CITY OF COLUMBIA - COMMUNITY DEVELOPMENT
BUILDING AND SITE DEVELOPMENT DIV.
SITE/CIVIL PLAN REVIEW CHECKLIST

Site Plan Name: __________________________________________
Address: _______________________________________________________________________________________
Site Legal Description: ____________________________________________________________________________
Project #: ____________________ Date Reviewed: _______________ Review Engineer: __________

Y | N | N/A (Not Applicable)

Prior to Review

– Land Disturbance permit application & $200 fee when disturbance is 1 acre or more.
– MDNR Land Disturbance permit (if applicable), with MDNR permit number on cover sheet.
– Commercial Permit and Plan Review Application if 1st submittal or Response to Comments form if subsequent submittal.
– All Plans signed and sealed by a Professional Engineer licensed in the state of Missouri.

Preliminary Items

– Review Development Agreement, verify that items mentioned in Development Agreement are included in plans (if applicable).
– Review preliminary plat and final plat.
– Review conceptual stormwater management plan (if applicable).
– If Planned Development (PD) zoning, review ordinances for any stipulations attached to the project.

Plan Requirements

Cover Sheet

– Developer/Owner’s name, mailing address and telephone number.
– Survey Benchmark tied to City datum.
– Legal description of lot/property.
– Note that adjoining property owners must be notified in writing 30 days prior to construction.
– Vicinity Map not less than 1” = 1 mile. Must have sufficient landmarks to locate the site.
– Table showing impervious area of the site (pre and post development).
– Index of sheets.
– Project Title.
– Utility company contact information and One Call phone number.
– Zoning district of property.
– Legend of line types and symbols.
– If property is not located within the regulated floodplain, the following note should be provided:
  This tract is not located within a Flood Hazard Zone as defined in City Ord. 29-2.3(d)(4), per the Boone County FIRM Panel #__________________________, dated 4/19/17.
– If the property does not contain a stream buffer provide the following statement:
  This tract is not regulated by the City of Columbia Stream Buffer ordinance as determined by the USGS map for this area, and Article X of Chapter 12A of the City of Columbia Code of Ordinances.

Provide a General note which reads as follows:
In order to terminate a state operating permit the Missouri Department of Natural Resources (MDNR) requires that the permittee submit a completed Form H (included with the approved permit) to the MDNR. A permit is eligible for termination when either perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover shall be at least 70% of fully established plant density over 100% of the disturbed area. A copy of Form H should be submitted to the City at which time the City will remove the project from its inspection schedule.

Provide a General note which reads as follows:
Land disturbance sites shall be inspected on a regular schedule and within a reasonable time period (not to exceed 48 hours) following heavy rains. Regularly scheduled inspections shall be at a minimum of once per week. Any deficiencies shall be noted in a weekly report of the inspection and corrected with seven calendar days of the report. Contractors are required to submit to City inspection staff copies of their inspection reports required by the Stormwater Pollution Prevention Plan (SWPPP) on a monthly basis if requested.

Title blocks

– Project Name; Address (or site location if no address has yet been assigned); Sheet numbers;
– Date (and any subsequent revision dates); Plan type (i.e. Land Disturbance, Site Plan).
General

- North arrow and scale on each sheet of plans.
- Profile stationing generally to read left to right.
- Dimensions of lot boundary including bearings and angles.
- Does site meet current definition of “lot”? Site must be on a legal lot before issuance of any permits or licenses, per Ordinance 29-5.2(b)(1).
- All existing and proposed easements on or adjacent to the development must be shown. Limit lines, easement types & widths required, along w/ legal reference (book & page) for all existing easements.
- All existing utility locations with labels.
- Utilities to be relocated, with proposed locations and labels.
- Tracer wire test locations for new sanitary sewer connections.
- No items of work “by others” on plans with the exception of retaining walls.
- Retaining walls with a height of 4 feet or greater (measured from bottom-of-footing to top-of-wall), or that support a surcharge, require a submittal of detailed plans and calculations, sealed by a Missouri Professional Engineer, demonstrating compliance with IBC 1807.2. (This can be a deferred submittal.) Retaining walls under 4 feet in height do not require this submittal but must still be designed to comply with IBC 1807.2.
- Guards are required for drops of 30” or greater and must be called out on site plans. If no detail is shown, then all the requirements of I.B.C. 1015 must be listed. These include but are not limited to location required, strength/attachment requirements, height, opening limitations.
- For any retaining walls, the engineer who designs the wall shall provide a statement of whether a global stability analysis is required.
- Show limits of regulated floodplain (if applicable).
- Show limits of Stream Buffer (if applicable).
- Proposed easements: descriptions with exhibits to be submitted for checking by City Surveyor.

Right of way

- Existing & proposed street names, right-of-way lines & widths (“Variable” width unacceptable).
- Right of Use required for retaining walls, signs, etc. proposed in City right of way.

Site and Dimension Plans

- Scale: 1”=50’ or larger.
- Building to be dimensioned from the property line.
- All Building setback lines on the site.
- All paved areas dimensioned.
- All curb types/ locations indicated.
- Curb return radii dimensioned.
- Intra-site location map or match lines where plans stretch across multiple sheets.
- Pavement Marking Plan (Temporary and Permanent).
- Drive entrances to public streets.
  - Width labeled.
  - Concrete driveway in conformance with City standards.
  - No curb radii shown.
  - Sufficient spot elevation callouts to determine that the drive entrance meets ADA/ City specifications.
- Standard Details.
  - Adequate notes provided indicating each City standard detail number needed on the project and a general note indicating that the contractor is required to have a copy of the City’s latest edition of the Street and Storm Sewer Specifications and Standards on site at all times during construction.
  -OR-
  - All applicable City standard details provided in the approved set of site plans. Details must include the City’s title block indicating the revision date and detail number.
Grading Plan

- Scale (1”=50’ or larger) and north arrow.
- Existing/Proposed elevation contours at no more than 2 foot interval.
- Grading Limits.
- Ground Slopes - Maximum ground slope is 3H:1V, unless a long-term slope stability analysis performed by a qualified professional engineer licensed in the state of Missouri indicates an acceptable factor of safety. Fill slopes set back at least 12 in. from any property line.
- Spot elevation callouts, high points, and low points as needed.
- Low finished floor elevation for each proposed structure.
- Ensure adverse impact will not occur on adjacent sites, and no grading (or other work) on adjacent properties without written permission.
- Demonstrate compliance with Ordinance12A-71, regulating soil stockpiles. At a minimum list the ordinance requirements and their applicability to this site. A designated location for the stockpile would be preferred.

Stormwater Management Plan, Drainage Map, and Calculations (Ord. 12A-85 – 12A-95)

- Drainage area maps, including all onsite areas and all offsite areas that drain to the site. Scale 1”=100’ or larger for onsite areas (smaller scale allowed for large offsite drainages).
- Storm drainage system extended appropriately.
  - Public vs. Private storm sewer system clearly labeled.
  - Public storm sewer system minimizes length under pavement. Pipes should be perpendicular or parallel to street alignment unless otherwise unavoidable.
- Existing/Proposed storm sewers.
- Storm sewer structures.
  - Structure numbers labeled.
  - Inverts/top elevations indicated.
  - Adequate side clearance for pipes provided.
  - Minimum length and width provided.
  - Minimum structure depth provided.
- Direction of flow on roofs and downspouts.
- Drainage Calculations:
  - 10% design storm required.
  - 1% Storm overflow system provided – per Section 4.7 of the Stormwater Management and Quality (SMWQ) Manual. Cannot cause backwater onto adjacent property for 1% and lesser storm event.
  - Must discharge to appropriate downstream drainage system – can’t shift, concentrate or increase flow unless adequate storm facilities are available.
  - Information provided must be equivalent to Figures 7.3.1 – 7.3.3 of the SMWQ Manual.
  - “K” and “C” values match table 2.2.1.1 and 2.2.1.2 of SMWQ Manual.
  - Time of Concentration (Tc) based on 100’ max overland flow length (Calculations required for Tc > 5 min.)
  - Manning’s “n” (RCP=.013, HDPE = 0.011, CMP=0.024 typically).
- Storm Profiles:
  - Profile required for storms pipes with two or more pipe runs.
  - Existing/proposed ground line.
  - Stationing / Elevation (inverts and top) / Structure numbers.
  - Pipe length, diameter, slope and type.
  - Pipe orientation for structures with two or more pipes. Max 90° angle change.
  - Structure size and type. No discharging a larger pipe into a smaller one.
  - Top of pipe doesn’t encroach into inlet throat.
  - Adequate vertical drop through the manhole (0.2”).
Minimum cover of 12 inches on top of the pipe.
Maximum pipe run of 500 feet between access points.
Minimum pipe slope of 0.4% / Velocity in system between 2 and 15 fps. No appreciable decrease in velocity at inlets, bends, etc.
Design storm Hydraulic Grade Line (HGL) at each structure, for Public system. HGL to be 0.5’ below any openings to the ground or street at all locations. (Even if designed for open channel flow, need to demonstrate energy losses haven’t pushed it into pressure flow.)
No bends in pipes smaller than 33 inches.
Pipe crown elevations entering a structure above/at crown of existing pipe.

Box Culverts:
Built to MoDOT specifications.
Calculations with headwater and tailwater depths.

Pipes:
Appropriate embedment (per std. details 540.01 or 540.02 for Public system).
Cover not less than manufacturer recommendation or 1’, whichever is greater.
Minimum pipe size in public system = 12”, 15” under pavement.
Toe walls and Flared end sections.

Outlets:
Grade for positive drainage at outlet.
Flowline indicated for end of pipe and end section.
Adequate outlet protection (per std. detail 530.03 for Public system).

Engineered Channels:
1% storm completely contained, w/ freeboard of 1’ below FFE of structures.
Velocity: max 6 fps (flow depth > 6”); 15 fps or limit of lining (depth < 6”).
Lining material – permissible shear stress within limits of Table 5.2.7.1. of SMWQ Manual
Lining height: design storm profile +0.5’. Sideslopes 2.5:1 max or 3:1 max (turf).
Height, width, sideslopes, min. grade, 100-yr WSE shown.
Storm drainage easements to be at least 16 feet wide and centered on pipe. Document must meet all recording requirements for conveyances as determined by the City’s Law Dept.

Tributary areas in non-R-1, R-2 or planned district equivalents must not allow 3,000 square feet of impervious area to drain across sidewalks (or 9,000 square feet of sodded area).
For re-development sites on an acre that have post-development stormwater flows greater than pre-development flows, include a note stating that analysis was performed which indicates that the increase in impervious area resulting from this project will not have any adverse effects on adjoining or neighboring property.
If re-development, follow flowchart, Fig. 6.8.1 of Stormwater Management and Water Quality (SMWQ) Manual.
If re-development, is site upstream of critical area? If yes, contact Stormwater Utility for detention requirements. For small sites, see Guidance dated 5/6/14.
Scaled maps showing pre- and post-development CN areas, and Drainage area maps showing all onsite and offsite areas that drain to each stormwater management BMP. Scale 1”=100’ or larger.

Detention -- Detention Checklist included later in this document.
Water Quality - Ch. 6.8 of SMWQ Manual: Individual BMP Checklists included later in this document.
Pre and Post development CN Calculations.
Level of Service Calculations. Permanent BMP’s adequate to meet required LOS.
Cross section provided for any BMP’s utilized.
Water Quality volume (WQv) calculated using Sec 2.3 of the SMWQ Manual. For conveyance BMPs, calculate Peak Discharge.
Permanent Access & Buffers for Stormwater Management Facility - Ch. 6.2 SMWQ:

- The water surface of the design storage pool minimum 20’ from structures, or greater if bldg. foundations or if slope stability is a consideration.
- Min. 2’ separation between the maximum ponding elevation and the lowest floor of applicable surrounding structures.
- Min. 15’ wide access strip for maintenance, with access from a street or parking area. Access needed for structures, inlet pipes, outlet pipes, spillways, etc.
- Right-of-use agreement needed where a public street crosses top of a permanent dam.
- Stormwater Management/BMP Covenant, with inspection schedule and forms. Please send original, executed and notarized document. Document must meet all recording requirements for conveyances as determined by the City’s Law Dept.

Erosion and Sediment Control Plan (ordinance 12A-66 – 12A-71)

- Stormwater Pollution Prevention Plan (SWPPP) is required if disturbed area > 1 acre.
- Project Narrative (Ord 12A-68) – Required for all projects needing Land Disturbance Permit.
  - Project description, explanation of existing significant problems.
  - Factors affecting runoff - existing & post-development.
  - Total disturbed area (in acres or sq. feet).
  - Limits of Disturbance shown.
  - Calc of peak runoff from 10-year freq., 24-hr. duration storm.
  - Explanation of selection of BMPs.
  - Minimum of 2 rows of silt fence at the toe of all slopes adjacent to a stream.

Initial BMP Installation Plan – temporary erosion control measures (Ord. 12A-70).

- Perimeter control BMPs (sediment fence, etc.)
- Ditch checks – straw bales not effective.
- Protection of inlets.
- Protection of adjacent properties.
- Stabilized Construction entrance.
- Stabilized parking/delivery/staging area.
- Diversion of offsite water around disturbance when feasible.
- Sediment basins (when required).
- Concrete wash out area.
- Other BMP’s.

Staged BMP Plan - Provide a separate or staged plan or notes that clearly indicate required erosion control BMPs for each stage of construction, e.g. grading, paving, building const., final stabilization.

Silt Basins–required for common, disturbed drainage areas over 10 ac. (per City’s DNR Operating permit.)

- Design information and calculations provided.
- Permanent Emergency Spillway with adequate protection.
- All inflow pipe flowlines above cleanout level.
- Riser pipe size/perforations indicated (when applicable).
- Anti-floatation device size indicated (when applicable).
- Baffles provided when necessary.

Plan shows ultimate removal of basin with notes regarding basin removal & clean out.

New Public Street or Sidewalk Plans

- Street plans meet all City requirements.
- Required Sidewalks shown. See Ord. 24-35 and 29-5.1(d).
- All Sidewalks & sidewalk ramps per City standards & specifications, with elevation callouts to demonstrate ADA compliance at ramps, across drive approaches, etc.
- General note provided which reads as follows:

  Contractor is responsible for notifying the BSD Right-of-Way Technician (874-7474), immediately prior to closure of street, during construction for inspections and again when work is complete and street is reopened:

- Grading in the public street ROW - Finished grade of ¼ to ¾ inch per foot towards the public street.
- Pavement cuts and patches per city standards.
Advisory: Prior to performing any work in City right-of-way or easement, the contractor must obtain a City Right of Way permit, which will include any required Temporary Traffic Control Plans and Pedestrian Traffic Control Plans. (ROW Permit application to be submitted by the contractor when construction schedule and other specifics are known.) All traffic control must meet MUTCD requirements. In addition, a Right-of-Way Closure Permit will be required for all street and/or sidewalk closures per Ordinance 24-41 through 46.

Other Permits (if applicable)

- MoDOT right-of-way permit required for all work in MoDOT jurisdiction.
- Floodplain Development permit required if regulated floodplain encroaches the site (even if outside limits of disturbance). In addition, an Elevation Certificate will be required for any proposed buildings before a Certificate of Occupancy is issued, which includes a post-construction survey.
- Work near water ways: provide Corps of Engineers 404 permit or proof that no permit is needed. If 404 is needed, also need US Fish & Wildlife & MDNR Endangered Species clearance.
- City of Columbia Right-of-Use for signs, retaining walls, etc. in City ROW.

Rain Gardens

- Maximum contributing area of 1 acre.
- Maximum ponding in depressional area of 3 days.
- Placement of rain gardens is to be 10 feet away from building foundations.
- Soils test to be provided (percolation test).

Bioretention

- Pretreatment.
- Ponding Area.
- Organic Mulch Layer.
- Planting Soil Bed - < 10% clay. With sufficient permeability.
- Sand Bed.
- Plants- detailed planting plan for the specific shape of each basin showing number, species and size of each planting.
- Water Level Control Structure.
- Side Slopes to be 3:1 or flatter and 25% of perimeter to be 5:1 or flatter.
- WQ\textsubscript{v} to be filtered through the planting soil in 1-3 days.
- Tributary area less than 4 acres.
- 1 cleanout per run and every 50 feet or less.
- Overflow that safely passes up to and including the 100 year storm event.
- Planting depth at least 2.5 feet deep.
- Ponding area at least 6 inches deep.
- K value to be between 1 and 2.

Pervious Pavement Systems

- Water Quality storm infiltrates into soil.
- Contributing area to pervious pavement to be less than a 3:1 ratio.
- 12 hour drain time used.

Extended Wet Detention

- Sediment forebay holding at least 10% of WQ\textsubscript{v} and 4-6 feet deep, formed by acceptable barrier.
- Permanent pool depths between 4-12 feet.
- WQ\textsubscript{v} above the permanent pool.
- WQ\textsubscript{v} to discharge over a period of 40 hours.
- Flow path to have a minimum length of three times the facility width, as measured across the center of the facility in the smallest dimension at the permanent pool elevation.
- Erosion protection provided at facility’s outfall.

Extended Dry Detention Basin

- Placed outside of stream corridors and stream buffer zones.
- Sized to treat the WQ\textsubscript{v} and discharge over a period of 40 hours.
Sediment forebay that captures 10% of the WQ_v and is 4-6 feet deep.

Basin depth between 2-5 feet for the WQ_v.

Side Slopes to be 3:1 or flatter and 25% of perimeter to be 5:1 or flatter.

1 foot of freeboard when detaining the WQ_v.

Erosion protection to be provided at facility’s outfall.

Turf Swale

Side slopes to be no steeper than 3:1.

Longitudinal slope at least 1%.

Velocity for 2 year storm must not exceed 4 fps or erosive velocity for turf.

Drainage area of 5 acres or less.

Surface storage of WQ_v maximum depth of 18 inches.

Stormwater Management BMPs – Detention—(Ch 6.4 - 6.7 of SMWQ Manual)

The default detention requirement is Flood Prevention Detention, which is assumed. If Channel Protection detention is selected, need to show applicability and meet requirements of Ch. 6.1.

Detention calculations with inflow / outflow hydrographs of all drainage areas for the 1, 2, 10 and 100 year design storms.

The maximum release rate shall be controlled by limiting the post-development storm water release rates to the predevelopment rates for the 1, 2, 10 and 100 year, 24 hour design storms.

Pre development CN = 78 max.

Ensure proper Time of Concentration (Tc) is used.

Redevelopment projects: If detention reduction is applicable, adjust CN appropriately.

Rate of inflow to the storage facility and all hydrologic considerations must include all tributary areas to the detention basin under existing conditions and fully developed conditions.

Stage-Storage curve.

Stage-outflow curve.

Required detention parameters provided in calculations or on plans:

- Total site area, acres.
- Total area to basin, acres.
- Off-site area to basin, acres.
- Percent impervious of total site, Pre-developed, %.
- Percent impervious of total site, Post-developed, %.
- Percent impervious of area to basin, Post-developed, %.
- Percent impervious of off-site area to basin, Post-developed, %.
- Storage volume at overflow, cf.
- Water elevation at 100-year storm, cfs.
- Orifice type and area, sf.

All designs shall include an emergency or overflow spillway which would pass excess flows greater than those of the 25 year design storms and overflows caused by clogging of the principal outlets. The emergency spillway shall be designed to safely pass the flow resulting from a 100-year frequency, 24-hour duration storm event.

Erosion control on the emergency or overflow spillway.

Cross section of emergency or overflow spillway including 100year storm design capacity, flowline elevation, 100 year design storm WSE, and top of berm elevation

Primary discharge is into an acceptable stormwater conveyance facility.

Proper side slopes per SMWQ Manual.

No detention structures shall be located within a designated 100-year flood plain.

No detention storage facility will be permitted within public street right-of-way without specific written approval from the Director of Public Works.

Orifice Design

- Orifice plate is stainless steel, aluminum, or ASTM A-123 galvanized with stainless steel fasteners, and sealant.
- Accessible trash rack on orifices smaller than 8” diameter.
Outlet orifice not impaired by tailwater.

Orifice plate can fit though access opening for future removal/replacement.

Underground Storage:

- Facility is Vented.
- Adequate access for maintenance/cleaning of vault and orifice.
- Bearing capacity of subgrade specified.
- All design dimensions, including depths of stone above and below chambers specified.
- Available storage volume calculated.

Cross section of dam including any compaction requirements.

Anti-seep collars – wet pond only.