K. LIGHT, GLARE and SHADOWS

Affected Environment

Ambient light in the vicinity of the University campus is comprised of stationary and mobile sources. Stationary sources include street lighting on-campus in conjunction with streets and surface parking areas, street lighting on City streets that are located within campus boundaries (e.g., West Campus area), and street lighting on major arterials that surround the University campus (e.g., NE 45th St., 15th Ave. NE, N.E. Pacific St. and Montlake Blvd. NE). On-campus lighting includes both pedestrian-scale lamp standards and cobra-type standards. Pedestrian-scale standards are typically 12 – 15 feet in height and light a relative small area, whereas, cobra-type standards are typically 30 – 35 feet in height and function by lighting a much broader area, which often results in light spillage onto adjacent areas. Off-campus street lighting utilizes cobra-type standards.

Other stationary sources of ambient light include fixed lighting in conjunction with athletic fields (e.g., tennis courts, golf driving range, Husky Stadium, etc.), security lighting, and light that emanates from within buildings – both on-campus and proximate to campus. Whereas lighting associated with athletic fields is elevated to cover a broader area, it is also focused on the field, with typically relatively little spillover. For example, fixed lighting associated with Husky Stadium is at a height of about 160 ft. and is directed toward the playing field. Such light, however, remains visible from great distances.

Mobile sources of light include light from headlights of vehicles operating on-campus, on streets that are located within campus boundaries, and on major arterials that surround the University campus.

There are no buildings on-campus that contain highly reflective surfaces and produce reflective solar glare. Glazing on campus buildings has a relatively low level of reflectance. Vehicle headlights and even glass surfaces on vehicles can, at times, temporarily produce reflective solar glare.

As depicted in Figure 3 (*Section II*), the University's Observatory[22] is located in the north-central area of the Central Campus, near NE 45th St., adjacent to Memorial Way. The Observatory is used for research and teaching. As shown in Figure 3, a University surface parking lot (N5) is located immediately east of the Observatory. Because of the size of existing deciduous trees that are proximate to the Observatory[23] (immediately west, southwest and northwest), the only effective direction for celestial viewing from the Observatory -- for most altitudes and during much of the year -- is toward the east over parking lot N5.[24] This is particularly true when viewing at relatively low altitudes above the horizon (i.e., below 65 degrees) and from mid-March to late October. At such times, the optimal field of view is roughly a 150-degree arc that extends from the northeast to the south. The present range of altitude[25], as viewed over parking lot N5 is approximately 75 degrees -- from roughly 15 degrees above the horizon to zenith. At altitudes above 65 - 75 degrees, the adjacent trees are less of a problem. Although the parking

[22] The Observatory is a historic structure that is listed on the Washington Historic Register. See discussion in *Section III* N., *Historic/Cultural*, of this Final EIS.
[23] Tree height is 40 - 50 feet – roughly 15 - 25 feet above the height of the telescope in the Observatory dome.
[24] UW, 1996.
[25] Variation in height above the horizon to zenith.

lot is lighted, staff of the Observatory exercise localized control over the level of light intensity in the parking lot in order to enhance celestial viewing.

Mature vegetation (deciduous and conifers) and buildings comprise a major portion of the campus, as depicted in Figure 15 (*Section III* G. *Land Use*). Shadows cast by trees and buildings periodically shade existing open spaces on-campus.

Impacts of the Proposed Action

The *Proposed Action* is not expected to result in any significant light, glare or shadow-related impacts.

One of the major contributors to on-campus ambient light levels is parking lot lighting. As discussed elsewhere in this DEIS, many of the surface parking lots would be replaced as a result of the *Master Plan Seattle Campus* with University-related buildings. As such, it is expected that the amount of light presently emanating from the campus due to parking lot lighting would be reduced. The cobra-type light standards would be removed, which would lessen light spillage impacts.

New sources of light would be added to the University context in the form of pedestrian-scale lighting associated with new or altered pathways in the landscape surrounding campus buildings, exterior lighting associated with new campus buildings, and indirect light that would emanate from within new campus buildings. The addition of lighting along new or improved pedestrian paths on-campus would be consistent with that of other pedestrian areas on campus. It is expected that the amount of light emanating from within proposed buildings would be similar to that of other recently-constructed University buildings. Areas immediately adjacent to new campus buildings could experience some localized light spillage, although such is not expected to be disruptive. It is expected that sources of light would be visible through the trees that form the landscape buffer around the campus. The existing mature trees, as well as new plantings as a result of this *Proposed Action*, would be expected to partially and seasonally screen some of this light from off-campus locations.

The height limit for development in the Central Campus is 105 ft. A portion of parking lot N5, located on the Central Campus immediately east of the University's Observatory (Figure 4) is a potential building site. Because of the possible height of a building at this location (presumably with glazing on the west and south facades), light emanating from within the building would be visible and could increase the level of ambient light in this part of campus and impair visibility from the Observatory. As noted previously, currently, to improve celestial viewing, staff of the Observatory can reduce the level of light intensity within this parking lot. It would be difficult to reduce the level of light intensity within a building at this site.

The primary source of existing glare is that associated with vehicles operating on-site. While glare caused by vehicle headlights can be very intrusive, it is normally temporary. The principal source of glare associated with most development projects is sunlight reflected from specular surfaces on building facades. Factors influencing the amount of reflective solar glare and the effect of that glare include: weather (e.g., cloud cover); time of day; building height, width and orientation of the south-facing facades; percent of the south-facade that is glazed or consists of specular material; reflectivity of the glass or specular surfaces; design relationship between the glazed and non-glazed portions of the facade (e.g., glass inset from frame); the color and texture of building materials that comprise the facade; and the proximity of other intervening structures or

landscaping. Although there are no plans at this time for future campus buildings, the University's existing internal design review processes that include architectural review, landscape review and environmental (SEPA) review would continue to review every major building project. It is expected that materials used in the facades of new buildings and glazing would be similar to that in other recent University buildings and not highly reflective.

Low sun angles in the mid-late morning and mid-late afternoon, particularly during the winter, could result in solar glare impacts from glazing on new campus buildings sited proximate to major arterials that border the Central Campus, namely 15th Ave. NE, NE Pacific St. and Montlake Blvd. NE. The existing landscape buffer, together with canopies of newly-planted trees (in conjunction with these projects, are expected to effectively mitigate the glare potential from glazing associated with these new buildings. As noted previously, the University's existing internal design review processes that include architectural review, landscape review and environmental (SEPA) review would continue to review every major building project.

New campus buildings, the proposed aerial plaza, and new plantings could cast shadows over portions of the campus and surrounding streets. The time of greatest shading would occur during low-angle sun conditions such as mid- to late afternoon in the winter and late afternoon to early evening in the summer. In most instances, areas that would be periodically shaded by new campus buildings and new plantings are already shaded by existing campus buildings and mature plantings. Potential building sites noted in Figure 4 and new campus open spaces (Figure 6) have been identified as part of the *Master Plan Seattle Campus* with this recognition. Development of the potential aerial plaza would create an area of shading extending beneath the structure roughly 275 feet along N.E. Pacific St., which does not presently exist. Lighting would be provided beneath the structure comparable to that beneath the Washington State Convention & Trade Center[26] to minimize shadow-related impacts. No significant impacts associated with shading are anticipated.

Impacts of the Alternatives

No Action Alternative

Because no new construction would occur with this alternative, no increase in light, glare or shadow impacts is anticipated. Existing levels of ambient light would occur on campus and light spillover into adjacent areas that current exists would continue.

Decentralization/Open Space Alternative

This alternative would include less on-campus development than under the *Proposed Action* (approximately 50 percent less). Consequently, in comparison with the proposed *Master Plan Seattle Campus*, fewer new buildings would be built resulting in fewer on-campus surface parking lots being replaced. The amount of reduction in ambient light levels, therefore, is not expected to be as great as would occur in conjunction with the *Proposed Action*. Also, because of decentralization, increased off-campus development would occur with associated increases in light levels proximate to those facilities. It is anticipated that glare and shadow-related impacts associated with on-campus development would be less than those of the *Proposed Action*. Because of decentralization, off-campus development, however, could result in glare and shadow impacts proximate to the new off-campus development.

[26] The Washington State Convention & Trade Center extends over a portion of 700 - 1,000-foot segment of I-5 in Downtown Seattle. Lighting is provided beneath the structure.

No Street or Alley Vacation Alternative

Impacts related to this alternative would be comparable to those of the *Proposed Action*. A purpose of this alternative would be to consolidate property for a more effective development and to create more open space. Without the street or alley vacations that are proposed, campus development could still occur, however, because property consolidation would not be possible, more buildings would be necessary. The West Campus is area most affected. As noted previously, a purpose of the vacations is to create additional open space on-campus. Because more buildings would be needed – particularly in the West Campus, it is possible that the potential for light, glare and shading impacts could increase. Similarly, open spaces that would be created as a result of this alternative would be smaller with a greater potential for shading impacts from the increased number of buildings.

Lifting of Lease Limit

Depending on the amount of University-related development that occurs in the University District, light, glare and shadow impacts could increase. All new building development in the University District, however, would adhere to City of Seattle development regulations and would be subject to the City's site-specific environmental review and design review processes. As indicated in the *UCUC Plan*, SEPA Determination of Non-Significance[27], specific impacts would be examined as part of project level environmental review when individual development applications are being considered.

Possible Mitigation Measures

The following mitigation measures are possible and could be available for the *Proposed Action,* and the *Decentralization/Open Space Alternative*, the *No Street or Alley Vacation Alternative* or the *Lifting of Lease Limit Alternative* -- relative to on-campus development.

- The University's existing internal design review processes (architectural, landscape and environmental review) would continue to review every major building project that is proposed on-campus.
- Exterior lighting fixtures could be shielded and sited to direct light away from adjacent land uses.
- Building facade design could consider using least-reflective glazing available. Glazing could be recessed from the wall of the structure and separated by building structural elements (e.g. spandrels, mullions) to lessen the effect of reflective solar glare.
- Design associated with subsequent development on parking lot N5 could evaluate the possibility of providing tinted glazing on the west facade of building in order to lessen the potential impacts on the Observatory as a result of increased levels of ambient light.
- Provide lighting beneath the aerial plaza structure.

Unavoidable Adverse Impacts

A tall building on parking lot N5 with glazing on the west façade could adversely affect the effectiveness of the Observatory.

[27] Seattle, 1998a