

CADD Standards

Drawing Production Guidance

July 2015

This section of the CADD Standards manual provides plan preparation guidance for specific drawings. The sub sections are organized by drawing name. This section is not comprehensive. This documentation is ongoing and is not intended to replace other guidance in other parts of the Design Manual and Plan Preparation Guide.

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CADD Standards

075WL_*.dgn

July 2015

Section 075WL has been created for wetlands, mitigation and other environmental issues. This section shall be included on all projects where wetlands have been delineated. This section may be required even if there are no designed wetland impacts. This section is also intended to help communicate the avoidance of wetland impacts. This section is usually not required on projects that don't require a wetland review for environmental clearance. Contact the Environmental Section Leader if project circumstances are questionable.

Ensure the appropriate reference files are attached and displayed. See "Appendix A – Plan Sheet References" (<http://www.dot.nd.gov/manuals/design/caddmanual/appendixa.pdf#page=11>).

Additional drawing references may be required if a project includes temporary work such as bypasses or cofferdams. Drawings showing temporary earthwork should be displayed in the 075WL sheets even if it doesn't create impacts.

All information in the Wetland_Impacts.dgn should be display in the 075WL sheets. This includes:

- Delineated wetlands and other waters
- Hatching for both temporary and permanent wetland impacts
- Hatching for both temporary and permanent other water impacts
- Hatching for wetland mitigation
- Labels
 - Type of impacts and mitigation
 - Acreages and/or linear feet of impacts and mitigation
 - Wetland numbers
- Grading tie lines.

The control.dgn reference should display the following information at a minimum.

- Section lines
- Section, township and range labels (control drawings usually label this near section corners)

The design.dgn reference should display the following information at a minimum.

- Riprap
- Cultural avoidance areas
- Bridge outline (only needed for new or extended structures)

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The DS_Align.dgn reference should display the following information at a minimum.

- Controlling alignment and stationing (This feature is often referenced from control.dgn)

The DS_Util.dgn reference should display the following information at a minimum.

- Pipes
- Box culverts
- Flow lines

The Topog.dgn reference should display the following information at a minimum.

- Streams, rivers, sloughs, and lakes – Include names if identified.
- All drainage features – pipes, box culverts, inlets and bridges
- Level display for “existing wet area – vegetation break” features should be turned off.

The RW_Bndry.dgn reference should display the following information at a minimum.

- Existing right of way
- Proposed right of way
- Construction easements

Add north arrows to the individual cut sheets.

CADD Standards

076TE_*.dgn

July 2015

Section 076TE is used for Temporary Sediment and Erosion Control. These sheets are used in storm water pollution prevention plan (SWPPP) evaluations. This guidance addresses some of the information requirements for SWPPP sheets.

Ensure the appropriate reference files are attached and displayed. See “Appendix A – Plan Sheet References” (<http://www.dot.nd.gov/manuals/design/caddmanual/appendixa.pdf#page=11>).

All information in the T_Erosion_C.dgn should be display in the 076TE sheets.

The Wetland_Impacts.dgn reference display within the 076TE sheets requires level display adjustments. The exterior boundaries for all water bodies including delineated wetlands and wetland mitigation needs to be displayed, but all hatching levels within this reference need to be turned off. Most labels should also be turned off. The only labels from this reference that should be displayed in 076TE sheets are for “Grading Tie Lines”.

The DS_Util.dgn reference display within the 076TE sheets requires level display Adjustments. Proposed pipes and culverts are not shown in these sheets. The only thing from DS_Util.dgn that is displayed in these sheets is the flow lines. If temporary drainage patterns are different than the final drainage patterns, DS_Util.dgn doesn’t need to be displayed and the temporary flow lines from T_Erosion_C.dgn will be displayed.

The following are some other import referenced features. This list is not inclusive.

The control.dgn reference should display the following information at a minimum.

- Section lines
- Section, township and range labels (control drawings usually label this near section corners)

The design.dgn reference should display the following information at a minimum.

- Cultural avoidance areas
- Bridge outline (only needed for new or extended structures)

CADD Standards

The DS_Align.dgn reference should display the following information at a minimum.

- Controlling alignment and stationing (This feature is often referenced from control.dgn)

The Topog.dgn reference should display the following information at a minimum.

- Streams, rivers, sloughs, and lakes – Include names if identified.
- All drainage features – pipes, box culverts, inlets and bridges
- Level display for “existing wet area – vegetation break” features should be turned off.

The RW_Bndry.dgn reference should display the following information at a minimum.

- Existing right of way
- Proposed right of way
- Construction easements

Add north arrows to the individual cut sheets.

CADD Standards

077PE_*.dgn

July 2015

Section 077PE is used for Permanent Sediment and Erosion Control. These sheets are used in storm water pollution prevention plan (SWPPP) evaluations. This guidance addresses some of the information requirements for SWPPP sheets.

Ensure the appropriate reference files are attached and displayed. See “Appendix A – Plan Sheet References” (<http://www.dot.nd.gov/manuals/design/caddmanual/appendixa.pdf#page=11>).

All information in the P_Erosion_C.dgn should be displayed in the 077PE sheets.

The Wetland_Impacts.dgn should be referenced into the 077PE_*.dgn but display of several levels should be turned off. Use the following display settings for Wetland_Impacts.dgn.

Level	Display
Dim (wt 1)	on
Grading Tie Line	on
Grading Tie Text	on
Label Plan View Text	on
Other Water Line	off
Other Water Permanent Impact Pattern	off
Other Water Temporary Impact Pattern	off
Seeding Pattern (Wetland)	on
Wetland Creation Mitigation Line	on
Wetland Creation Mitigation Pattern	off
Wetland Delineated Line Exst *	off
Wetland Impact Permanent Hatch	off
Wetland Impact Temporary Hatch	off
Wetland Seeding Line	on

* Note, the “Wetland Delineated Line Exist” level from P_Erosion_C.dgn will be displayed instead.

Wetland seeding pay items should be paid (shown) on 077PE_*.dgn sheets.

The following are some other import referenced features. This list is not inclusive.

The control.dgn reference should display the following information at a minimum.

- Section lines
- Section, township and range labels (control drawings usually label this near section corners)

CADD Standards

The design.dgn reference should display the following information at a minimum.

- Riprap
- Cultural avoidance areas
- Bridge outline (only needed for new or extended structures)

The DS_Align.dgn reference should display the following information at a minimum.

- Controlling alignment and stationing (This feature is often referenced from control.dgn)

The DS_Util.dgn reference should display the following information at a minimum.

- 077PE sheets display proposed pipes and culverts where as 076TE sheets don't.
- Flow Lines

The Topog.dgn reference should display the following information at a minimum.

- Streams, rivers, sloughs, and lakes – Include names if identified.
- All drainage features – pipes, box culverts, inlets and bridges
- Level display for “existing wet area – vegetation break” features should be turned off.

The RW_Bndry.dgn reference should display the following information at a minimum.

- Existing right of way
- Proposed right of way
- Construction easements

Add north arrows to the individual cut sheets.

CADD Standards

Design.dgn

Aug 2014

Safety fence is used to protect cultural resources avoidance areas within an earthwork project. These areas should be marked with the cultural resource avoidance hatching. The only time safety fence should be drawn in design.dgn is when it is used to mark cultural resource avoidance areas. Safety fence used for normal purposes should be drawn in a consign.dgn

The outline of new bridges and box culverts should be drawn in the design.dgn with the “bridge-box culvert” line. Bridge design plan sheets are seldom drawn so that they can be geo-referenced. Designers may have to adjust referencing to trace – draw the bridge or box culvert outline. In some cases, the outline may have to be drawn from scratch by using the bridge drawing details.

CADD Standards

DS_Util.dgn

Aug 2014

All ditches must be marked with flow lines to indicate direction of flow.

CADD Standards

Environmental_Wetlands.dgn –Base Maps

July 2013

The MicroStation base maps have been updated to work with annotation scale and geographic coordinate systems (GCS). The NDDOT wetland database is maintained with ESRI (ArcMap) and it is exported to the following MicroStation wetland drawing by the environmental section.

R:\project\BaseMaps\Projected Coordinate Systems\Environmental_Wetlands.dgn

Designers should reference this drawing using the GCS tools within MicroStation. The appropriate project wetlands should be copied into the designer's wetland drawing (Wetland_Impacts.dgn). See Also Wetland_Impact guidance.

http://www.dot.nd.gov/manuals/design/caddmanual/AppendixQ/Wetland_Impacts_dgn.pdf

The drawings in the “base map” directory change over time because additional wetland delineation information is added for new projects. Project drawings should not be edited after they are signed and sealed even if the changes are not within the viewable limits. Copying wetlands to project files preserves a static copy.

Creating a copy of the wetlands for designers can also expedite and simplify plan production work. Information that is a considerable distance from the project limits can be deleted (Example you might not need delineation information on Hwy 281 if you are working on Hwy 20). Cross sections can be processed quicker if Geopak doesn't have to read about wetlands that are not directly related to the project limits.

As designers copy wetland information, they need to assure the copy will be updated if updates occur in the original map and are within their project limits.

CADD Standards

P_Erosion_C.dgn

July 2015

Permanent seeding is included in the P_Erosion_C.dgn. Seeding often extends beyond the Grading Tie Line for a better vegetation transition.

Final wetland shapes should be included in the P_Erosion_C.dgn. These shapes should be similar to the delineated wetlands shown in the Wetland_Impacts.dgn except with the permanently impacted areas trimmed off. The shapes should represent what the delineated wetlands will look like after construction. Mitigation areas should not be represented in these shapes. Wetland mitigation areas will be shown separately in other drawings.

The following is a recommend procedure for including the final wetland shapes in the P_Erosion_C.dgn:

1. Copy elements on both “Wetland Delineated Line Exist” and “Wetland Impact Permanent Hatch” levels into the P_Erosion_C.dgn. Do NOT copy “Wetland Impact Temporary Hatch” or “Wetland Creation Mitigation Pattern” levels.
2. The “Create Region” tool will use the active symbology. Maintain the appropriate US ACE Jurisdiction Color Indicator even though they will not be labeled. Set the active symbology to the applicable wetland;
 - a. Existing Wetland Jurisdictional
 - b. Existing Wetland Non-Jurisdictional
 - c. Existing Wetland Undefined Jurisdiction
3. Use the “Create Region” with the difference option to trim the “Wetland Impact Permanent Hatch” areas from the “Wetland Delineated Line Exist” Elements. If the “Keep Original” option is turned off, the “Wetland Impact Permanent Hatch” element will disappear when using the create region tool.
4. While using the CADD Standards and these recommended procedures, there should be no wetland hatching or wetland patterning in this final drawing.

NDDOT staff can view the following video:

S:\SUPPORT\How_To\Wetlands_for_P_Erosion_C.mp4

CADD Standards

T_Erosion_C.dgn

Aug 2014

If temporary drainage patterns are different than proposed, the temporary drainage patterns must be marked with flow lines within the T_Erosion_C.dgn. Indicate flow direction for all ditches and areas where appreciable flows enter or leave the DOT right of way.

CADD Standards

Wetland_Impacts.dgn

Aug 2014

The wetlands associated with a project shall be copied from the Environmental_Wetlands drawing into the Wetland_Impacts.dgn. The Designer is responsible for confirming with the ETS Division that copied information is current and appropriate for calculating impacts. The delineations in the base maps are occasionally updated. Some projects may have future delineation updates that should be used for your project. Designers should NOT assume the delineations are applicable just because they can reference and copy wetlands. Coordination between Design and ETS is always needed.

Consultants need to create a drawing named Environmental_Wetlands.dgn in order to access the Environmental task group. The wetlands are drawn in Environmental Wetlands drawing and then copied into the Wetland Impacts drawing. This step may not be intuitive, but it is based on separate NDDOT division and functions.

Delineated wetlands are symbolized 3 different ways; Existing Wetland Jurisdictional, Existing Wetland Non-Jurisdictional, Existing Wetland Undefined Jurisdiction . The wetland symbology should indicate US Army Corp of Engineers Jurisdiction when known.

Standard symbology settings for the Wetland_Impacts.dgn are found in the MicroStation task group named “Wetland_Impacts”.

The Wetland_Impacts drawing should indicate the “Grading Tie Line”. Geopak sometimes refers to this line as “Limits of Construction”. However the term “Limits of Construction” should NOT be used in any drawing labels. These lines should always be labeled “Grading Tie Line” to disassociate it from areas of ground disturbance. The Grading Tie Line may also indicate the type of grading tie.

- Grading Tie Cut Line (Green Solid Line)
- Grading Tie Fill Line (Red Dashed Line)
- Grading Tie Transition Line (White Dotted Line)

If it is helpful to show cut, fill and transitions in a plan view, all three of these lines should be labeled. If showing all three of these lines would create confusion then all of the “Grading Tie Line” symbology can be shown as the white dotted line used for Grading Tie Transition Line. These lines must be clearly labeled in the Wetland_Impacts drawing in order to avoid confusion.

The levels used for placing Grading Tie Line labels is important because this is the only label from the Wetland_Impacts drawing that will be displayed in the 076TE and 077PE sheets.

Include the wetland numbers from the wetland impact table. Usually these labels are copied from the Environmental_Wetlands drawing.

Use the “Wetland Impact Permanent” and “Wetland Impact Temporary” hatch tools to indicate permanent and temporary wetland impacts. Label impact acreage.

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The drawing element “Other Water Line” shall be used to delineate dry channels and deep water habitat (fill greater than 6.6 feet below existing water line). The patterning named “Other Water Permanent Impact” and “Other Water Temporary Impact” shall be used to indicate if these impacts are temporary or permanent. Label impact acreage.

Use the “Wetland Mitigation Line” and “Wetland Mitigation Pattern” tools to indicate wetland mitigation if applicable. Create a contour line indicating the location and bottom elevation for the wetland mitigation area. Addition labeling and dimensioning may also be helpful. If wetland shapes are irregular use northing and easting’s to indicate important points. The plans need to provide enough details to correctly construct the mitigation areas. Label mitigation acreage.

On site wetland mitigation usually requires additional plan preparation. The mitigation needs to be detailed on the cross section sheets. Additional cross sections may be needed (See Section 4.7.1 Cross Section Interval). If the mitigation wetlands have an irregular shape, additional information should also be included in the plans.

On site wetland mitigation may require special wetland seeding. There is a separate wetland seeding line and hatch that should be used in the Wetland_Impacts.dgn. Other permanent seeding should be included in P_Erosion_C. Other temporary seeding should be included in T_Erosion_C.

See the “Wetland Information Check List” for additional Guidance.

http://www.dot.nd.gov/manuals/design/designmanual/wordfiles_design/Wetland%20Information%20Guidance%20for%20NDDOT%20Designers.doc

CADD Standards

Xsec.dgn

July 2013

There are 3 different lines to represent “existing ground” in a cross section:

1. Exst Grnd (Existing Ground)
2. Exst Grnd Assumed (Existing Ground Assumed)
3. Exst Grnd Void (Existing Ground Void)

“Exst Grnd” is used in areas of reliable survey data. “Exst Grnd Assumed” is in areas of an obscured surface. The obscured areas are often represented with a separate dtm or tin. “Exst Grnd Assumed” should also be used in areas where designers make assumptions or guesses about the existing ground such as under water assumptions. “Exst Grnd Void” is for areas where there is no reliable survey data and no assumptions are being made. The Exst Grnd Void line is used just to provide a continuous surface.

The following wetland information should be shown on proposed cross sections if applicable.

- Limits of delineated wetland
- Limits of onsite mitigation area – Enough cross sections should be cut to clearly show beginning and end of the area along with the elevation. For example cross sections should be cut near the beginning, center and near the end of each mitigation site.
- Included “Other Waters” line to distinguish limits of deep water areas (water deeper than 6.6’)
- Important mitigation elevations should be labeled.
- If the mitigation wetlands have an irregular shape, additional information should also be included in the plans.