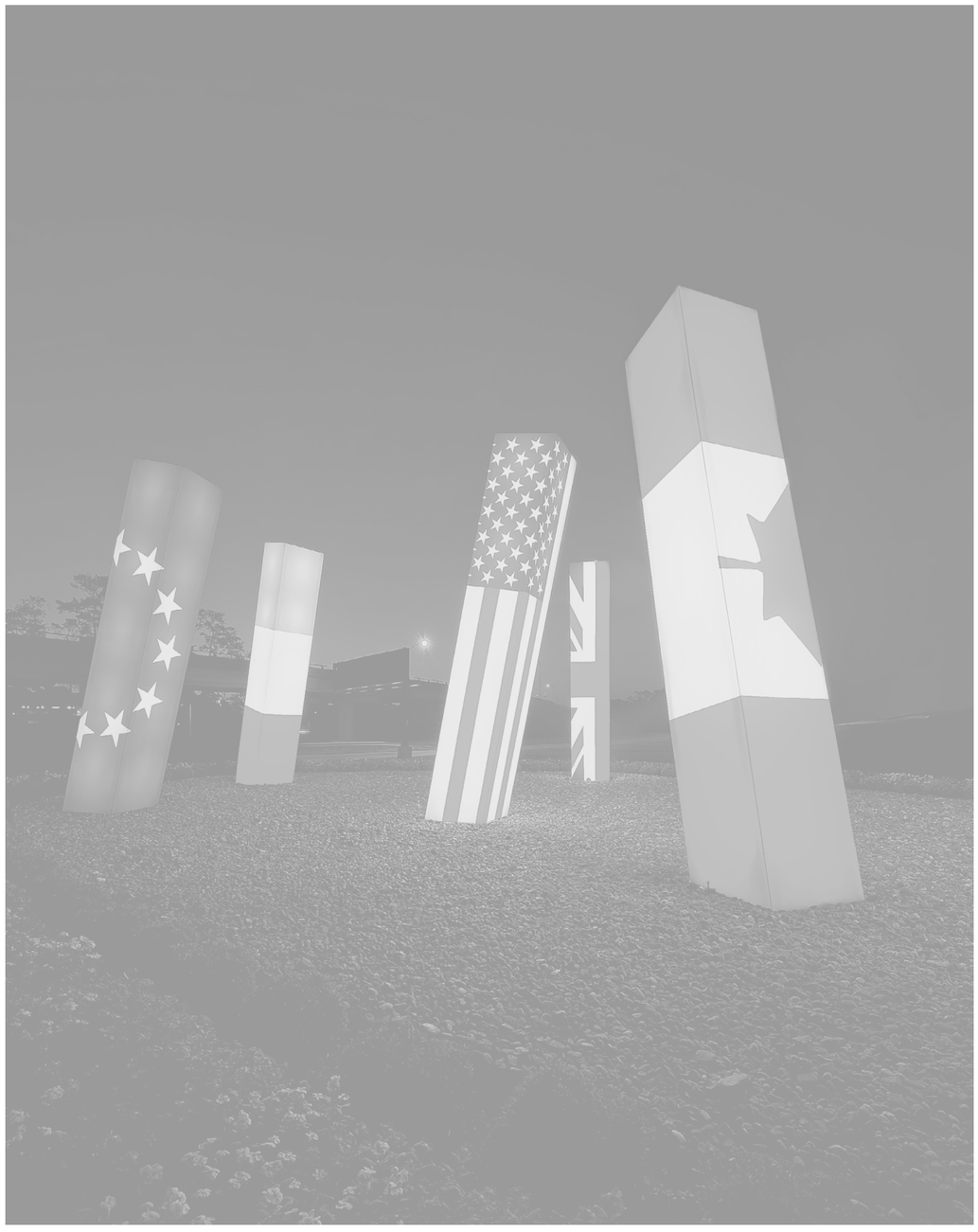
Sign Face Vinyl - Use 3M or approved equal:

- White text and arrows: 3M Reflective DG3 Film
- Symbols: Digitally printed on 3M reflective DG3 Film

Sign Face Typeface: Clearview Highway 2-W

Arrows: Use only official HAS wayfinding arrows (see HAS Wayfinding Signage Standards and Guidelines)

Symbols: Use only official HAS wayfinding symbols (see HAS Wayfinding Signage Standards and Guidelines).



06

Public Art

DISCRETIONARY

PUBLIC ART
DISCRETIONARY

PUBLIC ART

Public art is defined in these guidelines as any creative object installed or built in the public spaces of the campus. It can consist of sculptures, murals, statues, and objects displayed for the purposes of exhibition. It can also consist of utilitarian structures, such as fences, that have artistic ambitions. Public art can be installed by HAS within right-of-ways and roundabouts and by tenants within their leased parcels and in the common spaces of the campus, such as parks, greenways, trails, squares, site boundaries, pathways, and sidewalks.

Public art can be envisioned in any of the following formats:

- A single object placed in a prominent location, sometimes accompanied with landscaping.
- A sequence or group of objects placed in a prominent location, or along a path or route.
- A longitudinal installation along a strip of ground, which may combine sculptural elements and garden design.
- A sculptural object that accompanies or animates a public space.
- A landscaping design that has artistic or sculptural quality.
- A fence that displays artistic design.

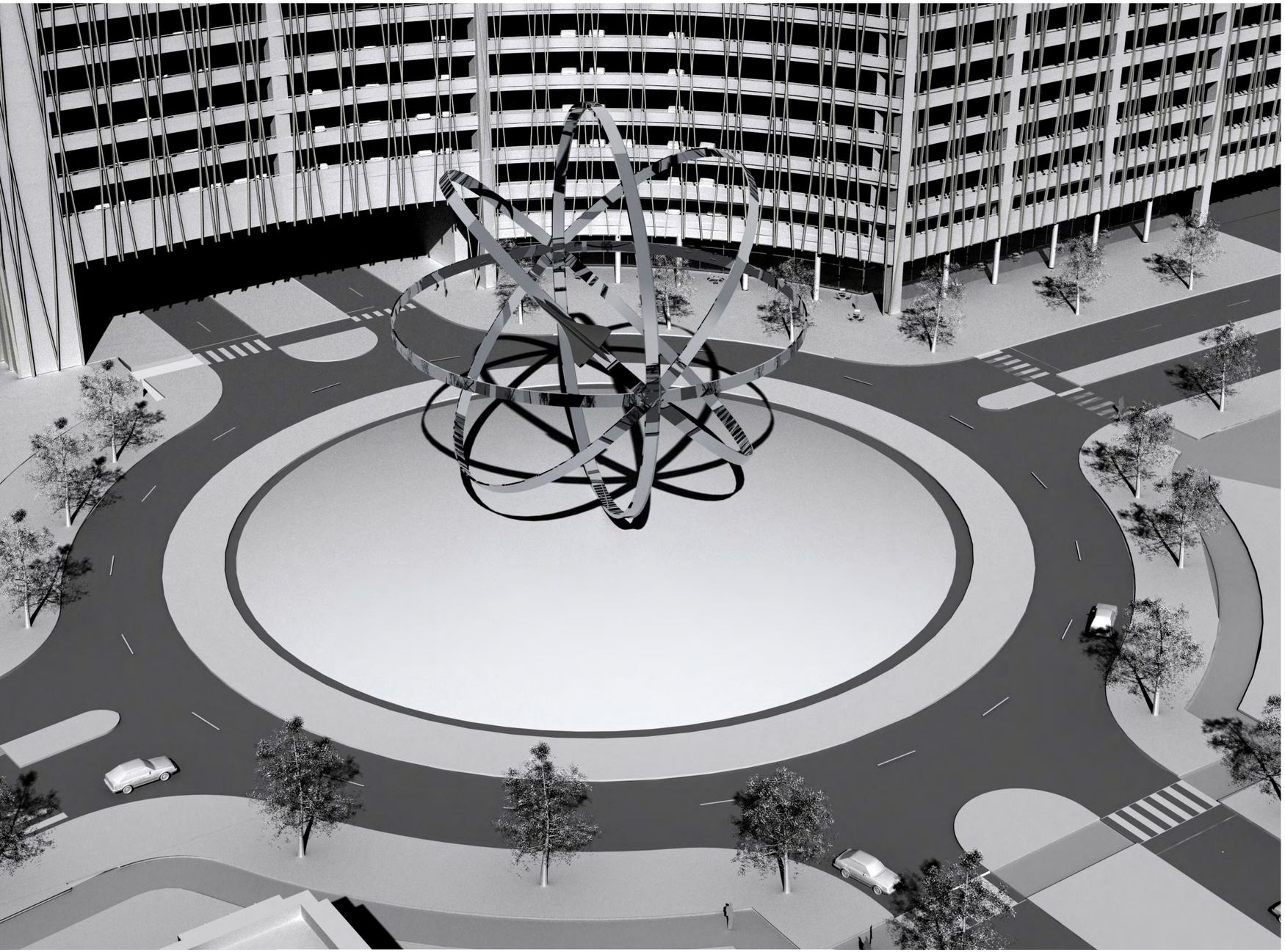
All public art installed in the Spaceport campus shall be pre-approved by HAS and meet the HAS Standards for Public Art. Public art commissioned and installed must adhere to the vision put forward in the land use plan, which establishes specific locations for prominent work. Public art must further the image and identity of the campus, and contribute to the overall message proposed by the campus vision. For these initiatives, consistency with the land use plan is the key variable.

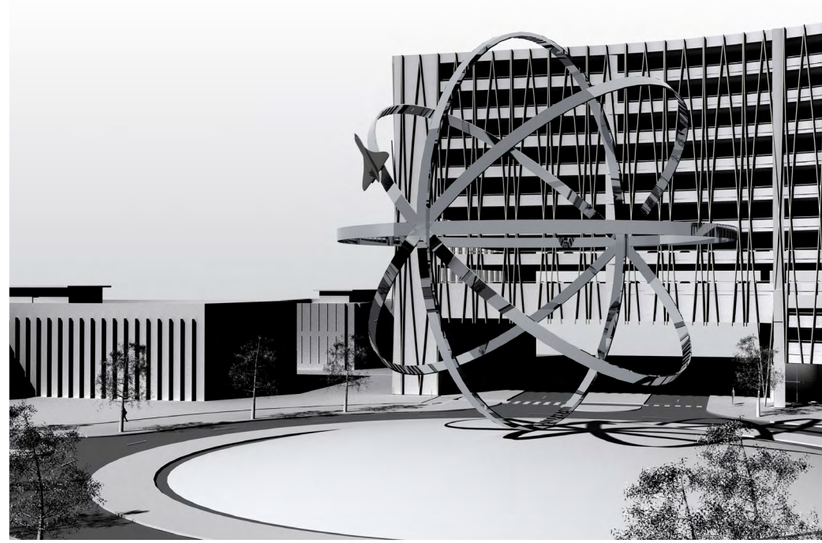
Private tenants can install public art within the boundaries of their leased parcels. The work and its location must be pre-approved by HAS. This public art can enhance the image, presence, and mission of the tenant, as well as the overall vision of Spaceport. HAS must see that the works do not create a disorganized assortment of objects in the campus landscape, and that a coherent image for Spaceport is maintained.

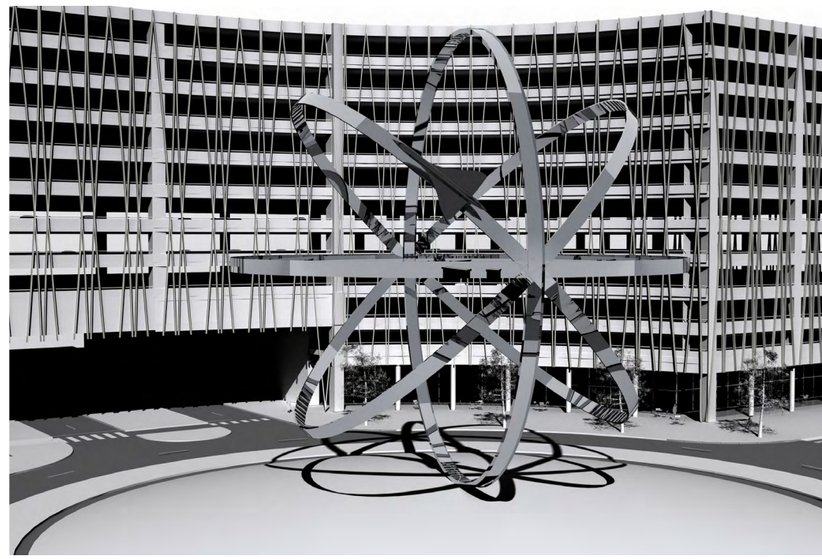
HAS representatives responsible for art displays will ensure that all artwork meets the following standards:

- It furthers the image, mission, and vision of Spaceport.
- It complies with all applicable safety standards.
- It complies with any applicable FAA regulations.
- It does not interrupt or block access or visuals, and impairs the functionality of the circulation system for vehicles, pedestrians, or users of micromobility vehicles.

HAS can partner with organizations and individuals from the Houston arts community for the purposes of commissioning, curating, and evaluating public artwork proposed by the agency or by private tenants.







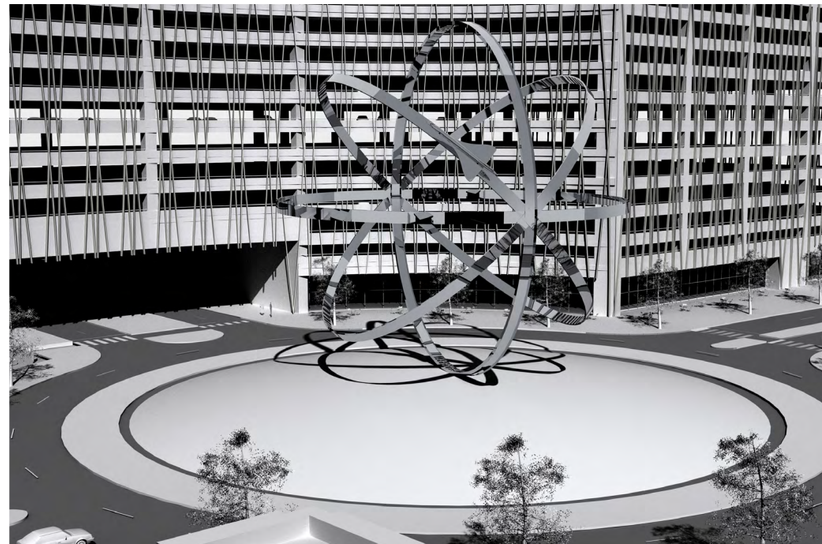


Figure 6.1 Conceptual renderings of artwork at roundabout with Multi-use HUB in the background

Figure 6.2 Michael Singer Studio - Becton Dickinson Courtyard Garden | Photo by David Stansbury

Figure 6.3 Michael Singer Studio - Athens Embassy Entry Garden | Photo by David Stansbury

Figure 6.4 Serpent Mound | Photo by Roy Luck

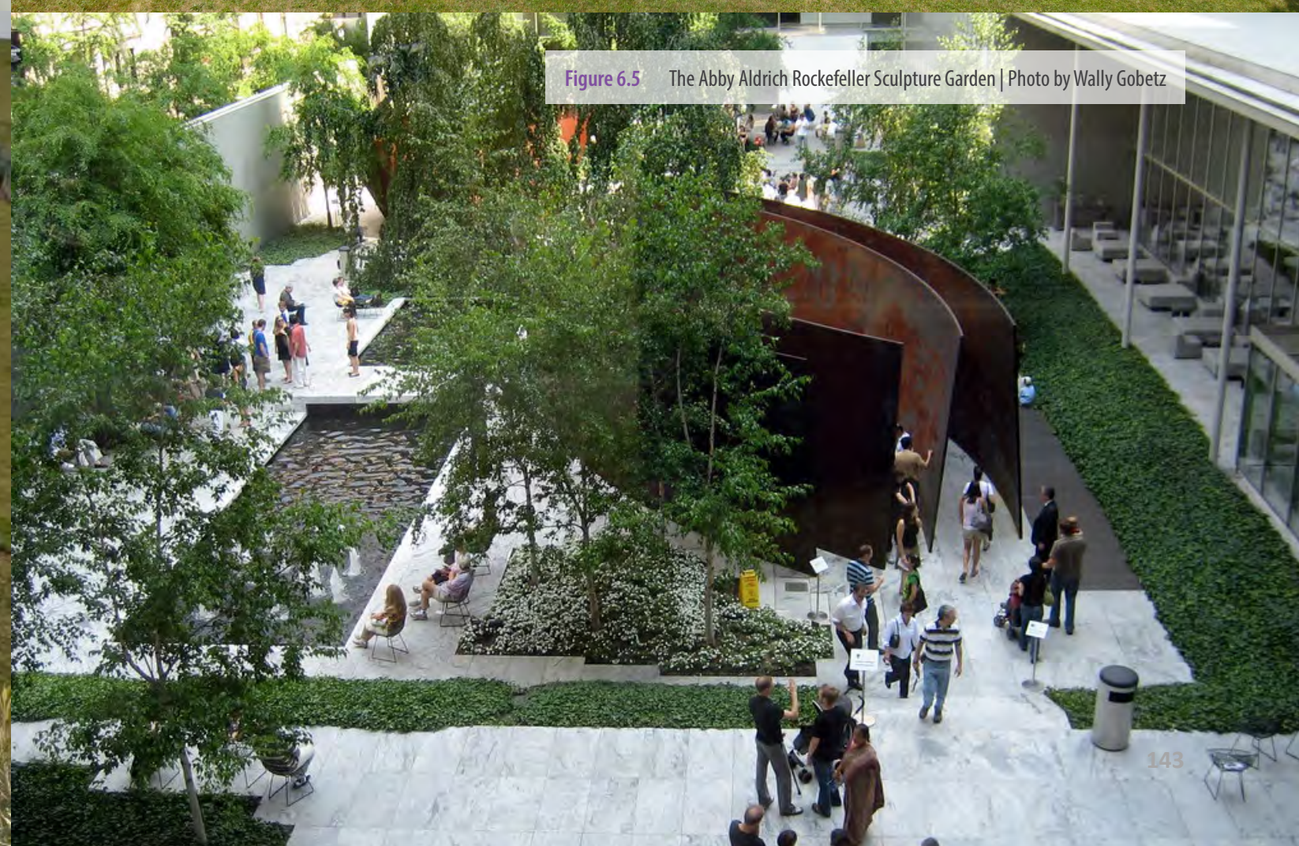


Figure 6.5 The Abby Aldrich Rockefeller Sculpture Garden | Photo by Wally Gobetz

Figure 6.6 Gyre | Photo by O Palsson

Figure 6.7 Light Spikes

Figure 6.8 Northeastern University, Boston | Photo © Payette Architects

Figure 6.9 Fence Art | Photos Courtesy Hyde & Seek Arts

HOUSTON SPACEPORT | HOUSTON AIRPORTS

Jacobs | lds architects + planners | Labozan Associates | JLL