

## CHAPTER 4

# SITE DEVELOPMENT AND LAND USE

### SECTION 401 GENERAL

**401.1 Scope and intent.** This chapter provides requirements for the development and maintenance of building and building sites to minimize negative environmental impacts and to protect, restore and enhance the natural features and environmental quality of the site.

**401.2 Predesign site inventory and assessment.** An inventory and assessment of the natural resources and baseline conditions of the building site shall be submitted with the construction documents.

The inventory and assessment shall:

1. Determine the location of any protection areas identified in Section 402.1 that are located on, or adjacent to, the building site;
2. Identify *invasive plant species* on the site for removal;
3. Identify native plant species on the site; and
4. Identify site features to be preserved.

### SECTION 402 PRESERVATION OF NATURAL RESOURCES

**402.1 Protection by area.** Where *flood hazard areas*, surface water bodies or wetlands, conservation areas, parklands, agricultural lands or *greenfields* are located on, or adjacent to, a lot, the development of the lot as a building site shall comply with the provisions of Sections 402.2 through 402.7.

**402.2. Flood hazard areas.** For locations within *flood hazard areas*, unless compliance with Section 402.2.1 or Section 402.2.2 is required by Table 302.1, new buildings and structures and *substantial improvements* shall comply with Section 402.2.3.

**402.2.1 Flood hazard area preservation, general.** Where this section is indicated to be applicable in Table 302.1, new buildings and structures, site disturbance, and development of land shall be prohibited within *flood hazard areas*.

**402.2.2 Flood hazard area preservation, specific.** Where this section is indicated to be applicable in Table 302.1, new buildings and structures, site disturbance, and development of land shall be prohibited within the specific *flood hazard areas* established pursuant to local land use authority.

**402.2.3 Development in flood hazard areas.** New buildings, structures and *substantial improvements* constructed in *flood hazard areas* shall be in compliance with Section 1612 of the *International Building Code* provided the lowest floors are elevated or dry floodproofed to not less than 1 foot (25 mm) above the elevation required by Section

1612 of the *International Building Code*, or the elevation established by the jurisdiction, whichever is higher.

**402.3 Surface water protection.** Where this section is indicated to be applicable in Table 302.1, buildings and building site improvements shall not be located over, or located within a buffer as established by the jurisdiction, around or adjacent to oceans, lakes, rivers, streams and other bodies of water that support or could support fish, recreation or industrial use. The buffer shall be measured from the ordinary high-water mark of the body of water.

#### Exceptions:

1. Buildings and associated site improvements specifically related to the use of the water including, but not limited to, piers, docks, fish hatcheries, and habitat restoration facilities, shall be permitted where the impacts of the construction and location adjacent to or over the water on the habitat is mitigated.
2. Buildings and associated site improvements shall be permitted where a wetlands permit has been issued under a national wetlands permitting program or otherwise issued by the authority having jurisdiction.

**402.4 Wetland protection.** Buildings and building site improvements shall not be located within a wetland or within a buffer as established by the jurisdiction around a wetland.

**Exception:** Buildings and associated site improvements specifically related to the use of the wetland including, but not limited to, piers, docks, fish hatcheries, and habitat restoration facilities, shall be permitted where the impacts of the construction and location adjacent to or over the wetland on the habitat are mitigated.

**402.5 Conservation area.** Where this section is indicated to be applicable in Table 302.1, site disturbance or development of land in or within 50 feet (15 240 mm) of a designated conservation area shall not be permitted.

**Exception:** Buildings and associated site improvements located in or within 50 feet (15 240 mm) of a conservation area shall be permitted where the building and associated site improvements serve a purpose related to the conservation area as determined by the authority that designated the conservation area.

**402.6 Agricultural land.** Where this section is indicated to be applicable in Table 302.1, buildings and associated site improvements shall not be located on land zoned for agricultural purposes.

**Exception:** Buildings and associated site improvements shall be permitted to be located on agriculturally zoned land where the building serves an agriculturally related purpose, including, but not limited to, primary residence, farmhouse, migrant workers housing, farm produce storage, processing and shipping.

**402.7 Greenfield sites.** Where this section is indicated to be applicable in Table 302.1, site disturbance or development shall not be permitted on *greenfield* sites.

**Exception:** The development of new buildings and associated site improvements shall be permitted on *greenfield* sites where the jurisdiction determines that adequate infrastructure exists, or will be provided, and where the sites comply with not less than one of the following:

1. The *greenfield* site is located within  $\frac{1}{4}$  mile (0.4 km) of developed residential land with an average density of not less than 8 dwelling units per acre (19.8 dwelling units per hectare).
2. The *greenfield* site is located within  $\frac{1}{4}$  mile (0.4 km) distance, measured over roads or designated walking surfaces, of not less than 5 diverse uses and within  $\frac{1}{2}$  mile (0.8 km) walking distance of not less than 7 diverse uses. The diverse uses shall include not less than one use from each of the following categories of diverse uses: retail, service, or community facility.
3. The *greenfield* site has access to transit service. The building on the building site shall be located in compliance with one of the following:
  - 3.1. Within  $\frac{1}{4}$  mile (0.4 km) distance, measured over designated walking surfaces, of existing or planned bus or streetcar stops.
  - 3.2. Within  $\frac{1}{2}$  mile (0.8 km) distance, measured over designated walking surfaces, of existing or planned rapid transit stops, light or heavy passenger rail stations, ferry terminals, or tram terminals.
4. The *greenfield* site is located adjacent to areas of existing development that have connectivity of not less than 90 intersections per square mile (35 intersections per square kilometer). Not less than 25 percent of the perimeter of the building site shall adjoin, or be directly across a street, public bikeway or pedestrian pathway from the qualifying area of existing development.
  - 4.1. Intersections included for determination of connectivity shall include the following:
    - 4.1.1. Intersections of public streets with other public streets;
    - 4.1.2. Intersections of public streets with bikeways and pedestrian pathways that are not part of a public street for motor vehicles; and
    - 4.1.3. Intersections of bikeways and pedestrian pathways that are not part of a public street for motor vehicles with other bikeways and pedestrian pathways that are not part of a public street for motor vehicles.

4.2. The following areas need not be included in the determination of connectivity:

- 4.2.1. Water bodies, including, but not limited to lakes and wetlands.
- 4.2.2. Parks larger than  $\frac{1}{2}$  acre (2023 m<sup>2</sup>), designated conservation areas and areas preserved from development by the jurisdiction or by the state or federal government.
- 4.2.3. Large facilities including, but not limited to airports, railroad yards, college and university campuses.

**402.7.1 Site disturbance limits on greenfield sites.** For *greenfield* sites that are permitted to be developed, site disturbances shall be limited to the following areas:

1. Within 40 feet (18 288 mm) of the perimeter of the building;
2. Within 15 feet (4572 mm) of proposed surface walkways, roads, paved areas and utilities;
3. Within 25 feet (7620 mm) of constructed areas with permeable surfaces that require additional staging areas to limit compaction in the constructed areas.

## SECTION 403 STORMWATER MANAGEMENT

**403.1 Stormwater management.** Stormwater management systems, including, but not limited to, infiltration, evapo-transpiration; rainwater harvest and runoff reuse; shall be provided and maintained on the building site.

**403.1.1 Increased runoff.** Stormwater management systems shall address the increase in runoff that would occur resulting from development on the building site and shall either:

1. Manage rainfall onsite and size the management system to retain not less than the volume of a single storm that is equal to the 95<sup>th</sup>-percentile rainfall event as recorded by the National Climatic Data Center or other approved precipitation records and all smaller storms and maintain the predevelopment natural runoff; or
2. Maintain or restore the predevelopment stable, natural runoff hydrology of the site throughout the development or redevelopment process. Postconstruction runoff rate, volume, and duration shall not exceed predevelopment rates. The stormwater management system design shall be based, in part, on a hydrologic analysis of the building site.

**403.1.2 Adjoining lots and property.** The stormwater management system shall not redirect or concentrate off-site discharge that would cause increased erosion or other drainage related damage to adjoining lots or public property.

**403.1.3 Brownfields.** Stormwater management systems on areas of *brownfields* where contamination is left in

place shall not use infiltration. Stormwater management systems shall not penetrate, damage, or otherwise compromise remediation actions at the building site.

**403.2 Coal tar sealants.** Coal tar sealants shall not be used in any application exposed to stormwater, wash waters, condensates, snowmelt, icemelt or any source of water that could convey coal tar sealants into soils, surface waters or groundwaters.

## SECTION 404 LANDSCAPE IRRIGATION AND OUTDOOR FOUNTAINS

**404.1 Landscape irrigation systems.** Irrigation of exterior landscaping shall comply with Sections 404.1.1 and 404.1.2.

**404.1.1 Water for outdoor landscape irrigation.** Outdoor landscape irrigation systems shall be designed and installed to reduce potable water use by 50 percent from a calculated mid-summer baseline in accordance with Section 404.1.2 or, where permitted by State regulation or local ordinances, the system shall be supplied by municipal reclaimed water or with *alternate onsite nonpotable water* complying with Chapter 7.

**Exceptions:** Potable water is permitted to be used as follows:

1. During the establishment phase of newly planted landscaping.
2. To irrigate food production.
3. To supplement nonpotable water irrigation of shade trees provided in accordance with Section 408.2.3.
4. Potable water is permitted for landscape irrigation where approved by local ordinance or regulation.

**404.1.2 Irrigation system design and installation.** Where in-ground irrigation systems are provided, the systems shall comply with all of the following:

1. The design and installation of outdoor irrigation systems shall be under the supervision of an irrigation professional accredited or certified by an appropriate local or national body.
2. Landscape irrigation systems shall not direct water onto building exterior surfaces, foundations, exterior paved surfaces or adjoining lots. Systems shall not generate runoff.
3. Where an irrigation control system is used, the system shall be one that regulates irrigation based on weather, climatological or soil moisture status data. The controller shall have integrated or separate sensors to suspend irrigation events during rainfall.
4. Irrigation zones shall be based on plant water needs with plants of similar need grouped together. Turf-

grass shall not be grouped with other plantings on the same zone.

5. Microirrigation zones shall be equipped with pressure regulators that ensure zone pressure is not greater than 40 psi (275.8 kPa), filters, and flush end assemblies.
6. Irrigation sprinklers shall:
  - 6.1. Have nozzles with matched precipitation rates.
  - 6.2. Be prohibited on landscape areas less than 4 feet (1230 mm) in any dimension.
  - 6.3. Be prohibited on slopes greater than 1 unit vertical to 4 units horizontal (25-percent slope).

**Exception:** Where the application rate of the irrigation sprinklers is less than or equal to 0.5 inches (12.7 mm) per hour.

- 6.4. Be permitted for use on turfgrass and crop areas only excepting microsprays of a flow less than 45 gallons (170 liters) per hour.
- 6.5. If of the pop-up configuration, pop-up to a height of not less than 4 inches (101 mm).
- 6.6. Only be installed in zones composed exclusively of irrigation sprinklers and shall be designed to achieve a lower quarter distribution uniformity of not less than 0.65.

**404.2 Outdoor ornamental fountains and water features.**

Where available and *approved* for use by the authority having jurisdiction, alternate nonpotable onsite water sources complying with Chapter 7 shall be used for outdoor ornamental fountains and other water features constructed or installed on a building site. Where the fountain or water feature is the primary user of the building site's nonpotable water source, a potable makeup water connection is prohibited.

**Exception:** Outdoor ornamental fountains and water features are allowed to use potable water provided water is recirculated and there is not an automatic refill valve connection to a source of potable water, and provided that either:

1. The catch basin or reservoir is no greater than 100 gallons (379 L); or
2. Less than 20 square feet (1.86 m<sup>2</sup>) of water surface area is exposed.

**404.2.1 Treatment.** The treatment required to maintain appropriate water quality shall be determined by the authority having jurisdiction.

**404.2.2 Recirculation.** Outdoor ornamental fountains and water features shall be equipped to recirculate and reuse the supplied water.

**404.2.3 Signage.** Signage in accordance with Chapter 7 shall be posted at each outdoor ornamental fountain and water feature where nonpotable water is used.

**SECTION 405  
MANAGEMENT OF VEGETATION, SOILS AND  
EROSION CONTROL**

**405.1 Soil and water quality protection.** Soil and water quality shall be protected in accordance with Sections 405.1.1 through 405.1.6.

**405.1.1 Soil and water quality protection plan.** A soil and water quality protection plan shall be submitted by the owner or the owner's authorized agent and *approved* prior to construction. The protection plan shall address the following:

1. A soils map, site plan, or grading plan that indicates designated soil management areas for all site soils, including, but not limited to:
  - 1.1. Soils that will be retained in place and designated as vegetation and soil protection areas (VSPAs).
  - 1.2. Topsoils that will be stockpiled for future reuse and the locations for the stockpiles.
  - 1.3. Soils that will be disturbed during construction and plans to restore disturbed soils and underlying subsoils to soil reference conditions.
  - 1.4. Soils that will be restored and re-vegetated.
  - 1.5. Locations for all laydown and storage areas, parking areas, haul roads and construction vehicle access, temporary utilities and construction trailer locations.
  - 1.6. Treatment details for each zone of soil that will be restored, including the type, source and expected volume of materials, including compost amendments, mulch and topsoil.
  - 1.7. A narrative of the measures to be taken to ensure that areas not to be disturbed and areas of restored soils are protected from compaction by vehicle traffic or storage, erosion, and contamination until project completion.
2. A written erosion, sedimentation and pollutant control program for construction activities associated with the project. The program shall describe the best management practices (BMPs) to be employed including how the BMPs accomplish the following objectives:
  - 2.1. Prevent loss of soil during construction due to stormwater runoff or wind erosion, including the protection of topsoil by stockpiling for reuse.
  - 2.2. Prevent sedimentation of stormwater conveyances or *receiving waters* or other public infrastructure.
  - 2.3. Prevent polluting the air with dust and particulate matter.

- 2.4. Prevent runoff and infiltration of other pollutants from construction site, including, but not limited to thermal pollution, concrete wash, fuels, solvents, hazardous chemical runoff, pH and pavement sealants. Ensure proper disposal of pollutants.

- 2.5. Protect from construction activities the designated vegetation and soil protection areas, *flood hazard areas* and other areas of vegetation that will remain on site.

3. A written periodic maintenance protocol for landscaping and stormwater management systems, including, but not limited to:

- 3.1. A schedule for periodic watering of new planting that reflects different water needs during the establishment phase of new plantings as well as after establishment. Where development of the building site changed the amount of water reaching the preserved natural resource areas, include appropriate measures for maintaining the natural areas.

- 3.2. A schedule for the use of fertilizers appropriate to the plants species, local climate and the preestablishment and post-establishment needs of the installed landscaping. Nonorganic fertilizers shall be discontinued following plant establishment.

- 3.3. A requirement for a visual inspection of the site after major precipitation events to evaluate systems performance and site impacts.

- 3.4. A schedule of maintenance activities of the stormwater management system including, but not limited to, cleaning of gutters, downspouts, inlets and outlets, removal of sediments from pretreatment sedimentation pits and wet detention ponds, vacuum sweeping followed by high-pressure hosing at porous pavement and removal of litter and debris.

- 3.5. A schedule of maintenance activities for landscaped areas including, but not limited to, the removal of dead or unhealthy vegetation; reseeding of turf areas; mowing of grass to a height that optimizes lawn health and retention of precipitation.

**405.1.2 Topsoil protection.** Topsoil that could potentially be damaged by construction activities or equipment shall be removed from areas to be disturbed and stockpiled on the building site for future reuse on the building site or other *approved* location. Topsoil stockpiles shall be secured and protected throughout the project with temporary or permanent soil stabilization measures to prevent erosion or compaction.

**405.1.3 Imported soils.** Topsoils or soil blends imported to a building site to serve as topsoil shall not be mined from the following locations:

1. Sites that are prime farmland, unique farmland, or farmland of statewide importance.
2. *Greenfield* sites where development is prohibited by Section 402.7.

**Exception:** Soils shall be permitted to be imported from the locations in Items 1 and 2 where those soils are a byproduct of a building and building site development process provided that imported soils are reused for functions comparable to their original function.

**405.1.4 Soil reuse and restoration.** Soils that are being placed on a building site shall be prepared and placed in a manner that establishes the ability of the soil to support the vegetation that has been retained and that will be planted. Soil reuse and restoration shall be in accordance with Sections 405.1.4.1 and 405.1.4.2.

**405.1.4.1 Preparation.** Before placing stockpiled or imported topsoil, compliance with all of the following shall occur:

1. Areas shall be cleared of debris including, but not limited to, building materials, plaster, paints, road base type materials, petroleum based chemicals, and other harmful materials;
2. Areas of construction-compacted subsoil shall be scarified; and
3. The first lift of replaced soil shall be mixed into this scarification zone to improve the transition between the subsoil and overlying soil horizons.

**Exception:** Scarification is prohibited in the following locations:

1. Where scarification would damage existing tree roots.
2. On inaccessible slopes.
3. On or adjacent to trenching and drainage installations.
4. On areas intended by the design to be compacted such as abutments, footings, inslopes.
5. *Brownfields*.
6. Other locations where scarification would damage existing structures, utilities and vegetation being preserved.

**405.1.4.2 Restoration.** Soils disturbed during construction shall be restored in areas that will not be covered by buildings, structures or hardscapes. Soil restoration shall comply with the following:

1. Organic matter. To provide appropriate organic matter for plant growth and for water storage and infiltration, soils shall be amended with a mature, stable compost material so that not less than the top 12 inches (305 mm) of soil contains not less than 3 percent organic matter. Sphagnum peat or

organic amendments that contain sphagnum peat shall not be used. Soil organic matter shall be determined in accordance with ASTM D2974. Organic materials selected for onsite amendment or for blending of imported soils shall be renewable within a 50-year cycle.

**Exception:** Where the reference soil for a building site has an organic level depth other than 12 inches (305 mm), soils shall be amended to organic matter levels and organic matter depth that are comparable to the site's reference soil.

2. Additional soil restoration criteria. In addition to compliance with Item 1, soil restoration shall comply with not less than three of the following criteria:

2.1. Compaction. Bulk densities within the root zone shall not exceed the densities specified in Table 405.1.2 and shall be measured using a soil cone penetrometer in accordance with ASABE S313.3. The root zone shall be not less than 12 inches (305 mm) nor less than the site's reference soil, whichever results in the greater depth of measurement. Data derived from a soil cone penetrometer shall be reported in accordance with ASABE EP542.

2.2. Infiltration rates. Infiltration rates or saturated hydraulic conductivity of the restored soils shall be comparable to the site's reference soil. Infiltration rates shall be determined in accordance with ASTM D3385 or ASTM D5093. For sloped areas where the methods provided in the referenced standards cannot be used successfully, alternate methods *approved* by the *code official* shall be permitted provided that the same method is used to test both reference soil and onsite soil.

2.3. Soil biological function. Where remediated soils are used, the biological function of the soils' mineralizable nitrogen shall be permitted as a proxy assessment of biological activity.

2.4. Soil chemical characteristics. Soil chemical characteristics appropriate for plant growth shall be restored. The pH, cation exchange capacity and nutrient profiles of the original undisturbed soil or the site's reference soil shall be matched in restored soils. Salinity suitable for regionally appropriate vegetation shall be established. Soil amendments and fertilizers shall be selected from those that minimize nutrient loading to waterways or groundwater.

**TABLE 405.1.2  
MAXIMUM CONE PENETROMETER READINGS**

SURFACE RESISTANCE (PSI)		SUBSURFACE RESISTANCE (PSI)	
All Textures Sand	Sand (includes loamy sand, sandy loam, sandy clay loam, and sandy clay)	Silt (includes loam, silt loam, silty clay loam, and silty clay)	Clay (includes clay loam)
110	260	260	225

**405.1.5 Engineered growing media.** Where engineered growing media are used onsite, including, but not limited to vegetative roofs, trees located within hardscape areas, and special soils specified for wetlands and environmental restoration sites, such media shall comply with the best available science and practice standards for that engineered growing media and use.

**405.1.6 Documentation.** The following shall be provided to document compliance with Sections 405.1.3 through 405.1.5:

1. Documentation, such as receipts from a soil, compost and amendments supplier, to demonstrate that techniques to restore soil occurred; and
2. Soil test results to demonstrate that the selected techniques achieved the criteria of Section 405.1.4.2. Not less than two soil tests shall be conducted on the building site. For building sites where more than 8,000 square feet (744 m<sup>2</sup>) of soil is to be disturbed during construction, there shall be not less than one report for every 4,000 square feet (372 m<sup>2</sup>) disturbed or report frequency as determined by the registered design professional.

**405.2 Vegetation and soil protection.** Vegetation and soils shall be protected in accordance with Sections 405.2.1 and 405.2.2.

**405.2.1 Vegetation and soil protection plan.** Where existing soils and vegetation are to be protected, a vegetation and soil protection plan establishing designated vegetation and soil protection areas (VSPAs) shall be submitted with the construction documents and other submittal documents. The protection plan shall address the following:

1. Identification of existing vegetation located on a building site that is to be preserved and protected.
2. Identification of portions of the building site to be designated as vegetation and soil protection areas (VSPAs) that are to be protected during the construction process from being affected by construction activities.
3. Specification of methods to be used such as temporary fencing or other physical barriers to maintain the protection of the designated vegetation and soil protection areas (VSPAs).
4. Specification of protected perimeters around trees and shrubs that are to be included in the designated

vegetation and soil protection areas (VSPAs). Perimeters around trees shall be identified as a circle with a radius of not less than 1 foot (305 mm) for every inch (25 mm) of tree diameter with a radius of not less than 5 feet (1524 mm). The perimeters around shrubs shall be not less than twice the radius of the shrub.

**Exception:** *Approved* alternative perimeters appropriate to the location and the species of the trees and shrubs shall be permitted.

5. Specification of methods to protect the viability of the designated vegetation and soil protection areas (VSPAs) to support the remaining vegetation at the conclusion of the construction process including minimizing impacts on the existing stormwater drainage patterns associated with the VSPAs.
6. Identification of plans, methods and practices used to designate essential areas of soil and subsoil disturbance.

**405.2.1.1 Tree protection zones (TPZ).** Where tree protection zones are specified, the specifications and documentation shall be in accordance with Part 5 of TCIA/ANSI A300.

**405.2.2 Invasive plant species.** *Invasive plant species* shall not be planted on a building site. A management plan for the containment, removal and replacement of any *invasive plant species* currently on the site shall be generated based on either published recommendation for the referenced invasive plant or guidance prepared by a qualified professional. Existing vegetation that is to be retained on a building site shall be protected as required by Section 405.2.

**405.3 Native plant landscaping.** Where new landscaping is installed as part of a site plan or within the building site, not less than 75 percent of the newly landscaped area shall be planted with native plant species.

**SECTION 406  
BUILDING SITE WASTE MANAGEMENT**

**406.1 Building site waste management plan.** A building site waste management plan shall be developed and implemented to divert not less than 75 percent of the land-clearing debris and excavated soils from disposal. Land-clearing debris includes rock, trees, stumps and associated vegetation. The plan shall include provisions that address all of the following:

1. Materials to be diverted from disposal by efficient usage, recycling or reuse on the building site shall be specified.
2. Diverted materials shall not be sent to sites that are agricultural land, *flood hazard areas* or *greenfield* sites where development is prohibited by Section 402.1 except where *approved* by the *code official*.
3. The effective destruction and disposal of *invasive plant species*.