6.0
Design Guidelines

Design Guidelines

6.1 OVERVIEW

The following design guidelines are intended as a conceptual framework for future development on campus. These guidelines are not prescriptive, but intended to allow flexibility in implementation while supporting the College Master Plan Goals stated in the Executive Summary. Those goals are as follows:

- Provide facilities that support educational programs and community needs, and promote the effective use of contemporary technology.
- Encourage enrollment by presenting a safe, inclusive, accessible, and welcoming environment
- Promote environmentally sound College operations
- Strengthen the College's ties with the communities in which it operates

The following design guidelines address the above goals in specific areas that affect campus development:

- Vehicular Circulation and Parking
- Pedestrian Circulation
- Landscape and Open Space
- Buildings; Sustainability and Re-use
- Wayfinding and Signage
- Infrastructure

6.2 CAMPUS DESIGN APPROACH

Highline College's campus is organized by several north-south and east-west axis with diagonal axis toward the heart of campus where the unobstructed view of Puget Sound and Olympic mountains can be seen. Building additions and replacements are organized along these axes while primary pedestrian paths are also strategically meandered around them.

The newly named street "College Way", which will become the main vehicular entrance from Pacific Highway resulting in a campus entry experience that will be altered significantly. This alteration provides opportunity to strengthen the campus' east frontage connecting the main vehicular entrance to the north with another important campus access from 240th Street, establishing the East Parking lot as the main parking lot for the College. Along the east frontage, where the diagonal axis intersect, pedestrian plaza entrances are proposed to mark campus accesses and provide welcoming transitions from the surrounding community into the campus.

6.3 VEHICULAR CIRCULATION AND PARKING

The HC campus is in an excellent location, within close proximity to I-5 and Pacific Highway. Presently, commercial development along Pacific Highway blocks visibility and access to the College from this very busy arterial. Currently vehicular access to the campus is predominantly from the southern edge along South 240th Street. The main entrance is a source of traffic congestion, as the majority of students utilize this entrance to access the East Parking lot. The proximity to Pacific Highway makes it difficult to make a left hand turn from the East Parking Lot, causing severe back-ups during peak time periods. Sound Transit plans to complete improvements to College Way (estimating summer 2023), including widening it to three lanes, in association with the new Transit Center and light rail station to be located east of Pacific Highway. The College will continue to meet with Sound Transit to coordinate entry, circulation, and parking improvements on campus to align with Sound Transit improvements. The proposed

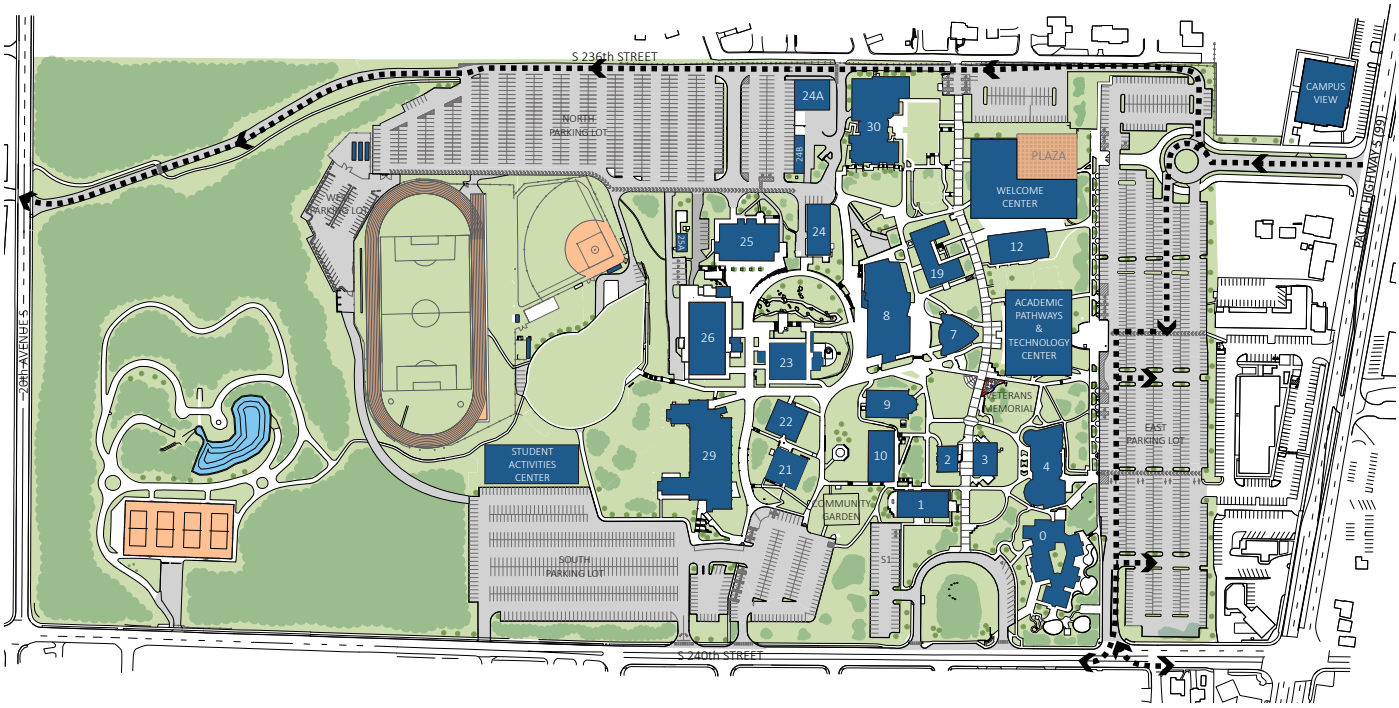
north end College Way improvements off of Pacific Highway will provide a stronger main entrance/exit point from the campus, thus alleviating some of the vehicular congestion at South 240th Street. Entrance improvements at the north end of the East Parking Lot are planned for the Short-Term Plan.

Alterations to the original roads and their lack of a direct role in shaping the design of the campus layout influenced their recommended non-contributing status in the Cultural Resource Report (Appendix C). Likewise, parking areas, due to the lack of original design features and the extent of alterations, are not recommended as NRHP eligible or potentially contributing to the historic district. Relative to the historic district, their key function has been to keep vehicular traffic out of the core campus.

In the Short-Term Plan, improvements to the East Parking Lot are planned to increase parking and enhance the entrance from both College Way and South 240th Street. The College Master Plan also seeks to improve connections between the existing parking lots, and a connector road west of the existing track is anticipated in the Mid-Term Plan to provide a connection between the North and South parking lots. Improved signage to more easily identify links between parking lots will facilitate increased utilization of the South and North parking lots.

Below is a conceptual plan indicating primary vehicular circulation through campus, existing and potential new parking.

PROPOSED PRIMARY VEHICLE CIRCULATION



EXISTING BUILDING

EXISTING AND POTENTIAL PARKING

PRIMARY VEHICULAR ROUTE

Parking

Provisions for parking that is not only sufficient, but convenient, are important considerations for campus development. While enrollment currently is flat, HC anticipates continued growth through the Mid Term plan. The College will continue its commitment to alternative transportation modes to reduce the number of Single Occupancy Vehicles (SOVs) on campus consistent with its sustainability values. Potential additional parking at the end of each phase is outlined below.

Below count does not include motorcycle stalls.

Location	Existing	Short Term	Mid Term
East Lot	793	793	793
North Lot	572	572	572
South Lot	612	612	612
CWU	14	14	14
Admin Lot	45	45	45
Childcare Lot	0	0	0
Campus View	15	15	15
Underlook (Back of 25)	0	0	0
Field House (PAV, 27)	0	0	0
Building 24 Lot	2	2	2
Building 16 Lot	24	24	24
West Lot	50*	50*	61
Connector Road	0	0	38
Total Stalls	**2127**	**2127**	**2176**

*Unpaved stalls

In the Short Term Plan, entry improvements to align with Sound Transit improvements to College Way may result in a net loss of parking stalls in the East Parking Lot. This is necessary to accommodate a wider vehicular entrance, pedestrian circulation, a bike path, and landscaping. It is anticipated that increased ridership with Sound Transit may alleviate future parking demand. If additional parking is needed, the existing West gravel lot may be paved in the Mid Term plan to provide approximately 61 formal parking stalls.

To accommodate anticipated campus growth in the Mid-Term Plan, additional parking is planned for the south end of the East Parking Lot. This will add approximately 81 parking stalls in the Mid-Term Plan, for a net increase of 97 parking stalls over existing. Per the parking and traffic study (Appendix B), the estimated parking stalls required by the end of the Mid-Term Plan is 101 parking stalls. If additional parking is needed in the Mid-Term Plan, a proposed future parking expansion of the South Parking Lot near the proposed connector road could provide an additional 38 parking stalls.

Please refer to the traffic analysis and parking study included in the Appendix.

Design of the proposed parking improvements will be in accordance with City of Des Moines municipal code.

6.4 PEDESTRIAN CIRCULATION

Parking is located on the perimeter of campus, enabling the principal method of transportation once inside campus to be pedestrian. The majority of the built environment is on the east side of campus, whereas the western edge of the campus is the natural environment. The College Master Plan seeks to strengthen the original campus core and primary pedestrian paths.

This approach supports the historic pedestrian-focused function of the core campus. Although many of the walkways remain in their original locations, the loss of original materials and design features influenced the recommendation for non-contributing status in the Cultural Resource Report (Appendix C). The one notable exception is the original walkway canopy remaining between the fieldhouse (Building 28) and the locker rooms (Building 27). The importance of pedestrian circulation can continue

to inform design development and planning within the campus to support the historic pedestrian functional focus.

Highline College is situated on a site with multiple plateaus and steep slopes between them. The highest elevation is at the East Parking Lot at approximately 390 feet, and then decreasing heading west down to 152 feet at the western boundary. Refer to Existing Conditions Analysis section for topographic diagram. The north/south pedestrian paths facilitate circulation and access to buildings on a relatively flat "plateau". The photo to the right is of the primary north/south pedestrian pathway along the original campus core. The primary entrances to buildings should be accessed from primary paths, with the main façade oriented to the path. The east/west pedestrian paths facilitate vertical circulation on campus as they traverse the slopes.

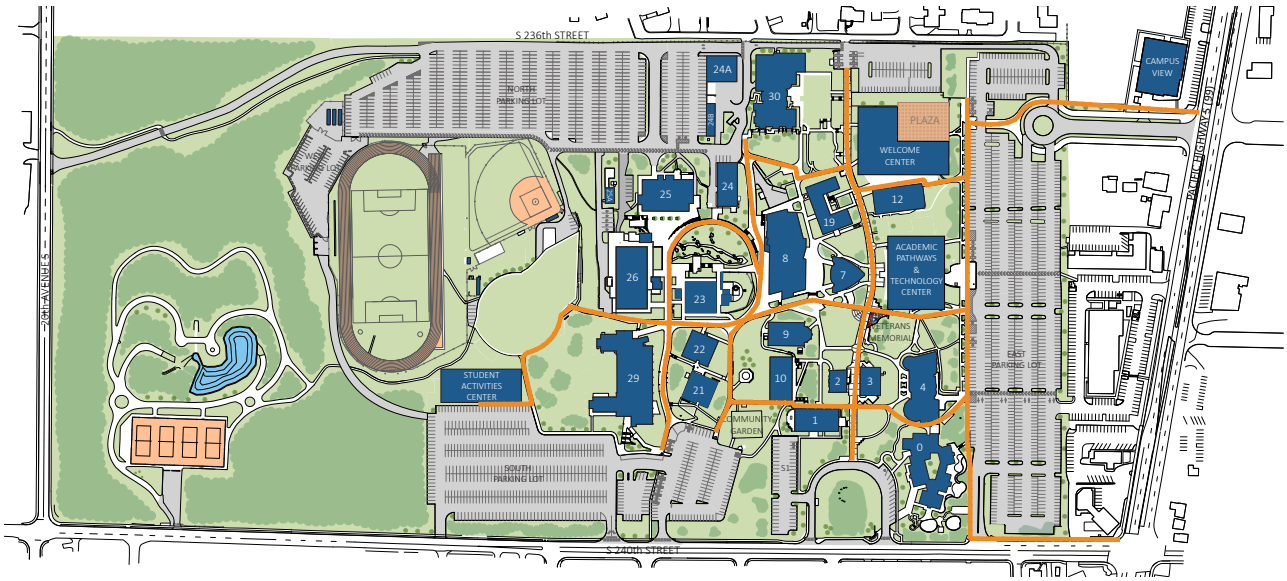
PRIMARY PEDESTRIAN PATH

Pedestrian improvements in the Campus Master Plan include east frontage improvements by the east parking lot to improve visual wayfinding and pedestrian access to campus; and accessible ramps leading from Building 29 to Building 27/28 and fields. Upon demolition of Buildings 15 and 18 in the Mid-Term Plan, pedestrian improvements and a bike lane will extend from the west campus to east parking lot just south of the Building 16 Replacement project. The following design goals should be addressed during pedestrian improvements:

- Primary pathways should be of significant widths to allow for emergency vehicle access
- Improve site accessibility through the use of ramps. At locations where the terrain is too steep or impractical for a ramp, vertical circulation will occur in lobbies at key points on campus and traverse the students from one plateau to the next.
- Primary pedestrian pathways in the east/west direction should maximize views of Puget Sound and Olympic Mountains.
- Create outdoor spaces for informal learning adjacent to paths.

Below diagram indicates main pedestrian routes.

PROPOSED PEDESTRIAN CIRCULATION



6.5 LANDSCAPE AND OPEN SPACE

Landscape is a supporting component of Highline College's visual and physical character. There has been a loss of open lawn areas, the addition of trees and shrubs, and designed planting features within the campus due to alterations over time, as identified in the Cultural Resource Survey (Appendix C). Going forward the retention of historic open spaces, and compatibility of new landscape features and plantings with the historic character of the campus will be important. The findings in the Cultural Resource Survey provide a discussion of the 1964 and 1967 development phases to help inform compatible new designs.

VIEW OF CAMPUS GREEN AND PUGET SOUND; LOOKING WEST FROM THE STUDENT CENTER

Open Space

In the Pacific Northwest, open spaces must be carefully oriented to take full advantage of sunlight and protection from the wind. The existing campus green space is a successful example of open space on campus. As buildings get replaced/demolished in the short and mid-term plans, it provides the opportunity to create more open space on campus for outdoor gatherings, informal learning areas, view corridors, and landscape.

The central lawn area surrounding Building 7 is recommended to be retained as this was part of the original lawn area in the first phase of campus development as identified in the historical campus survey. Please refer to the Appendix.

Landscape

Our vision for the landscape design is to provide appropriate landscaping around the building which will help incorporate it into the surrounding development. The plant palate will be a mixture of native material and ornamental, non-native species to provide interest and variety. Plants will be selected that are proven to be hardy, have low water demands, and that do not require extensive or specialized maintenance.

Planting and site grading will be carefully coordinated to facilitate maintenance. Irrigation will be provided for all lawn and ornamental planting areas with a combination of high-efficiency drip and spray heads controlled by automatic control valves and operated by a controller. The sites will be designed as separate systems utilizing a single controller if possible.

Design of the proposed landscaping improvements will be in accordance with City of Des Moines municipal code.

Site Landscape

The perimeter of the site is surrounded by residential zones areas on three sides and zoned for transit-commercial on one. The property line along the north, south and west shall incorporate a minimum 10-foot-wide Type I Solid Screen Buffer. A Solid Screen Buffer shall consist of a solid screen of evergreen trees spaced to grow together in two years and shall cover at least five feet of the buffer. Shrubs and groundcovers shall be planted at a spacing to cover in the remainder of the area within two years. In areas where 10 feet of buffer may not be achievable, architectural barriers (including walls, planters, and fences), or berms may be incorporated into the landscape design. Architectural barriers will require an application to" Adjust the Landscape" but will also allow for a 50% reduction of the width of the buffer area. Incorporation of architectural barriers shall be included along the northeast property line that is adjacent to South 236th Street.

Parking Lot Landscape

Landscape within parking areas shall be located in such a manner as to divide and break up the large expanses of pavement, divide and define driveways, parking stalls and corridors, limit cross-taxiing, delineate and separate pedestrian and vehicular traffic, and screen parking facilities from abutting properties. Planting areas and landscaping shall be reasonably dispersed throughout the parking lot with the interior dimensions of such areas being sufficient to protect the landscaping materials planted therein and to ensure proper growth. The primary landscaping materials used shall consist of canopy-type deciduous trees with non-aggressive root systems or spreading evergreen trees planted in wells or strips with a mixture of deciduous and evergreen shrubs and/or ground cover. Root barrier will be provided where any tree is planted within six feet of a curb, walk or drive. Shrubs will be selected for the ability to withstand reflected heat from paved surfaces and growth that maintains site lines. A minimum of 5% of the parking area shall be landscaped with one tree for every five stalls, 40% of the trees shall be evergreen. Shrubs and groundcover shall cover the remainder of the planting area at a spacing that fill in the remaining area within two years. No interior parking landscape area shall be smaller than 50 square foot. Biofiltration areas shall be incorporated into the parking areas to provide storm water treatment. Biofiltration areas shall incorporate plants that can be inundated during the winter months and dry during the summer months. Biofiltration areas can also be educational opportunities and educational signage could be incorporated to identify and explain storm water runoff and treatment.

Building & Infill Planting

Building and infill planting will be primarily trees, shrubs and groundcover. Plant material shall be proposed that are low water use or drought tolerant and will thrive in the Des Moines area. Plants shall provide year-round interest and shall include a mix of native and ornamental deciduous and evergreen plants. Landscaping around the building will include a code minimum approach with entrances and common spaces receiving additional embellishment as a way to define and separate entries and direct pedestrians. Large open space areas will be predominantly lawn. Lawn adjacent to buildings shall consist of drought tolerant varieties that require a minimal amount of fertilizer or other maintenance requirements. Large lawn areas outside buildings or walkway areas shall be varieties of native grass with a mixture of prairie wildflowers. These perimeter grass areas should have a minimal maintenance requirement. Deciduous trees will be selected to promote visibility, softening of facades, and provide shade. Informally planted conifers will screen service and equipment areas, bare walls and parking areas. Ornamental shrubs areas will occur at highly visible locations near building entries and outdoor gathering spaces. Small focal point trees will be incorporated in key locations in the shrub areas. Pedestrian scale flowering trees will be included in outdoor gathering areas. Native plantings shall be incorporated in non-pedestrian areas used. Building and infill planting will be primarily trees, shrubs and groundcover. Plant material approved by the college follows:

APPROVED PLANT LIST

DECIDUOUS TREES

ACER RUBRUM `BOWHALL` / BOWHALL MAPLE

LIRIODENDRON TULIPIFERA `FASTIGIATA` / TULIP TREE

EVERGREEN TREES

CHAMAECYPARIS OBTUSA / HINOKI FALSE CYPRESS

THUJA PLICATA / WESTERN RED CEDAR

TSUGA HETEROPHYLLA / WESTERN HEMLOCK

NATIVE PLANT MIX

ARCTOSTAPHYLOS UVA-URSI / KINNIKINNICK

DICENTRA FORMOSA / WESTERN BLEEDING-HEART

HOLODISCUS DISCOLOR / OCEAN-SPRAY

POLYSTICHUM MUNITUM / WESTERN SWORD FERN

SYMPHORICARPOS ALBUS / COMMON WHITE SNOWBERRY

VACCINIUM OVATUM / EVERGREEN HUCKLEBERRY

UPLAND RAIN GARDEN MIX

ASTILBE BITERNATA / FALSE GOATSBEARD

CEANOTHUS X `JULIA PHELPS` / CALIFORNIA LILAC

CORNUS SERICEA `KELSEYI` / KELSEYI DOGWOOD

DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS

MAHONIA REPENS / CREEPING MAHONIA

POLYSTICHUM MUNITUM / WESTERN SWORD FERN

SPIRAEA DOUGLASII / WESTERN SPIREA

WET RAIN GARDEN PLANTS

HOUTTUYNIA CORDATA / HERBA HOUTTUYNIA

MIMULUS GUTTATUS / SEEP MONKEYFLOWER

SCIRPUS MICROCARPUS / SMALL-FRUITED BULRUSH

BOWHALL MAPLE

WESTERN HEMLOCK

CEANOTHUS

BUFFER PLANTING

ARCTOSTAPHYLOS UVA-URSI / KINNIKINNICK

BUXUS SEMPERVIRENS / AMERICAN BOXWOOD

FOTHERGILLA GARDENII / DWARF FOTHERGILLA

HYDRANGEA MACROPHYLLA / LARGELEAF HYDRANGEA

HYDRANGEA QUERCIFOLIA / OAKLEAF HYDRANGEA

FOTHERGILLA

6.6 BUILDINGS

The majority of buildings on campus are the original 1960s buildings that were inexpensively built, but proving costly to maintain due to failing mechanical/electrical systems and infrastructure. Further, they do not function well programmatically for the College. It is a high priority of the College to replace these buildings in a logical sequence, focusing first on replacing the buildings in the worst condition (i.e. the Faculty Office Buildings). As part of this process, the College will first consider re-using, adding to or renovating existing buildings with historical significance as a means to extend their functional role within the campus as long as reasonably possible.

While the existing original 1960s era buildings total 71% of the quantity of buildings on campus, they only comprise 41% of the total building area. As these multiple small buildings are consolidated into larger, more efficient buildings, the overall area (gross square feet) will increase to compensate for internal corridors, undersized spaces, common spaces for informal learning, restrooms and elevators which many of the existing original buildings lack.

Consolidating and replacing small, inefficient buildings with larger buildings will necessitate these buildings to be two-three stories in height to minimize the overall building footprint and allow space for future development, landscape and open space. Building height will conform to the City of Des Moines municipal code as called out by the current I-C Institutional Campus Zone, which allows for a maximum building height of 85 feet for multi-residential, and 65 feet for all other buildings and structures. Buildings with a height above 35 feet shall be set back 20 feet for the first 35 feet, plus one foot for every two feet of height above 35 feet in accordance with the municipal code.

Buildings shall be longitudinally sited in the east west direction wherever feasible to maximize daylight, and to assist with accessible vertical circulation from one site plateau to the next through elevators within the building, and ramps exterior to the building.

In addition, the design of buildings should address the following goals:

- Replace multiple small, inefficient buildings, and consolidate into larger two-three story buildings creating more open space.
- Maximize views of Puget Sound and views into campus green/outdoor open spaces.
- Design classrooms for flexibility to accommodate multiple seating arrangements and learning styles, and adaptable for changing programmatic needs of the College.
- Provide specialized labs as needed to accommodate unique programs and those with special instructional needs.
- Incorporate the latest technology and card access in new buildings and major renovations, e.g., wireless connectivity.

- The primary entrance and building façade will front one of the primary pedestrian paths – creating a more identifiable "front door" to each building.
- Buildings should exceed minimum code requirements for accessibility by, wherever possible, improving student access to the surrounding buildings and open spaces.
- Buildings built within the recommended NRHP historic district should be compatible where feasible with the character defining features of the 1960s academic buildings to strengthen the overall visual character and place identify of the campus. Refer to Section 6.0 Preservation Plan for Building 7.
- Create common spaces for informal learning to occur.
- Incorporate safety and secure spaces for students, staff and faculty.
- Utilize sustainable design strategies as described below.

6.7 SUSTAINABILITY

One of the Master Plan goals for the College is to provide environmentally responsible operations. HC has developed a strategy plan for reducing greenhouse gas emissions (See Appendix). These strategies include reducing building energy consumption through behavioral changes, DDC upgrades, VFD replacements with high efficiency motors/pumps, re-commissioning selected buildings, and replacing CFL bulbs with LED energy efficient fixtures. Further, all new facilities Major Capital Projects should be designed according to Leadership in Energy and Environmental Design (LEED) Silver standards. The College is committed to specifying high efficiency systems that use less energy, aid with reducing greenhouse gas emissions, and creating a more sustainable campus.

Furthermore, the College seeks to conserve energy and resources through more efficient classroom scheduling. It is inefficient to keep a building open all day when there may be only morning classes and an evening class. Classes should be concentrated in a few larger buildings rather than distributed among multiple buildings on campus to reduce the campus' heating and cooling loads. This is especially true during the summer months, when fewer classrooms are in use.

Other sustainable considerations for new construction include: high indoor air quality, maximize daylight and views, strive to use regional materials, materials with recycled content, or rapidly renewable materials. Buildings that are being renovated should strive to maintain a high percentage of existing exterior walls, floors, and roofs where feasible. In addition, the College has identified the following indicators to meet its sustainability objective:

Objective: The College demonstrates stewardship of environmental resources.

Indicators:

- Management of waste streams shows continued reduction in landfill materials and increased recycling.
- Measures: Waste stream/landfill and commingled recycling program costs and tonnage
- Working environments are maintained in a way that is conducive to fulfilling the college's mission.
- Measures: Facilities reports on maintenance calls and the number of classroom relocations.
- The College continually increases energy conservation and efficiency.
- Measures: Reports on energy and water usage, Commute Trip Reduction (CTR) Program reports.
- The College encourages awareness and use of 'green' practices in its working environments.
- Measure: Campus community utilizes "Green Procurement" purchasing best practices as defined by "The Environmental Resources Center for Higher Education" (Campus ERC).

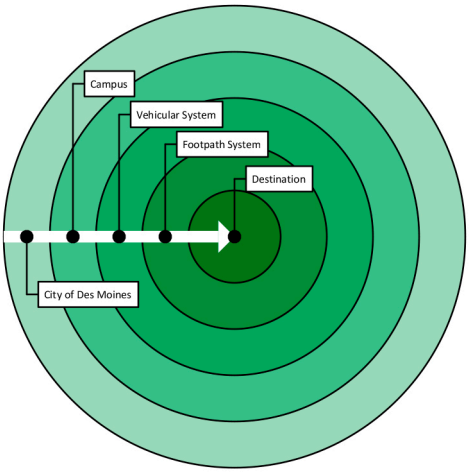
- All new construction or major facilities projects employ the highest, most current green standards, and comply with state conservation requirements.
- Measure: Rate of LEED standards compliance in all new construction or major facilities renovations.
- The College encourages the use of alternative transportation forms for students, faculty and staff commuting to the Des Moines campus.

Measure: The number of ORCA pass reimbursements each year increases by 10% annually.

6.8 WAYFINDING AND SIGNAGE

Introduction

This section outlines the plans for signage upgrades and changes across campus.



The foundational thinking of wayshowing (the signs) and wayfinding (the customer process of finding their way) is summarized in this diagram:

The goal is to provide wayshowing elements (signs) at every level to guide (show) a customer to and through the campus, working from the general (campus level) to the specific destination (building level). Once inside the building an interior wayshowing system would guide the customer to their destination room..

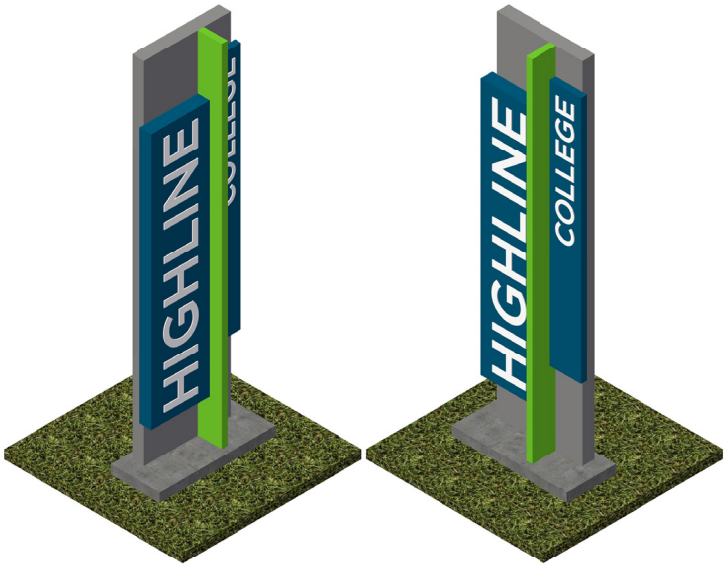
Campus signage has been planned in two phases. Phase 1- Campus Entrance Signage has been completed with the placement of uniquely labeled monument signs at each entrance of the college.

College Way - Pacific Highway Entrance/Main Campus Entrance

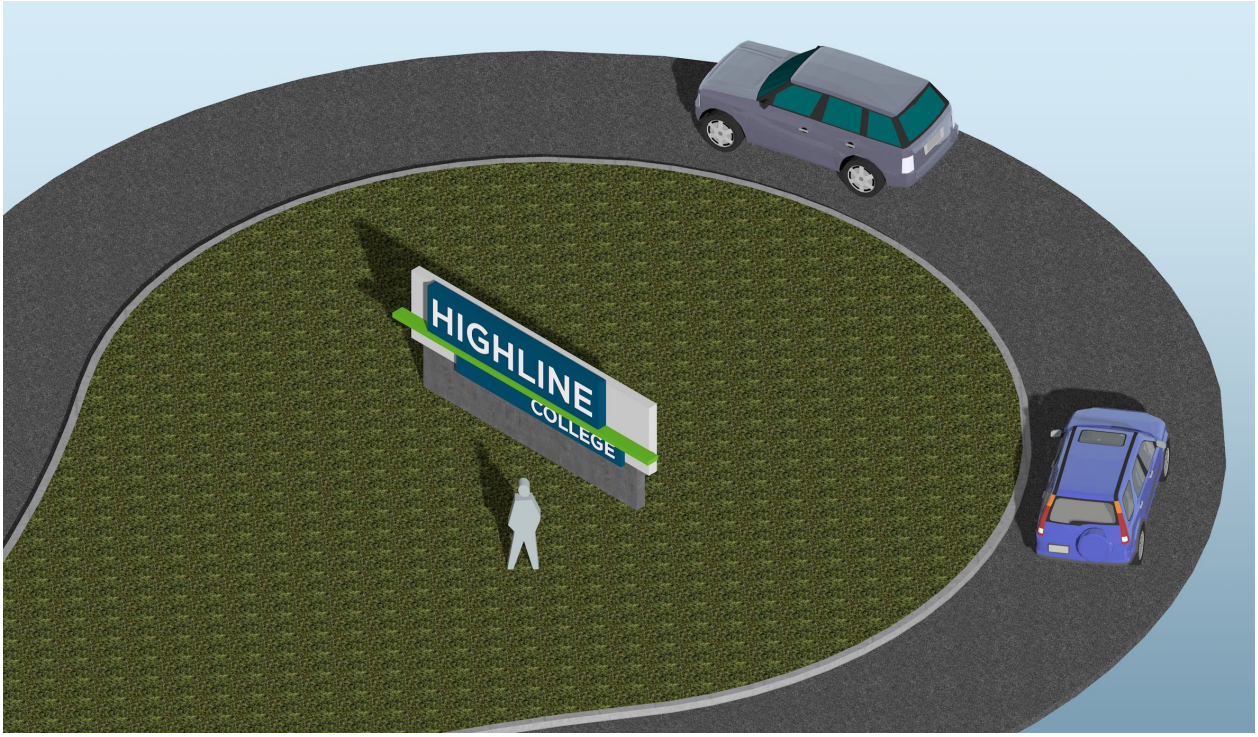
Phase 1 included the design of two signs to be added with the Sound Transit project. After the Sound Transit project is completed, two monument signs are planned at the main entrance of College Way from Pacific Highway 99, and one monument sign will be placed at the entry roundabout to mark the arrival to Highline's campus.

This future entrance, which is planned to be constructed in 2023 in conjunction with the Sound Transit light rail extension, will become the primary vehicular and pedestrian entrance to the college. As such this entrance needs a strong visual to stand proud of the commercial nature of the highway at this point and form a strong and positive first impression of Highline College's physical environment.

MAIN ENTRANCE SIGNAGE (HIGHWAY 99)



COLLEGE WAY ENTRANCE ROUNDABOUT SIGNAGE



Phase 2 signage is looking at the interior wayfinding in and around the campus more aligned with directional and informational improvements. These wayfinding signs will be of the same family as the monument sign, but at a smaller scale. Campus informational signage and directional/building signage will be replaced as funding allows.

Providing wayfinding continuity from the east main campus entrance through the east campus perimeter to key welcoming buildings, such as Building 6 Student Services and eventually the future Welcome Center for Student Success and Academic Pathways & Technology Center, a key strategy for the Phase 2 signage approach.

A Phase 2 Signage Concept Design Study was completed in 2022, and included the following conceptual sign types:

- Type 1: Main Pedestrian Entrances
- Type 2: Directional Signage – Footpaths
- Type 3: Building ID Signage – In-Ground and Wall-Mounted
- Type 4: I-Spot Signage

SIGN TYPE CONCEPTS PHASE 2

1. CAMPUS ENTRY SIGNAGE

2. DIRECTIONAL SIGNAGE

3. BUILDING ID SIGNS

3. BUILDING ID SIGNS

I-Spot Signage

Given the nature of the Highline College campus and the order in which the buildings are numbered, the best wayshowing technique is to employ I-Spots- "directional or information spots" that include a campus "You Are Here" map for orientation as well as other information. The purpose is to orient a customer to where they are currently at on the campus, facilitate their ability to generate a cognitive map of the campus, provide confirming or reconfirming information, and get them headed in the direction of the customer's intended destination.

The campus map should be oriented in the direction that the customer is looking at the campus with their "You Are Here" location clearly noted. The I-Spot should include a cross-reference list of popular destinations and services within buildings and the buildings in which they can be found.

The campus map on the I-Spot sign should be the same map as found in the downloadable version on the college website. Some additional key information such as the main campus phone number, address, and public safety phone number should be included.

The Concept Design Study envisions renovating the existing "kiosks" to become I-Spots that are graphically consistent with campus identity signage.

I SPOT SIGNAGE PHASE 2

4. I-SPOT SIGNAGE

4. I-SPOT SIGNAGE

OTHER SIGNS

Vehicular Circulation

In addition to the vehicular entrance signs that were installed in Phase 1, , additional vehicular circulation signs may be necessary. These signs direct drivers around the campus to visitor and other parking areas. The messaging may include a few key destination buildings where large audiences might assemble, such as the athletics buildings or performance halls.

Vehicular circulation signs should be freestanding and highly visible with clear graphics and messages. The white lettering should be reflective nighttime viewing.

Parking lot names and sections should be clearly identified on the light poles as they are now. These signs could be color-coded so long as color is not the primary identifying characteristic: color alone is not a sufficient wayshowing or identification method. If the parking lots are renamed from East, South, and North and abbreviated E1, E2, N1, and so forth, the lot/section system could be simplified.

Branding Notes

The signage should follow the college's brand standards with regards to fonts and colors with some discretion. The challenge is that brands and their standards change more frequently than signage. But at the same time the college needs to maintain a cohesive visual brand experience. It is wise to employ the college logo strategically to avoid costly changes when the brand visuals need to change.

6.9 INFRASTRUCTURE: STORMWATER AND UTILITIES

The civil portion of this Master Plan includes evaluation and proposed mitigation of the development impacts to stormwater and utilities on campus. The City of Des Moines has jurisdiction over all development, including stormwater and off-site road improvements. The Highline Water District and Midway Sewer District have jurisdiction over their respective utilities.

STORMWATER MANAGEMENT

As stated in Section 2.0 Existing Conditions, the volume of the existing detention pond is 9.49 acre-feet based on a topographic survey after the pond was built. This pond provides flow control for both existing conditions and changed campus conditions. At the time of this report, the pond has 6.594 acre-feet of storage available for future campus development (see the Stormwater Technical Information Report for more detail).

For stormwater management, flow control and water quality treatment are required for projects over 5,000 square feet in size. For building projects including demolition, the net increase in impervious surface is counted towards this threshold. The building projects in this Master Plan are all under the threshold and will not require stormwater management. However, the parking lots and roads all require stormwater management.

Flow Control

The City of Des Moines utilizes a modification of the 2016 King County Surface Water Design Manual (KCSWDM) for flow control requirements.

Flow control will be provided in the on-site regional detention pond until the detention bank has been fully utilized. Per the City's requirements, if the pond is utilized for flow control, all new development projects must have two separate detention volume calculations: one that mitigates impacts from pre-developed (forested) conditions to existing conditions, and one that mitigates impacts from existing to developed conditions. For project areas where the existing conditions are similar to pre-developed conditions (forested), only one calculation is provided.

As noted in the Technical Information Report, the existing regional detention pond available storage can accommodate the envisioned planned campus improvements with additional storage beyond the Master Plan horizon.

The City has requested that the existing drainage basin to the pond is modeled to confirm the pond is functioning as designed. We compared peak flows from the original pond design with peak flows in the existing condition. There is no significant difference in peak outflows from the site in the existing conditions compared with the pond design flows, and we can conclude that the pond is functioning as designed.

Water Quality Treatment

Water Quality Treatment is required for projects that exceed 5,000 square feet of new pollution generating surface and are required to meet the Enhanced Basic Treatment standard per the Washington State Department of Ecology 2014 Stormwater Management Manual for Western Washington (SMMWW). Water Quality Treatment can be provided by any DOE approved enhanced treatment facility including:

- Bioretention cells with underdrains per WADOE SMMWW BMP T7.30
- Compost-Amended Vegetated Filter Strips (CAVFS) per WADOE SMMWW BMP T7.40
- Stormfilter Treatment Train with ZPG and CSF per the KCSWDM Section 6.5.5
- Proprietary filter cartridge facilities with an Enhanced Treatment GULD rating by the WSDOE

The above water quality Best Management Practices can be implemented as a "kit-of-parts" either to provide water quality for a specific campus development or to retrofit the campus in stand-alone water quality improvement projects. The "kit-of-parts" concept works well for a campus, as it provides flexibility and creativity to achieve not only jurisdictional water quality requirements but to implement facilities that can double up as attractive planters, natural drainage systems, permaculture systems, and interpretive educational opportunities.

Conveyance

We evaluated the existing onsite north and center storm main collector pipes using King County Runoff Time Series 10-year peak flows per the 2009 King County Surface Water Design Manual. The Master Plan projects will increase peak runoff from the Campus from 22.65 cubic feet per second to 23.00 cubic feet per second, approximately a 1.5 percent increase, which is negligible. Thus, the existing storm main collector pipes have capacity to accommodate the planned projects. For existing capacity constraints, see the Storm Drain Infrastructure section under Utilities below.

UTILITIES

The projected Master Plan growth will impact other utilities for the campus. Highline Water District estimates that the projected growth of five percent will not require any improvements to their infrastructure. Likewise, Midway Sewer District estimates that they have capacity to accommodate an increase in demand of five percent over the next ten years. Although capacity off site is not an issue, there is a need for upgrades to some of the utility infrastructure on site. KPFF provided assessments of the required upgrades to utilities on campus in 2004 and 2007. The upgrades have all been implemented, except for the items listed below.

Storm Drain Infrastructure

The most urgent repair issue for the storm drain infrastructure is the north branch of the storm drain main. This pipe is undersized and causes flooding in the lower end of the North Parking Lot. Flooding causes a significant decrease in the number of parking stalls and potential damage to cars parked in that area. In addition, flooding due to long storm events may overtop the ditches to the west and result in soil erosion being carried to Massey Creek (see Figure A for a map of the area).

Another issue is the drainage around Building 19. This issue was identified in 2007 and the College has replaced some pipes on the east side of the building and added waterproofing. However, the west and north sides of the building are still in need of upgrades, including improved drainage to the Building 19 electrical vault.

Other drainage issues as observed by the campus staff include:

- Stormwater backing up on the north and east side of Building 7. The roof drain pipes for this building need to be replaced.

- Tree roots have damaged a catch basin at the north end of the east parking lot and the connecting pipe to the west which needs to be replaced.
- A six-inch diameter storm pipe between Buildings 15 and 16 and south of Building 15 needs to be replaced.

Sanitary Sewer Infrastructure

Issues as observed by the campus staff include:

- An eight-inch sanitary sewer pipe east of Building 21 is failing. The pipe slope is relatively flat in this area.
- An eight-inch sanitary sewer pipe between Buildings 25 and 26 is failing. The short section of pipe is located between two manholes and follows the steep grade of the stairs to the north.

Water Infrastructure

The 2007 Facility Repair Recommendations by KPFF identified the lack of a loop for the water system in the northeast corner of the campus. This section of the campus is susceptible to shut-downs since it is dependent on one water line, and any problems with the line could cause Buildings 14, 15, 16, 17, 18, 24B and 30 to shut down. The lack of a loop also means the buildings near the end of the system are likely to experience lower water pressure due to the large distance travelled by the water to reach these buildings compared to a looped system.

Although Highline Water District has sufficient capacity off site, individual development projects may require additional water distribution on site to meet fire flow demands.

The once used temporary heating water piping west of Building 26 to Building 27 has been abandoned above ground will need to be demolished.

Utility drawings are included in the next Section. The Technical Information Report (TIR) is included in the Appendix.

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