EROSION CONTROL AND STORMWATER MANAGEMENT REPORT

FOR

LANDIS RIDGE PHASE 2A

FEBRUARY 7TH, 2025

PREPARED FOR

ARCO DESIGN/BUILD

DESIGN BY: LOGAN CRISS, EIT
REVIEW BY: GARY ZURAWSKI, PE

1.0 Project Narrative

This report is for the proposed industrial project located on Olde Beatty Ford Road in Landis, NC. The project contains 1 industrial building with associated parking, utilities, and erosion control. The parcel contains 15.18 acres with a stream located on the East side of the proposed project area. This parcel is a part of a larger development called Landis Ridge, which is under construction. The parcel in this proposal is a separate project with separate permit requirements, but will be called Landis Ridge Phase 2A for clarity. The proposed project has a total disturbance of 22.47 acres. The site drains to one common convergence point. The entire site drains toward the southeast corner, with an existing drainage swale from the Landis Ridge project running along the eastern edge of the site. The site falls within the Coldwater Creek (Lake Fisher) water supply Watershed, which is a Surface water classification of Water supply IV, and is a Protected area (WS-IV P). It is also in the Yadkin River Basin. The site is zoned IND and its PIN number is 140-002.

1.1 Existing Conditions

The parcel's current land cover condition is undisturbed woodlands with a stream located on the east side of the site. Wetland and stream disturbance is below half an acre. A variety of different soil types are present on site, see the web soil survey in the appendix.

1.2 Proposed Conditions

The proposed site improvements consist of 1 industrial building with associated grading, utilities, and erosion control practices. Access to the site will be on Old Beatty Ford Road, through the currently under construction Landis Ridge Project. One sediment basin will be used to control sedimentation in disturbed areas for this parcel. This basin has been designed and maintained by others under separate cover. The runoff on site will be channelized and directed to the sediment basin via lined swales. Swales were sized and lined to control the 10-year, 5 minute storm. Additional erosion control measures including rock construction entrance, silt fence with associated outlets, inlet protection, and soil stockpiles are also utilized on site. The permanent pond for stormwater treatment will be a regional pond and will be designed by others under a separate cover and permit. See sheets C7.00 through C7.43 for details and sequencing.

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APPENDIX A.
QUADRANGLE MAP

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

CHINA GROVE QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 17S

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, July 2020 - July 2020
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1980 - 2022
Hydrography.....National Hydrography Dataset, 2002 - 2018
Contours.....National Elevation Dataset, 2008
Boundaries.....Multiple sources; see metadata file 2019 - 2021

Wetlands.....FWS National Wetlands Inventory Not Available

MN
GN
7°59´ 142 MILS
0°15´ 4 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
NV
Grid Zone Designation 17S

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

NORTH CAROLINA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Cleveland
2 Rowan Mills
3 Salisbury
4 Enochville
5 Rockwell
6 Kannapolis
7 Concord
8 Mount Pleasant

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

CHINA GROVE, NC
2022

NSN 7643016378620
NGA REF NO. USGSX24K8578

APPENDIX B.
SOIL REPORT

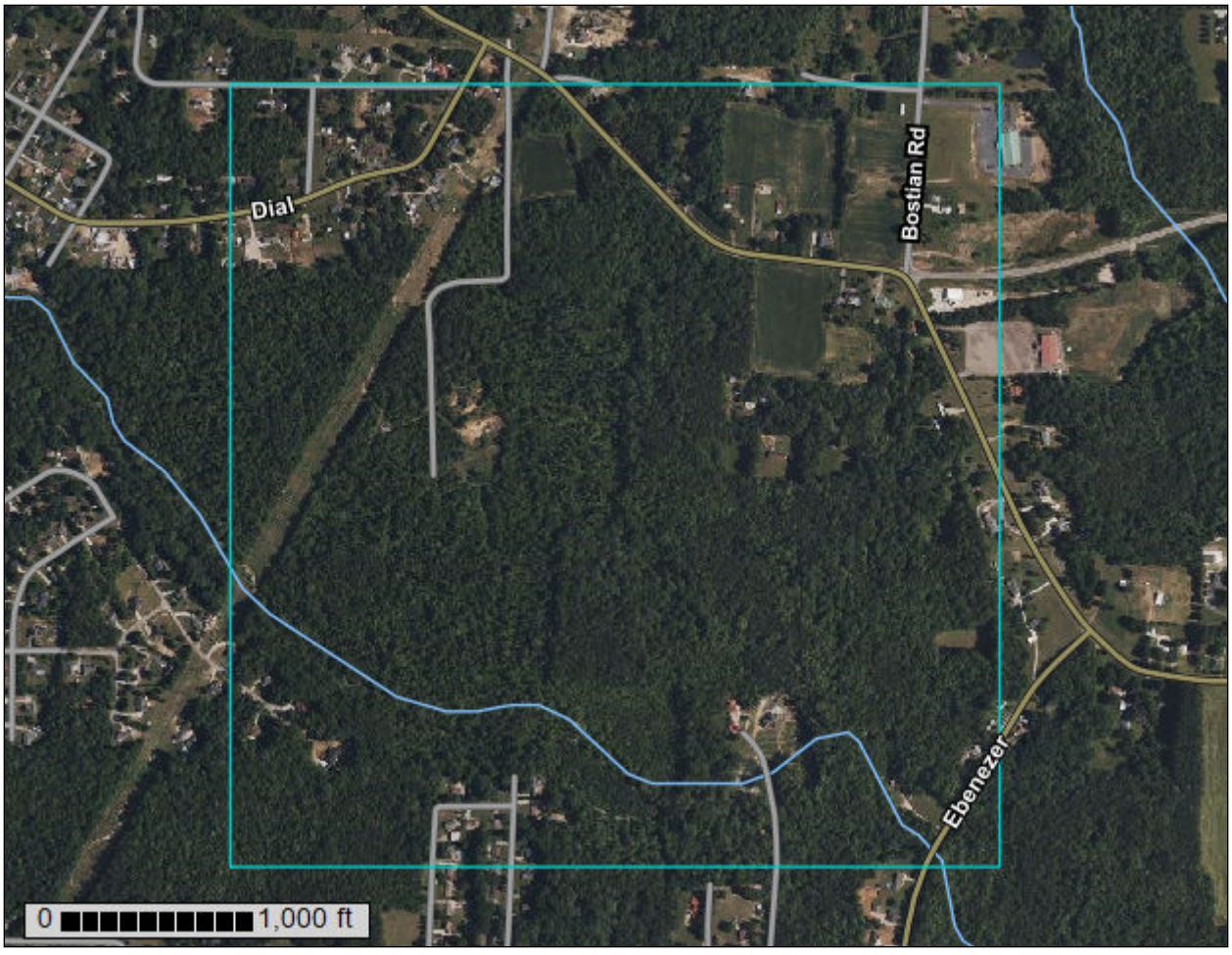
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rowan County, North Carolina



November 12, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rowan County, North Carolina
Survey Area Data: Version 22, Sep 9, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 13, 2022—May 9, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	22.2	5.9%
EnB	Enon fine sandy loam, 2 to 8 percent slopes	43.7	11.6%
EnC	Enon fine sandy loam, 8 to 15 percent slopes	35.0	9.3%
PaC	Pacolet sandy loam, 8 to 15 percent slopes	31.7	8.4%
PaD	Pacolet sandy loam, 15 to 25 percent slopes	0.1	0.0%
PcB2	Pacolet sandy clay loam, 2 to 8 percent slopes, moderately eroded	164.9	43.8%
PcC2	Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded	36.9	9.8%
PxD	Poindexter-Rowan complex, 15 to 25 percent slopes	19.2	5.1%
RnB	Rion-Wedowee complex, 2 to 8 percent slopes	19.0	5.0%
SaB	Saw-Pacolet complex, 2 to 8 percent slopes	0.9	0.2%
SaC	Saw-Pacolet complex, 8 to 15 percent slopes	2.2	0.6%
ScB2	Saw-Pacolet complex, 2 to 8 percent slopes, moderately eroded	0.3	0.1%
WtB	Wynott-Enon complex, 2 to 8 percent slopes	0.7	0.2%
Totals for Area of Interest		**376.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class.

Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The

pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rowan County, North Carolina

ChA—Chewacla loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2vy6r
Elevation: 330 to 660 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Chewacla, frequently flooded, and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chewacla, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 6 inches: loam
Bw - 6 to 52 inches: sandy clay loam
Cg - 52 to 80 inches: stratified sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F136XY610GA - Flood plain forest, wet
Hydric soil rating: No

Minor Components

Wehadkee, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

EnB—Enon fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 3vn1
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Enon and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Enon

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Typical profile

Ap - 0 to 7 inches: fine sandy loam
BA - 7 to 10 inches: sandy clay loam
Bt - 10 to 27 inches: clay
BC - 27 to 33 inches: clay loam
C - 33 to 80 inches: loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY720NC - Basic upland forest, moist
Hydric soil rating: No

EnC—Enon fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 3vn2
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Enon and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Enon

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Typical profile

Ap - 0 to 7 inches: fine sandy loam
BA - 7 to 10 inches: sandy clay loam
Bt - 10 to 27 inches: clay
BC - 27 to 33 inches: clay loam
C - 33 to 80 inches: loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F136XY720NC - Basic upland forest, moist
Hydric soil rating: No

PaC—Pacolet sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 3vnn
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pacolet and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 5 inches: sandy loam
E - 5 to 8 inches: sandy loam
Bt - 8 to 29 inches: clay
BC - 29 to 38 inches: sandy clay loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

PaD—Pacolet sandy loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 3vnp
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Pacolet and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 5 inches: sandy loam
E - 5 to 8 inches: sandy loam
Bt - 8 to 29 inches: clay
BC - 29 to 38 inches: sandy clay loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

PcB2—Pacolet sandy clay loam, 2 to 8 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2m9wh
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pacolet, moderately eroded, and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet, Moderately Eroded

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 7 inches: sandy clay loam
Bt - 7 to 24 inches: clay
B - 24 to 33 inches: sandy clay loam
C - 33 to 80 inches: loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

PcC2—Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2m9wj
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pacolet, moderately eroded, and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet, Moderately Eroded

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 7 inches: sandy clay loam
Bt - 7 to 24 inches: clay
B - 24 to 33 inches: sandy clay loam
C - 33 to 80 inches: loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

PxD—Poindexter-Rowan complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2md4r
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Poindexter and similar soils: 45 percent
Rowan and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Poindexter

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Typical profile

A - 0 to 3 inches: loam
E - 3 to 7 inches: loam
Bt - 7 to 26 inches: sandy clay loam
C - 26 to 39 inches: loam
Cr - 39 to 43 inches: weathered bedrock
R - 43 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 80 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Ecological site: F136XY730SC - Basic upland forest, depth restriction, dry
Hydric soil rating: No

Description of Rowan

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Typical profile

A - 0 to 2 inches: loam
E - 2 to 9 inches: loam
Bt - 9 to 29 inches: sandy clay loam
C - 29 to 80 inches: loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F136XY720NC - Basic upland forest, moist
Hydric soil rating: No

RnB—Rion-Wedowee complex, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 3vp0
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rion and similar soils: 50 percent

Wedowee and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rion

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt - 8 to 26 inches: sandy clay loam
BC - 26 to 38 inches: sandy clay loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Description of Wedowee

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 12 inches: sandy loam
BE - 12 to 15 inches: sandy clay loam
Bt - 15 to 29 inches: clay
C - 29 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

SaB—Saw-Pacolet complex, 2 to 8 percent slopes

Map Unit Setting
National map unit symbol: 3vp5
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Saw and similar soils: 50 percent
Pacolet and similar soils: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saw

Setting
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and/or gneiss

Typical profile
Ap - 0 to 8 inches: sandy loam
Bt - 8 to 20 inches: clay
BC - 20 to 26 inches: sandy clay loam
C - 26 to 29 inches: sandy loam
R - 29 to 80 inches: unweathered bedrock

Properties and qualities
Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist
Hydric soil rating: No

Description of Pacolet

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 5 inches: sandy loam
E - 5 to 8 inches: sandy loam
Bt - 8 to 29 inches: clay
BC - 29 to 38 inches: sandy clay loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

SaC—Saw-Pacolet complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 3vp6
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Saw and similar soils: 50 percent
Pacolet and similar soils: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saw

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and/or saprolite derived from gneiss

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt - 8 to 20 inches: clay
BC - 20 to 26 inches: sandy clay loam
C - 26 to 29 inches: sandy loam
R - 29 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist

Hydric soil rating: No

Description of Pacolet

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 5 inches: sandy loam
E - 5 to 8 inches: sandy loam
Bt - 8 to 29 inches: clay
BC - 29 to 38 inches: sandy clay loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

ScB2—Saw-Pacolet complex, 2 to 8 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2m9wr
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Saw, moderately eroded, and similar soils: 50 percent
Pacolet, moderately eroded, and similar soils: 45 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saw, Moderately Eroded

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and/or saprolite derived from gneiss

Typical profile

Ap - 0 to 5 inches: sandy clay loam
Bt - 5 to 20 inches: clay
BC - 20 to 26 inches: sandy clay loam
C - 26 to 29 inches: sandy loam
R - 29 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist
Hydric soil rating: No

Description of Pacolet, Moderately Eroded

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Typical profile

Ap - 0 to 7 inches: sandy clay loam
Bt - 7 to 28 inches: clay
BC - 28 to 44 inches: sandy clay loam
C - 44 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

WtB—Wynott-Enon complex, 2 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2md4m
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Wynott and similar soils: 60 percent
Enon and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wynott

Setting
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Typical profile
A - 0 to 4 inches: sandy loam
E - 4 to 14 inches: sandy loam
Bt - 14 to 24 inches: clay
BC - 24 to 28 inches: sandy clay loam
Cr - 28 to 80 inches: weathered bedrock

Properties and qualities
Slope: 2 to 8 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F136XY730SC - Basic upland forest, depth restriction, dry
Hydric soil rating: No

Description of Enon

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Typical profile

Ap - 0 to 7 inches: fine sandy loam
BA - 7 to 10 inches: sandy clay loam
Bt - 10 to 27 inches: clay
BC - 27 to 33 inches: clay loam
C - 33 to 80 inches: loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY720NC - Basic upland forest, moist
Hydric soil rating: No

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APPENDIX C. NOAA RAINFALL DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: Landis, North Carolina, USA*
Latitude: 35.5316°, Longitude: -80.5953°
Elevation: 767 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.69** (4.33-5.10)	**5.56** (5.12-6.04)	**6.48** (5.96-7.03)	**7.13** (6.54-7.73)	**7.86** (7.18-8.51)	**8.36** (7.60-9.06)	**8.81** (7.96-9.55)	**9.20** (8.27-9.98)	**9.64** (8.57-10.5)	**9.92** (8.75-10.8)
10-min	**3.75** (3.46-4.07)	**4.44** (4.10-4.83)	**5.18** (4.78-5.63)	**5.70** (5.23-6.17)	**6.26** (5.72-6.78)	**6.66** (6.05-7.21)	**7.00** (6.32-7.58)	**7.30** (6.55-7.91)	**7.62** (6.77-8.29)	**7.82** (6.89-8.53)
15-min	**3.13** (2.88-3.39)	**3.72** (3.43-4.05)	**4.37** (4.02-4.75)	**4.81** (4.41-5.21)	**5.29** (4.83-5.73)	**5.62** (5.10-6.08)	**5.90** (5.33-6.39)	**6.14** (5.51-6.66)	**6.39** (5.68-6.96)	**6.54** (5.77-7.13)
30-min	**2.14** (1.98-2.32)	**2.57** (2.37-2.80)	**3.11** (2.86-3.38)	**3.48** (3.19-3.77)	**3.92** (3.58-4.24)	**4.23** (3.84-4.58)	**4.52** (4.08-4.89)	**4.78** (4.29-5.18)	**5.09** (4.52-5.54)	**5.30** (4.67-5.78)
60-min	**1.34** (1.23-1.45)	**1.61** (1.49-1.75)	**1.99** (1.83-2.16)	**2.27** (2.08-2.46)	**2.61** (2.38-2.82)	**2.87** (2.60-3.10)	**3.11** (2.81-3.37)	**3.35** (3.01-3.63)	**3.65** (3.24-3.97)	**3.87** (3.41-4.22)
2-hr	**0.772** (0.709-0.841)	**0.935** (0.858-1.02)	**1.16** (1.06-1.27)	**1.33** (1.22-1.45)	**1.55** (1.41-1.69)	**1.72** (1.55-1.87)	**1.88** (1.69-2.05)	**2.04** (1.82-2.23)	**2.25** (1.99-2.46)	**2.41** (2.11-2.64)
3-hr	**0.549** (0.504-0.599)	**0.663** (0.609-0.724)	**0.828** (0.759-0.904)	**0.954** (0.872-1.04)	**1.12** (1.02-1.22)	**1.25** (1.13-1.36)	**1.38** (1.24-1.50)	**1.52** (1.35-1.65)	**1.70** (1.49-1.85)	**1.83** (1.59-2.00)
6-hr	**0.334** (0.307-0.364)	**0.402** (0.370-0.440)	**0.502** (0.461-0.548)	**0.580** (0.531-0.632)	**0.685** (0.623-0.744)	**0.768** (0.694-0.834)	**0.852** (0.764-0.926)	**0.938** (0.832-1.02)	**1.06** (0.923-1.15)	**1.15** (0.989-1.25)
12-hr	**0.196** (0.181-0.214)	**0.237** (0.218-0.259)	**0.297** (0.273-0.324)	**0.345** (0.316-0.375)	**0.410** (0.373-0.445)	**0.463** (0.417-0.501)	**0.516** (0.462-0.558)	**0.572** (0.506-0.618)	**0.650** (0.565-0.701)	**0.711** (0.609-0.767)
24-hr	**0.117** (0.108-0.125)	**0.141** (0.131-0.152)	**0.177** (0.165-0.191)	**0.205** (0.191-0.221)	**0.244** (0.226-0.262)	**0.275** (0.254-0.295)	**0.306** (0.282-0.329)	**0.338** (0.311-0.364)	**0.382** (0.350-0.412)	**0.417** (0.381-0.450)
2-day	**0.068** (0.063-0.073)	**0.082** (0.076-0.088)	**0.102** (0.095-0.110)	**0.118** (0.110-0.126)	**0.139** (0.129-0.149)	**0.157** (0.145-0.168)	**0.174** (0.160-0.186)	**0.192** (0.176-0.206)	**0.216** (0.198-0.232)	**0.235** (0.215-0.253)
3-day	**0.048** (0.045-0.051)	**0.058** (0.054-0.062)	**0.072** (0.067-0.077)	**0.083** (0.077-0.088)	**0.098** (0.091-0.104)	**0.109** (0.101-0.117)	**0.121** (0.112-0.130)	**0.134** (0.123-0.143)	**0.151** (0.138-0.162)	**0.164** (0.150-0.176)
4-day	**0.038** (0.035-0.041)	**0.046** (0.043-0.049)	**0.056** (0.053-0.060)	**0.065** (0.061-0.069)	**0.077** (0.071-0.082)	**0.086** (0.079-0.092)	**0.095** (0.088-0.102)	**0.105** (0.097-0.112)	**0.118** (0.108-0.127)	**0.129** (0.118-0.138)
7-day	**0.025** (0.023-0.026)	**0.030** (0.028-0.032)	**0.036** (0.034-0.039)	**0.041** (0.039-0.044)	**0.049** (0.045-0.052)	**0.054** (0.051-0.058)	**0.060** (0.056-0.064)	**0.066** (0.061-0.070)	**0.074** (0.068-0.079)	**0.081** (0.074-0.086)
10-day	**0.020** (0.019-0.021)	**0.024** (0.022-0.025)	**0.028** (0.027-0.030)	**0.032** (0.030-0.034)	**0.037** (0.035-0.040)	**0.041** (0.039-0.044)	**0.045** (0.042-0.048)	**0.050** (0.046-0.053)	**0.055** (0.051-0.059)	**0.059** (0.055-0.063)
20-day	**0.013** (0.012-0.014)	**0.016** (0.015-0.016)	**0.018** (0.018-0.019)	**0.021** (0.020-0.022)	**0.024** (0.023-0.025)	**0.026** (0.025-0.028)	**0.029** (0.027-0.030)	**0.031** (0.029-0.033)	**0.034** (0.032-0.036)	**0.037** (0.034-0.039)
30-day	**0.011** (0.010-0.011)	**0.013** (0.012-0.013)	**0.015** (0.014-0.016)	**0.016** (0.016-0.017)	**0.019** (0.018-0.020)	**0.020** (0.019-0.021)	**0.022** (0.021-0.023)	**0.024** (0.022-0.025)	**0.026** (0.024-0.027)	**0.027** (0.026-0.029)
45-day	**0.009** (0.009-0.009)	**0.011** (0.010-0.011)	**0.012** (0.012-0.013)	**0.013** (0.013-0.014)	**0.015** (0.014-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.020** (0.019-0.021)	**0.021** (0.020-0.022)
60-day	**0.008** (0.008-0.008)	**0.009** (0.009-0.010)	**0.011** (0.010-0.011)	**0.012** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.015)	**0.016** (0.015-0.016)	**0.017** (0.016-0.017)	**0.018** (0.017-0.018)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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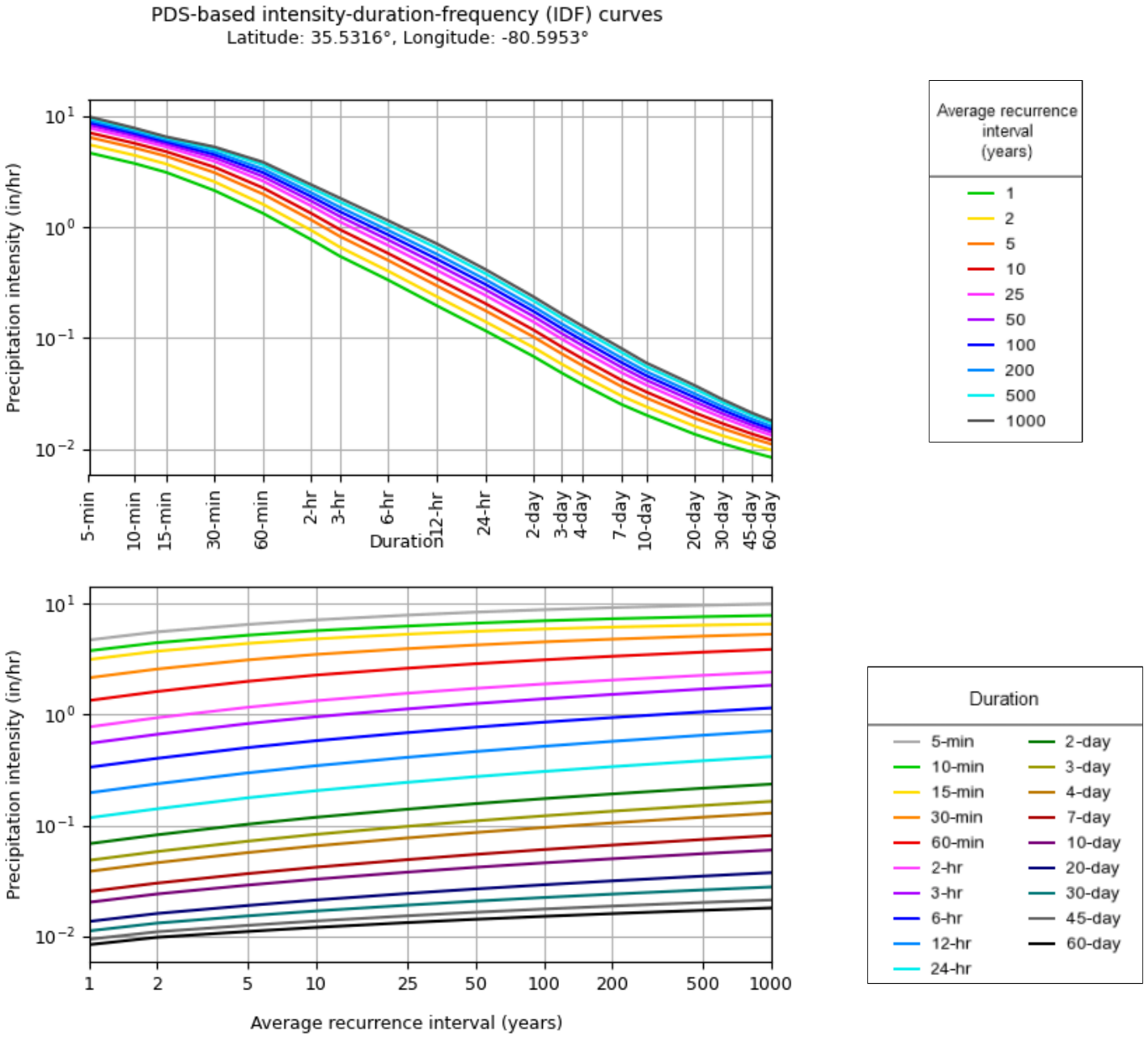
PF graphical



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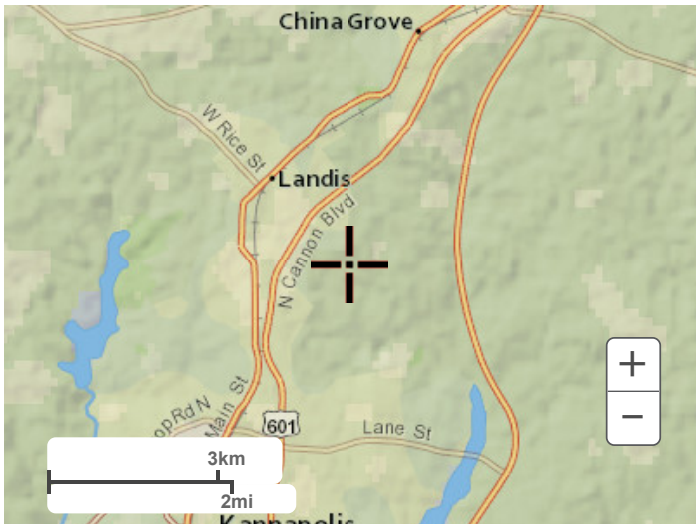
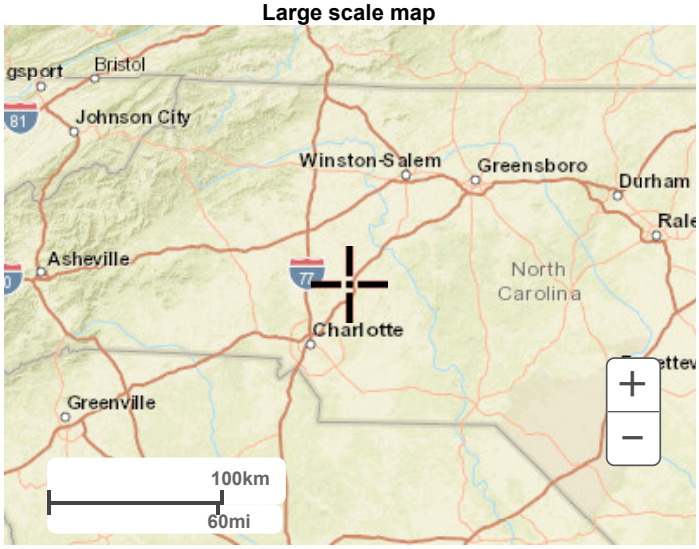
Maps & aerials

Small scale terrain

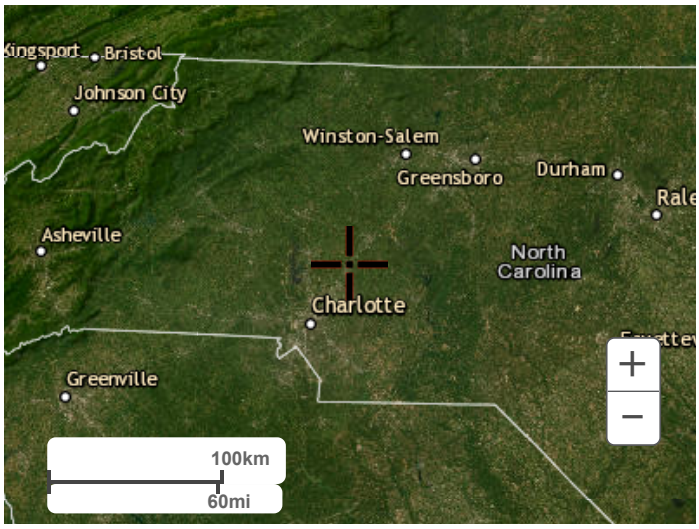


Large scale terrain

Large scale map



Large scale aerial



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APPENDIX D.
STORMWATER
STUDIO PIPE MODEL

Storm Sewer Tabulation

Project Name: STRM-100

Stormwater Studio 2024 v 3.0.0.35

02-07-2025

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
101-100	194.24	0.023	13.019	0.95	0.02	11.29	5.0	8.19	6.22	70.20	100.61	12.33	36	2.28	754.42	750.00	757.08	751.99	764.19	755.88	1
103-101	58.25	0.078	12.918	0.95	0.07	11.19	5.0	8.13	6.23	69.76	120.60	12.26	36	3.27	756.42	754.52	759.08	756.51	767.11	764.19	2
114-103	104.99	0.671	5.063	0.75	0.50	4.12	5.0	7.42	6.41	26.44	60.30	8.87	30	2.16	760.77	758.50	762.49	759.79	771.48	767.11	3
115-114	36.71	0.092	4.392	0.95	0.09	3.62	5.0	7.37	6.43	23.26	57.79	7.81	30	1.99	763.15	762.42	764.76	763.76	771.64	771.48	4
116-114	221.90	0.070	4.300	0.95	0.07	3.53	5.0	6.92	6.55	23.13	40.54	5.82	30	0.98	764.90	762.73	766.51	765.31	774.04	771.64	5
118-116	174.82	0.043	3.856	0.95	0.04	3.15	5.0	6.69	6.61	20.82	75.44	9.23	30	3.38	771.31	765.39	772.83	766.36	781.38	774.04	6
119-118	60.90	0.063	3.813	0.90	0.06	3.11	5.0	6.56	6.65	20.66	41.01	6.17	30	1.00	772.02	771.41	773.54	773.14	782.06	781.38	7
122-119	110.23	0.016	2.977	0.95	0.02	2.38	5.0	6.32	6.72	15.96	22.62	7.08	24	1.00	773.72	772.62	775.13	773.91	785.60	782.06	8
123-122	83.28	0.224	2.961	0.70	0.16	2.36	5.0	6.14	6.77	15.98	22.62	6.23	24	1.00	774.65	773.82	776.07	775.47	784.36	785.60	9
RL-10	32.82	0.347	0.347	0.95	0.33	0.33	5.0	5.00	7.13	2.35	0.56	26.95	4	7.39	784.65	782.22	825.18	782.56	786.50	784.36	10
124-123	141.30	0.762	2.389	0.65	0.50	1.87	5.0	5.82	6.87	12.87	22.62	5.18	24	1.00	776.16	774.75	777.43	776.59	784.29	784.36	11
125-124	141.13	0.103	1.272	0.80	0.08	1.04	5.0	5.45	6.98	7.27	10.50	5.94	18	1.00	778.17	776.76	779.20	777.70	784.23	784.29	12
126-125	140.53	0.506	0.816	0.65	0.33	0.62	5.0	5.03	7.12	4.43	6.46	5.30	15	1.00	779.92	778.52	780.76	779.29	784.23	784.23	13
RL-13	49.67	0.310	0.310	0.95	0.29	0.29	5.0	5.00	7.13	2.10	0.46	24.04	4	4.97	784.65	782.18	833.84	782.51	786.50	784.23	14
RL-11	40.29	0.355	0.355	0.95	0.34	0.34	5.0	5.00	7.13	2.41	0.51	27.56	4	6.09	784.65	782.20	837.28	782.53	786.50	784.29	15
RL-12	49.31	0.353	0.353	0.95	0.34	0.34	5.0	5.00	7.13	2.39	0.37	27.40	4	3.25	783.78	782.18	848.71	782.52	786.50	784.23	16
104-103	35.41	0.089	7.776	0.95	0.08	6.99	5.0	8.09	6.24	43.67	124.65	7.69	36	3.49	759.24	758.00	761.35	760.43	769.05	767.11	17
106-104	259.49	0.081	6.962	0.95	0.08	6.40	5.0	7.71	6.34	40.58	52.05	10.14	30	1.61	765.18	761.00	767.33	762.72	781.23	769.05	18
107-106	62.67	0.175	5.058	0.95	0.17	4.59	5.0	7.59	6.37	29.26	41.01	8.01	30	1.00	767.11	766.48	768.92	768.17	778.59	781.23	19
108-107	134.87	0.589	4.882	0.95	0.56	4.43	5.0	7.34	6.44	28.49	41.01	6.86	30	1.00	768.56	767.21	770.34	769.46	778.57	778.59	20
108-107 (1)	134.89	0.548	4.294	0.95	0.52	3.87	5.0	7.07	6.51	25.16	41.01	6.26	30	1.00	770.01	768.66	771.69	770.96	778.56	778.57	21
109-108	134.71	0.589	2.363	0.95	0.56	2.03	5.0	6.77	6.59	13.40	22.62	5.59	24	1.00	771.96	770.61	773.26	772.22	778.57	778.56	22

Notes: IDF File = LandisNC.idf, Return Period = 10-yrs.

Project File: 2025.02.07 STRM-100 Sub 2.sws

Storm Sewer Tabulation

Project Name: STRM-100

Stormwater Studio 2024 v 3.0.0.35

02-07-2025

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
109-108 (1)	134.70	0.513	1.774	0.95	0.49	1.47	5.0	6.44	6.68	9.85	22.62	4.51	24	1.00	773.41	772.06	774.52	773.73	778.59	778.57	23
110-109	62.83	0.435	1.261	0.85	0.37	0.99	5.0	6.33	6.71	6.62	19.50	7.06	18	3.45	776.18	774.01	777.16	774.68	780.78	778.59	24
111-110	155.47	0.193	0.826	0.80	0.15	0.62	5.0	5.90	6.84	4.21	7.21	4.37	15	1.25	778.34	776.40	779.16	777.46	783.04	780.78	25
112-111	131.22	0.380	0.633	0.75	0.28	0.46	5.0	5.48	6.97	3.22	10.50	3.03	18	1.00	779.50	778.19	780.18	779.50	784.24	783.04	26
113-112	118.27	0.253	0.253	0.70	0.18	0.18	5.0	5.00	7.13	1.26	6.45	3.56	15	1.00	781.03	779.85	781.48	780.23	785.32	784.24	27
CO1-106	102.36	0.000	1.823	0.00	0.00	1.73	0.0	5.73	6.89	11.94	16.06	8.28	18	1.99	776.03	773.99	777.34	775.01	786.11	781.23	28
TEE 1-CO1	67.16	0.000	1.412	0.00	0.00	1.34	0.0	5.57	6.94	9.31	11.31	6.58	18	0.99	777.29	776.62	778.45	777.70	782.28	786.11	29
TEE 2-TEE 1	71.03	0.000	1.060	0.00	0.00	1.01	0.0	5.40	7.00	7.05	11.38	4.77	18	1.00	778.15	777.44	779.16	778.92	782.28	782.28	30
RL-3	21.64	0.347	0.347	0.95	0.33	0.33	5.0	5.00	7.13	2.35	3.61	5.55	10	2.31	780.50	780.00	781.18	780.55	782.50	782.28	31
RL-2	21.64	0.352	0.352	0.95	0.33	0.33	5.0	5.00	7.13	2.38	3.61	5.58	10	2.31	780.50	780.00	781.19	780.55	782.50	782.28	32
CO3-108	181.28	0.000	1.383	0.00	0.00	1.31	0.0	5.68	6.91	9.08	20.55	8.40	18	3.26	777.42	771.50	778.57	772.23	782.34	778.56	33
RL-6	21.64	0.344	0.344	0.95	0.33	0.33	5.0	5.00	7.13	2.33	3.89	5.68	10	2.70	780.50	779.92	781.18	780.44	782.50	782.34	34
TEE 4-CO3	64.33	0.000	1.039	0.00	0.00	0.99	0.0	5.53	6.96	6.87	12.09	4.69	18	1.13	778.25	777.52	779.25	779.03	782.28	782.34	35
RL-7	21.74	0.347	0.347	0.95	0.33	0.33	5.0	5.00	7.13	2.35	3.60	5.55	10	2.30	780.50	780.00	781.18	780.55	782.50	782.28	36
TEE 5-TEE 4	81.11	0.000	0.692	0.00	0.00	0.66	0.0	5.28	7.03	4.62	6.15	4.45	15	0.77	778.98	778.35	779.84	779.58	782.28	782.28	37
RL-8	21.64	0.347	0.347	0.95	0.33	0.33	5.0	5.00	7.13	2.35	3.61	5.55	10	2.31	780.50	780.00	781.18	780.55	782.50	782.28	38
CO4-TEE 5	71.75	0.000	0.345	0.00	0.00	0.33	0.0	5.05	7.11	2.33	3.86	3.65	12	1.00	779.92	779.20	780.56	780.31	784.05	782.28	39
RL-9	21.64	0.345	0.345	0.95	0.33	0.33	5.0	5.00	7.13	2.33	3.61	5.52	10	2.31	780.50	780.00	781.18	780.55	786.49	784.05	40
RL-1	28.45	0.411	0.411	0.95	0.39	0.39	5.0	5.00	7.13	2.78	4.82	6.71	10	4.12	780.50	779.33	781.23	779.84	786.50	786.11	41
TEE 3-TEE 2	72.30	0.000	0.713	0.00	0.00	0.68	0.0	5.20	7.06	4.78	7.00	5.54	15	1.00	779.22	778.49	780.09	779.28	782.31	782.28	42
CO2-TEE 3	59.42	0.000	0.366	0.00	0.00	0.35	0.0	5.01	7.12	2.47	6.95	4.41	15	0.99	779.90	779.31	780.53	779.86	782.39	782.31	43
RL-5	5.16	0.366	0.366	0.95	0.35	0.35	5.0	5.00	7.13	2.48	4.67	5.61	10	3.88	780.20	780.00	780.90	780.58	786.50	782.39	44

Notes: IDF File = LandisNC.idf, Return Period = 10-yrs.

Project File: 2025.02.07 STRM-100 Sub 2.sws

Storm Sewer Tabulation

Project Name: STRM-100

02-07-2025

Stormwater Studio 2024 v 3.0.0.35

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
RL-4	21.64	0.347	0.347	0.95	0.33	0.33	5.0	5.00	7.13	2.35	3.61	5.55	10	2.31	780.50	780.00	781.18	780.55	782.50	782.31	45
120-119	47.90	0.109	0.109	0.70	0.08	0.08	5.0	5.00	7.13	0.54	16.69	4.05	15	6.68	778.79	775.59	779.08	775.76	783.71	782.06	46
121-119	24.55	0.665	0.665	0.90	0.60	0.60	5.0	5.00	7.13	4.27	19.32	7.36	15	8.95	776.51	774.32	777.34	774.80	783.64	782.06	47
117-116	36.03	0.374	0.374	0.85	0.32	0.32	5.0	5.00	7.13	2.27	9.00	2.89	15	1.94	766.75	766.05	767.35	767.22	774.12	774.04	48
105-104	30.00	0.726	0.726	0.70	0.51	0.51	5.0	5.00	7.13	3.62	15.82	6.53	15	6.00	764.04	762.24	764.80	762.72	769.06	769.05	49
102-101	36.01	0.079	0.079	0.95	0.08	0.08	5.0	5.00	7.13	0.53	9.41	1.33	15	2.12	758.50	757.73	758.82	758.82	764.26	764.19	50

Notes: IDF File = LandisNC.idf, Return Period = 10-yrs.

Energy Grade Line Calculations

Project Name: STRM-100

Stormwater Studio 2024 v 3.0.0.35

02-07-2025

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
			Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev		Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev	n Value	Enrgy Loss	HGLa Elev	EGLa Elev	Enrgy Loss
	(in)	(cfs)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)
1	36	70.20	750.00	1.99‡	4.98	751.99	14.09	3.09	754.53	194.24	754.42	2.66²	6.64	757.08	10.58	1.74	758.83	0.013	4.291	757.08	758.83	0.00
2	36	69.76	754.52	1.99‡	4.98	756.51	14.00	3.05	759.43	58.25	756.42	2.66²	6.63	759.08	10.53	1.72	760.80	0.013	1.372	759.08	760.80	0.00
3	30	26.44	758.50	1.29‡	2.55	759.79	10.39	1.68	761.12	104.99	760.77	1.72²	3.60	762.49	7.35	0.84	763.33	0.013	2.210	762.49	763.33	0.00
4	30	23.26	762.42	1.34‡	2.69	763.76	8.66	1.17	764.78	36.71	763.15	1.61²	3.35	764.76	6.95	0.75	765.51	0.013	0.729	764.76	765.51	0.00
5	30	23.13	762.73	2.50	4.91	765.31	4.71	0.35	765.65	221.90	764.90	1.61²	3.34	766.51	6.93	0.75	767.26	0.013	1.605	766.51	767.26	0.00
6	30	20.82	765.39	0.97‡	1.76	766.36	11.82	2.17	767.61	174.82	771.31	1.52²	3.14	772.83	6.64	0.69	773.52	0.013	5.914	772.83	773.52	0.00
7	30	20.66	771.41	1.73	3.61	773.14	5.71	0.51	773.64	60.90	772.02	1.52	3.12	773.54	6.62	0.68	774.22	0.013	0.575	773.54	774.22	0.00
8	24	15.96	772.62	1.29‡	2.14	773.91	7.45	0.86	774.73	110.23	773.72	1.41²	2.38	775.13	6.72	0.70	775.84	0.013	1.102	775.13	775.84	0.00
9	24	15.98	773.82	1.66	2.78	775.47	5.75	0.51	775.99	83.28	774.65	1.42²	2.38	776.07	6.72	0.70	776.77	0.013	0.782	776.07	776.77	0.00
10	4	2.35	782.22	0.33¹	0.09	782.56	26.95	11.29	793.85	32.82	784.65	0.33²	0.09	825.18	26.95	11.29	836.47	0.012	42.626	825.18	836.47	0.00
11	24	12.87	774.75	1.84	3.02	776.59	4.26	0.28	776.87	141.30	776.16	1.27²	2.10	777.43	6.11	0.58	778.01	0.013	1.143	777.43	778.01	0.00
12	18	7.27	776.76	0.94‡	1.16	777.70	6.25	0.61	778.28	141.13	778.17	1.03²	1.29	779.20	5.62	0.49	779.69	0.013	1.412	779.20	779.69	0.00
13	15	4.43	778.52	0.77‡	0.80	779.29	5.56	0.48	779.76	140.53	779.92	0.84²	0.88	780.76	5.04	0.39	781.16	0.013	1.398	780.76	781.16	0.00
14	4	2.10	782.18	0.33¹	0.09	782.51	24.04	8.98	791.49	49.67	784.65	0.33²	0.09	833.84	24.04	8.98	842.82	0.012	51.325	833.84	842.82	0.00
15	4	2.41	782.20	0.33¹	0.09	782.53	27.56	11.81	794.34	40.29	784.65	0.33²	0.09	837.28	27.56	11.81	849.09	0.012	54.750	837.28	849.09	0.00
16	4	2.39	782.18	0.33¹	0.09	782.52	27.40	11.67	794.19	49.31	783.78	0.33²	0.09	848.71	27.40	11.67	860.38	0.012	66.195	848.71	860.38	0.00
17	36	43.67	758.00	2.42	6.12	760.43	7.14	0.79	761.22	35.41	759.24	2.11²	5.30	761.35	8.24	1.05	762.40	0.013	1.182	761.35	762.40	0.00
18	30	40.58	761.00	1.72‡	3.61	762.72	11.24	1.96	764.42	259.49	765.18	2.15	4.48	767.33	9.05	1.27	768.60	0.013	4.180	767.33	768.60	0.00
19	30	29.26	766.48	1.68‡	3.52	768.17	8.32	1.08	769.21	62.67	767.11	1.81²	3.80	768.92	7.70	0.92	769.84	0.013	0.627	768.92	769.84	0.00
20	30	28.49	767.21	2.25	4.65	769.46	6.13	0.58	770.04	134.87	768.56	1.78²	3.75	770.34	7.60	0.90	771.24	0.013	1.200	770.34	771.24	0.00
21	30	25.16	768.66	2.30	4.73	770.96	5.32	0.44	771.40	134.89	770.01	1.68²	3.50	771.69	7.19	0.80	772.49	0.013	1.088	771.69	772.49	0.00
22	24	13.40	770.61	1.61	2.70	772.22	4.96	0.38	772.60	134.71	771.96	1.30²	2.15	773.26	6.22	0.60	773.86	0.013	1.257	773.26	773.86	0.00

Notes: Return Period = 10-yrs. ¹ Critical depth. ² Critical depth. ‡ Supercritical.

Project File: 2025.02.07 STRM-100 Sub 2.sws

Energy Grade Line Calculations

Project Name: STRM-100

Stormwater Studio 2024 v 3.0.0.35

02-07-2025

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
			Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev		Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev	n Value	Enrgy Loss	HGLa Elev	EGLa Elev	Enrgy Loss
	(in)	(cfs)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)
23	24	9.85	772.06	1.67	2.80	773.73	3.52	0.19	773.92	134.70	773.41	1.11²	1.79	774.52	5.49	0.47	774.99	0.013	1.068	774.52	774.99	0.00
24	18	6.62	774.01	0.67‡	0.76	774.68	8.72	1.18	775.45	62.83	776.18	0.98²	1.23	777.16	5.40	0.45	777.62	0.013	2.166	777.16	777.62	0.00
25	15	4.21	776.40	1.06	1.11	777.46	3.80	0.22	777.68	155.47	778.34	0.82²	0.86	779.16	4.93	0.38	779.54	0.013	1.856	779.16	779.54	0.00
26	18	3.22	778.19	1.31	1.64	779.50	1.96	0.06	779.56	131.22	779.50	0.68²	0.79	780.18	4.10	0.26	780.45	0.013	0.885	780.18	780.45	0.00
27	15	1.26	779.85	0.38‡	0.32	780.23	3.95	0.24	780.46	118.27	781.03	0.45²	0.40	781.48	3.18	0.16	781.64	0.013	1.176	781.48	781.64	0.00
28	18	11.94	773.99	1.02‡	1.29	775.01	9.29	1.34	776.12	102.36	776.03	1.32²	1.64	777.34	7.27	0.82	778.16	0.012	2.040	777.34	778.16	0.00
29	18	9.31	776.62	1.08‡	1.36	777.70	6.84	0.73	778.43	67.16	777.29	1.16²	1.47	778.45	6.32	0.62	779.07	0.012	0.647	778.45	779.07	0.00
30	18	7.05	777.44	1.49	1.76	778.92	3.99	0.25	779.17	71.03	778.15	1.01²	1.27	779.16	5.55	0.48	779.64	0.012	0.467	779.16	779.64	0.00
31	10	2.35	780.00	0.55‡	0.38	780.55	6.19	0.60	781.06	21.64	780.50	0.68²	0.48	781.18	4.92	0.38	781.56	0.012	0.500	781.18	781.56	0.00
32	10	2.38	780.00	0.55‡	0.38	780.55	6.20	0.60	781.07	21.64	780.50	0.69²	0.48	781.19	4.96	0.38	781.57	0.012	0.500	781.19	781.57	0.00
33	18	9.08	771.50	0.73‡	0.86	772.23	10.55	1.73	773.26	181.28	777.42	1.15²	1.45	778.57	6.24	0.61	779.17	0.012	5.917	778.57	779.17	0.00
34	10	2.33	779.92	0.52‡	0.36	780.44	6.46	0.65	780.97	21.64	780.50	0.68²	0.48	781.18	4.90	0.37	781.55	0.012	0.583	781.18	781.55	0.00
35	18	6.87	777.52	1.50	1.77	779.03	3.89	0.23	779.27	64.33	778.25	1.00²	1.25	779.25	5.49	0.47	779.71	0.012	0.448	779.25	779.71	0.00
36	10	2.35	780.00	0.55‡	0.38	780.55	6.19	0.60	781.06	21.74	780.50	0.68²	0.48	781.18	4.92	0.38	781.56	0.012	0.500	781.18	781.56	0.00
37	15	4.62	778.35	1.23	1.22	779.58	3.78	0.22	779.80	81.11	778.98	0.86	0.90	779.84	5.11	0.41	780.25	0.012	0.446	779.98	780.39	0.14
38	10	2.35	780.00	0.55‡	0.38	780.55	6.19	0.60	781.06	21.64	780.50	0.68²	0.48	781.18	4.92	0.38	781.56	0.012	0.500	781.18	781.56	0.00
39	12	2.33	779.20	1.00	0.79	780.31	2.97	0.14	780.44	71.75	779.92	0.65²	0.54	780.56	4.33	0.29	780.86	0.012	0.413	780.56	780.86	0.00
40	10	2.33	780.00	0.55‡	0.38	780.55	6.14	0.59	781.05	21.64	780.50	0.68²	0.48	781.18	4.90	0.37	781.55	0.012	0.500	781.18	781.55	0.00
41	10	2.78	779.33	0.51‡	0.35	779.84	7.94	0.98	780.53	28.45	780.50	0.73²	0.51	781.23	5.48	0.47	781.70	0.012	1.173	781.23	781.70	0.00
42	15	4.78	778.49	0.79‡	0.82	779.28	5.87	0.53	779.81	72.30	779.22	0.88²	0.92	780.09	5.21	0.42	780.51	0.012	0.703	780.09	780.51	0.00
43	15	2.47	779.31	0.54‡	0.51	779.86	4.83	0.36	780.54	59.42	779.90	0.63²	0.62	780.53	4.00	0.25	780.78	0.012	0.239	780.53	780.78	0.00
44	10	2.48	780.00	0.58‡	0.40	780.58	6.15	0.59	781.10	5.16	780.20	0.70²	0.49	780.90	5.06	0.40	781.30	0.012	0.200	780.90	781.30	0.00

Notes: Return Period = 10-yrs. ² Critical depth. ‡ Supercritical.

Energy Grade Line Calculations

Project Name: STRM-100

02-07-2025

Stormwater Studio 2024 v 3.0.0.35

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
			Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev		Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev	n Value	Enrgy Loss	HGLa Elev	EGLa Elev	Enrgy Loss
	(in)	(cfs)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)
45	10	2.35	780.00	0.55‡	0.38	780.55	6.19	0.60	781.06	21.64	780.50	0.68²	0.48	781.18	4.92	0.38	781.56	0.012	0.500	781.18	781.56	0.00
46	15	0.54	775.59	0.17‡	0.10	775.76	5.63	0.49	775.98	47.90	778.79	0.29²	0.22	779.08	2.46	0.09	779.18	0.013	3.200	779.08	779.18	0.00
47	15	4.27	774.32	0.48‡	0.44	774.80	9.77	1.48	775.52	24.55	776.51	0.83²	0.86	777.34	4.95	0.38	777.72	0.013	2.197	777.34	777.72	0.00
48	15	2.27	766.05	1.17	1.19	767.22	1.90	0.06	767.28	36.03	766.75	0.60²	0.59	767.35	3.87	0.23	767.59	0.013	0.310	767.35	767.59	0.00
49	15	3.62	762.24	0.48‡	0.43	762.72	8.44	1.11	763.33	30.00	764.04	0.76²	0.78	764.80	4.63	0.33	765.13	0.013	1.800	764.80	765.13	0.00
50	15	0.53	757.73	1.09	1.13	758.82	0.47	0.00	758.83	36.01	758.50	0.32	0.24	758.82	2.19	0.07	758.89	0.013	0.064	758.90	758.97	0.08

Notes: Return Period = 10-yrs. ² Critical depth. ‡ Supercritical.

Project File: 2025.02.07 STRM-100 Sub 2.sws

Inlet Report

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025

Line No	Inlet		Q				Curb		Grate			Gutter							Inlet			Byp Line No
	Id	Type	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Ht (in)	L (ft)	L (ft)	W (ft)	Area (sqft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CB-102	Combination	0.15	0.37	0.49	0.04	3.0	3.00	3.00	2.00	-	0.050	1.50	0.050	0.020	0.013	0.11	3.15	0.18	0.96	3.0	0
2	CB-103	Combination	0.53	0.97	1.12	0.37	3.0	4.55	4.55	2.00	-	0.050	1.50	0.050	0.020	0.013	0.15	5.25	0.15	5.25	0.0	1
3	CB-115	Combination	3.59	0.60	3.22	0.97	3.0	10.71	10.71	2.00	-	0.050	1.50	0.050	0.020	0.013	0.21	8.15	0.21	8.15	0.0	2
4	CB-114	Combination	0.62	0.03	0.56	0.08	3.0	1.53	1.53	2.00	-	0.050	1.50	0.050	0.020	0.013	0.12	3.50	0.12	3.50	0.0	50
5	CB-116	Combination	0.47	0.01	0.45	0.03	3.0	0.71	0.71	2.00	-	0.050	1.50	0.050	0.020	0.013	0.11	3.00	0.11	3.00	0.0	4
6	CB-118	Combination	0.29	0.00	0.28	0.01	3.0	1.00	1.00	2.00	-	0.030	1.50	0.050	0.020	0.013	0.10	2.55	0.10	2.55	0.0	5
7	CB-119	Combination	0.40	0.00	0.38	0.03	3.0	0.07	0.07	2.00	-	0.038	1.50	0.050	0.020	0.013	0.10	2.90	0.10	2.90	0.0	48
8	CB-122	Combination	0.11	0.00	0.11	0.00	3.0	1.00	1.00	2.00	-	0.038	1.50	0.050	0.020	0.013	0.06	1.30	0.06	1.30	0.0	7
9	CB-123	Combination	1.12	0.00	1.12	0.00	3.0	1.00	1.00	2.00	0.38	Sag	1.50	0.050	0.020	0.013	0.21	8.25	0.21	8.25	0.0	8
10	RL-10	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	CB-124	Combination	3.53	0.00	3.53	0.00	3.0	1.00	1.00	2.00	1.20	Sag	1.50	0.050	0.020	0.013	0.44	19.75	0.44	19.75	0.0	9
12	CB-125	Combination	0.59	0.00	0.59	0.00	3.0	1.00	1.00	2.00	0.20	Sag	1.50	0.050	0.020	0.013	0.18	6.75	0.18	6.75	0.0	11
13	CB-126	Combination	2.34	0.00	2.34	0.00	3.0	1.00	1.00	2.00	0.80	Sag	1.50	0.050	0.020	0.013	0.34	14.75	0.34	14.75	0.0	0
14	RL-13	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	RL-11	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	RL-12	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	CB-104	Combination	0.60	0.06	0.66	0.00	3.0	3.00	3.00	2.00	6.00	Sag	1.50	0.050	0.020	0.013	0.08	1.83	0.29	1.83	3.0	0
18	CB-106	Combination	0.55	0.00	0.49	0.06	3.0	0.93	0.93	2.00	-	0.044	1.50	0.050	0.020	0.013	0.11	3.30	0.11	3.30	0.0	17
19	CB-107	Combination	1.19	0.00	1.19	0.00	3.0	1.00	1.00	2.00	0.40	Sag	1.50	0.050	0.020	0.013	0.21	8.25	0.21	8.25	0.0	0
20	CB-107.5	Combination	3.99	0.00	3.99	0.00	3.0	1.00	1.00	2.00	1.35	Sag	1.50	0.050	0.020	0.013	0.47	21.25	0.47	21.25	0.0	0
21	CB-108	Combination	3.71	0.00	3.71	0.00	3.0	1.00	1.00	2.00	1.26	Sag	1.50	0.050	0.020	0.013	0.45	20.25	0.45	20.25	0.0	0
22	CB-108.5	Combination	3.99	0.00	3.99	0.00	3.0	1.00	1.00	2.00	1.35	Sag	1.50	0.050	0.020	0.013	0.47	21.25	0.47	21.25	0.0	0

Notes: Return Period = 10-yrs. All curb inlets are Horiz throat.,

Project File: 2025.02.07 STRM-100 Sub 2.sws

Inlet Report

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025

Line No	Inlet		Q				Curb		Grate			Gutter							Inlet			Byp Line No
	Id	Type	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Ht (in)	L (ft)	L (ft)	W (ft)	Area (sqft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	CB-109	Combination	3.48	1.09	4.56	0.00	3.0	1.00	1.00	2.00	1.55	Sag	1.50	0.050	0.020	0.013	0.51	23.25	0.51	23.25	0.0	0
24	CB-110	Combination	2.64	0.68	2.23	1.09	3.0	5.76	5.76	2.00	-	0.015	1.50	0.050	0.020	0.013	0.23	9.45	0.23	9.45	0.0	23
25	CB-111	Combination	1.10	0.85	1.27	0.68	3.0	3.92	3.92	2.00	-	0.020	1.50	0.050	0.020	0.013	0.19	7.20	0.19	7.20	0.0	24
26	CB-112	Combination	2.03	0.54	1.71	0.85	3.0	5.14	5.14	2.00	-	0.020	1.50	0.050	0.020	0.013	0.21	8.05	0.21	8.05	0.0	25
27	CB-113	Combination	1.26	0.00	0.73	0.54	3.0	1.38	1.38	2.00	-	0.010	1.50	0.050	0.020	0.013	0.18	6.90	0.18	6.90	0.0	26
28	18INCH STORM CLEANOUT 1	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	18X15X10 TEE 1	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	15X15X10 TEE 2	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	RL-3	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	RL-2	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	18INCH STORM CLEANOUT 3	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	RL-6	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	18X15X10 TEE 4	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	RL-7	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	15X12X10 TEE 5	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	RL-8	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	18INCH STORM CLEANOUT 4	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	RL-9	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	RL-1	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	15X15X10 TEE 3	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	18INCH STORM CLEANOUT 2	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	RL-5	Grate	2.48	0.00	2.48	0.00	-	-	3.00	2.00	6.00	Sag	1.50	0.050	0.020	0.013	0.22	8.85	0.43	8.85	3.0	0

Notes: Return Period = 10-yrs. All curb inlets are Horiz throat.,

Project File: 2025.02.07 STRM-100 Sub 2.sws

Inlet Report

Project Name: STRM-100

Stormwater Studio 2024 v 3.0.0.35

02-07-2025

Line No	Inlet		Q				Curb		Grate			Gutter							Inlet			Byp Line No
	Id	Type	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Ht (in)	L (ft)	L (ft)	W (ft)	Area (sqft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
45	RL-4	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	CB-120	Combination	0.54	0.00	0.54	0.00	3.0	1.00	1.00	2.00	0.18	Sag	1.50	0.050	0.020	0.013	0.18	6.75	0.18	6.75	0.0	0
47	CB-121	Combination	4.27	0.00	4.27	0.00	3.0	1.00	1.00	2.00	1.45	Sag	1.50	0.050	0.020	0.013	0.49	22.25	0.49	22.25	0.0	0
48	CB-117	Combination	2.27	0.03	1.69	0.60	3.0	6.69	6.69	2.00	-	0.050	1.50	0.050	0.020	0.013	0.17	6.35	0.17	6.35	0.0	3
49	CB-105	Combination	3.62	0.00	3.62	0.00	3.0	1.00	1.00	2.00	1.23	Sag	1.50	0.050	0.020	0.013	0.44	19.75	0.44	19.75	0.0	0
50	CB-101	Combination	0.53	0.08	0.54	0.08	3.0	1.02	1.02	2.00	-	0.050	1.50	0.050	0.020	0.013	0.11	3.40	0.11	3.40	0.0	0

Notes: Return Period = 10-yrs. All curb inlets are Horiz throat.,

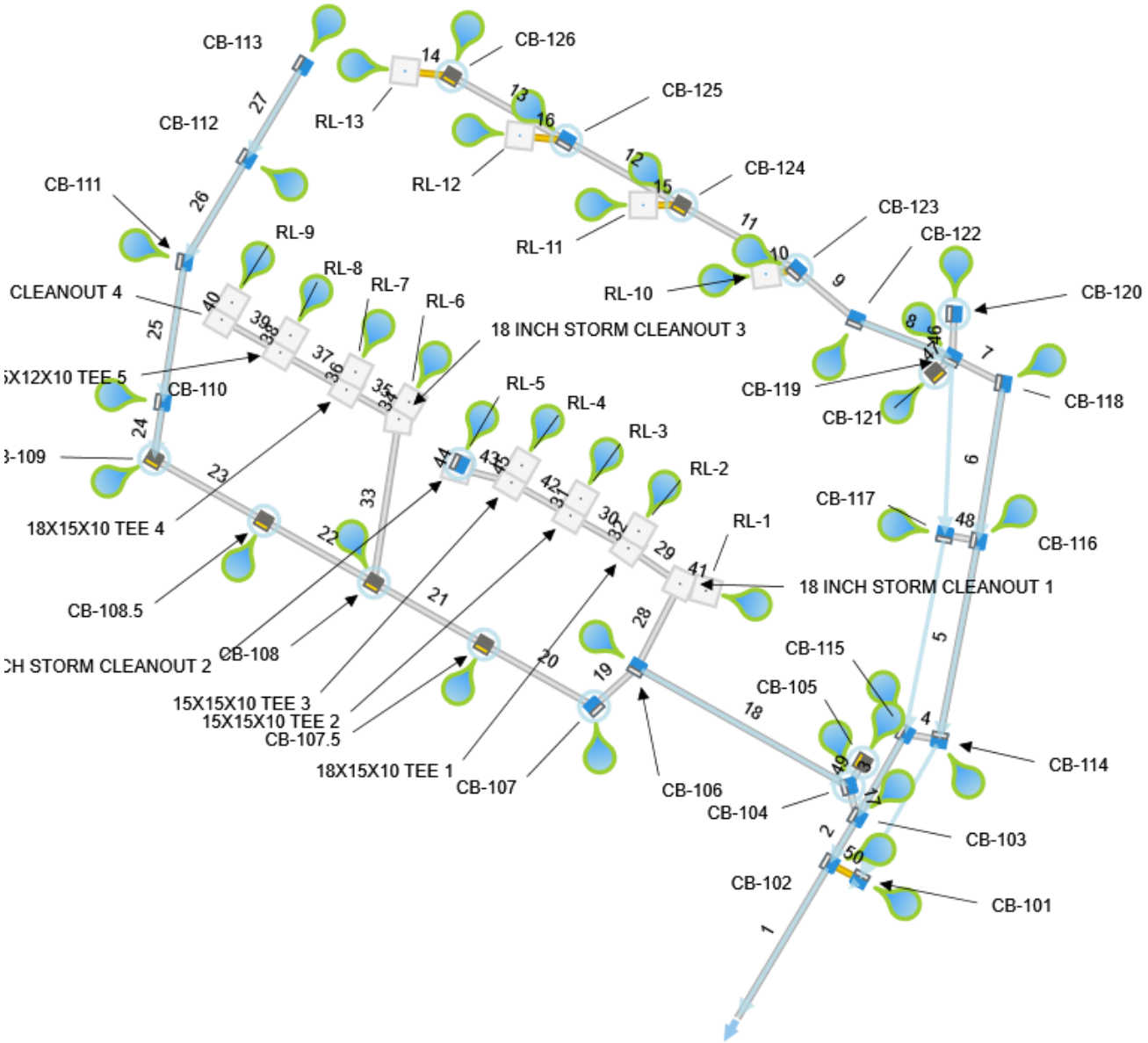
APPENDIX E. STORMWATER STUDIO PLAN AND PROFILE

Plan View

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



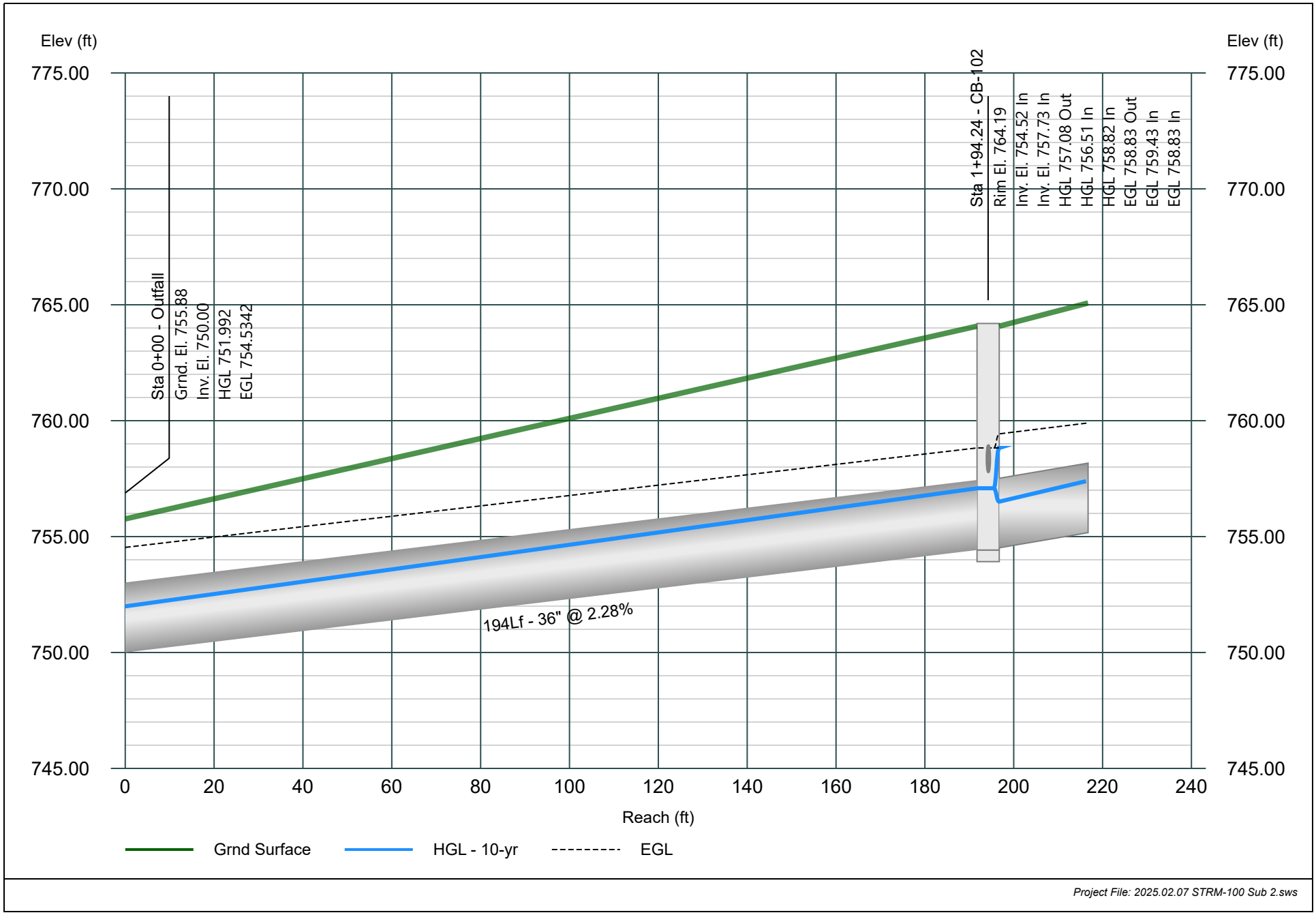
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 1 - 101-100

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



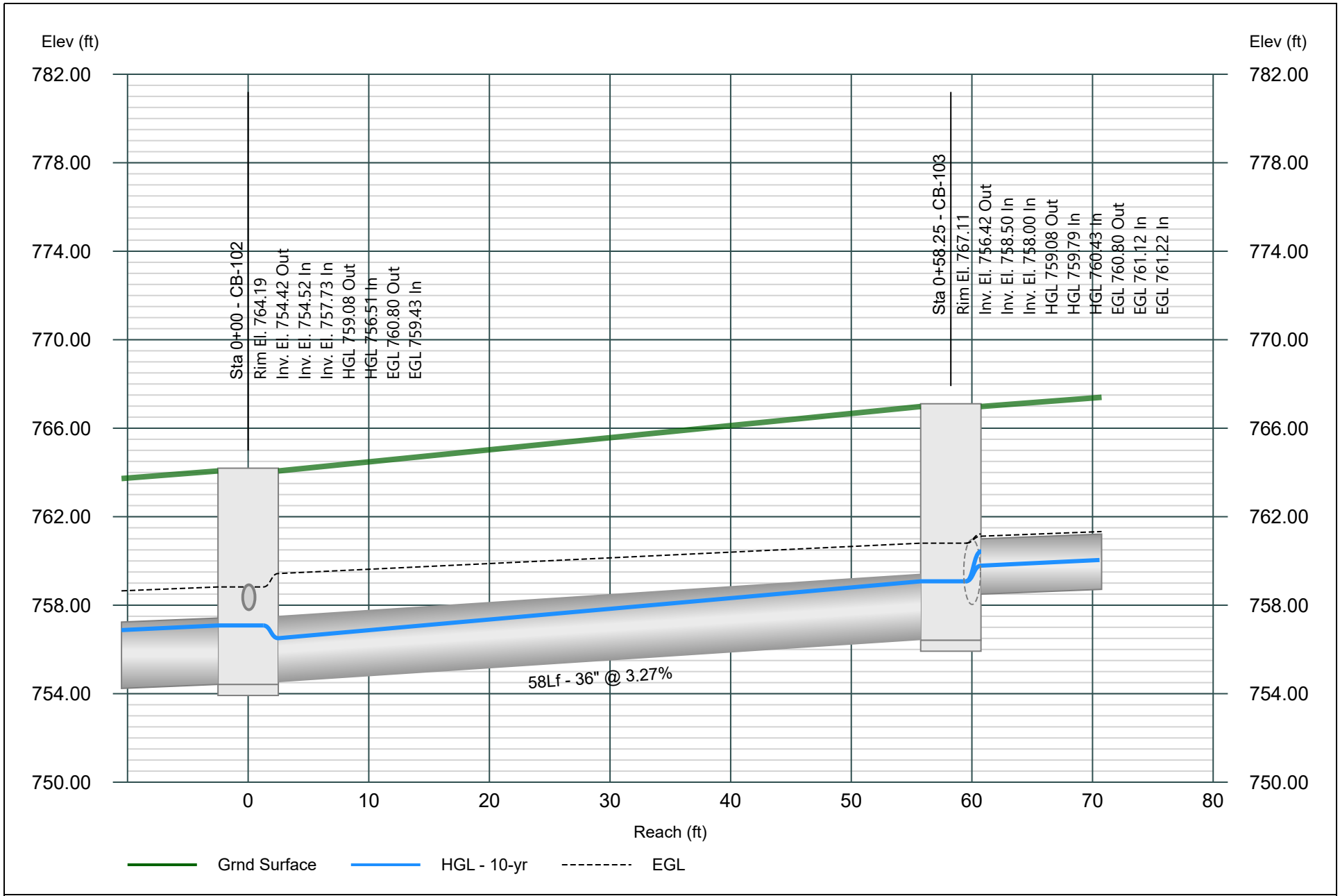
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 2 - 103-101

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



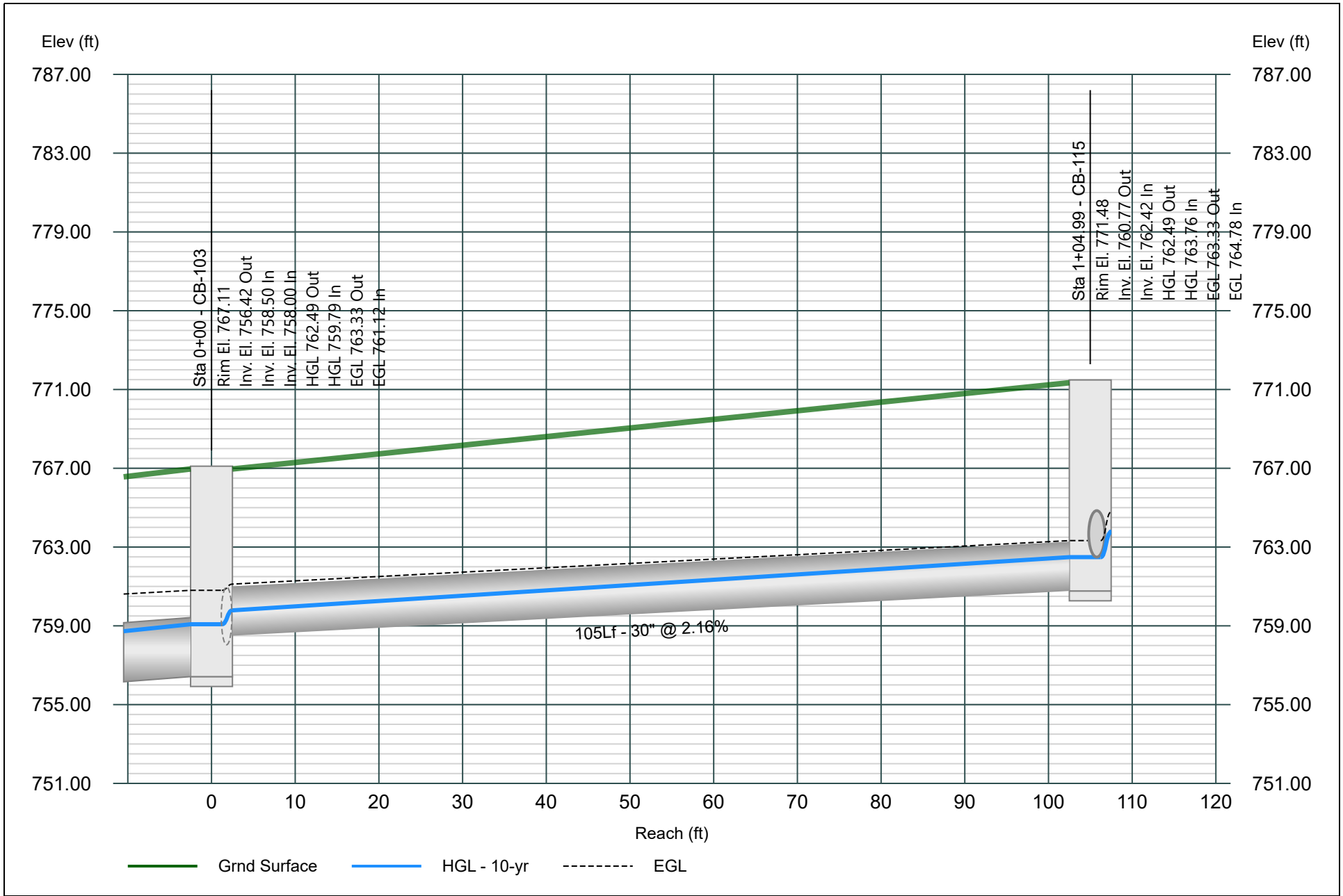
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 3 - 114-103

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



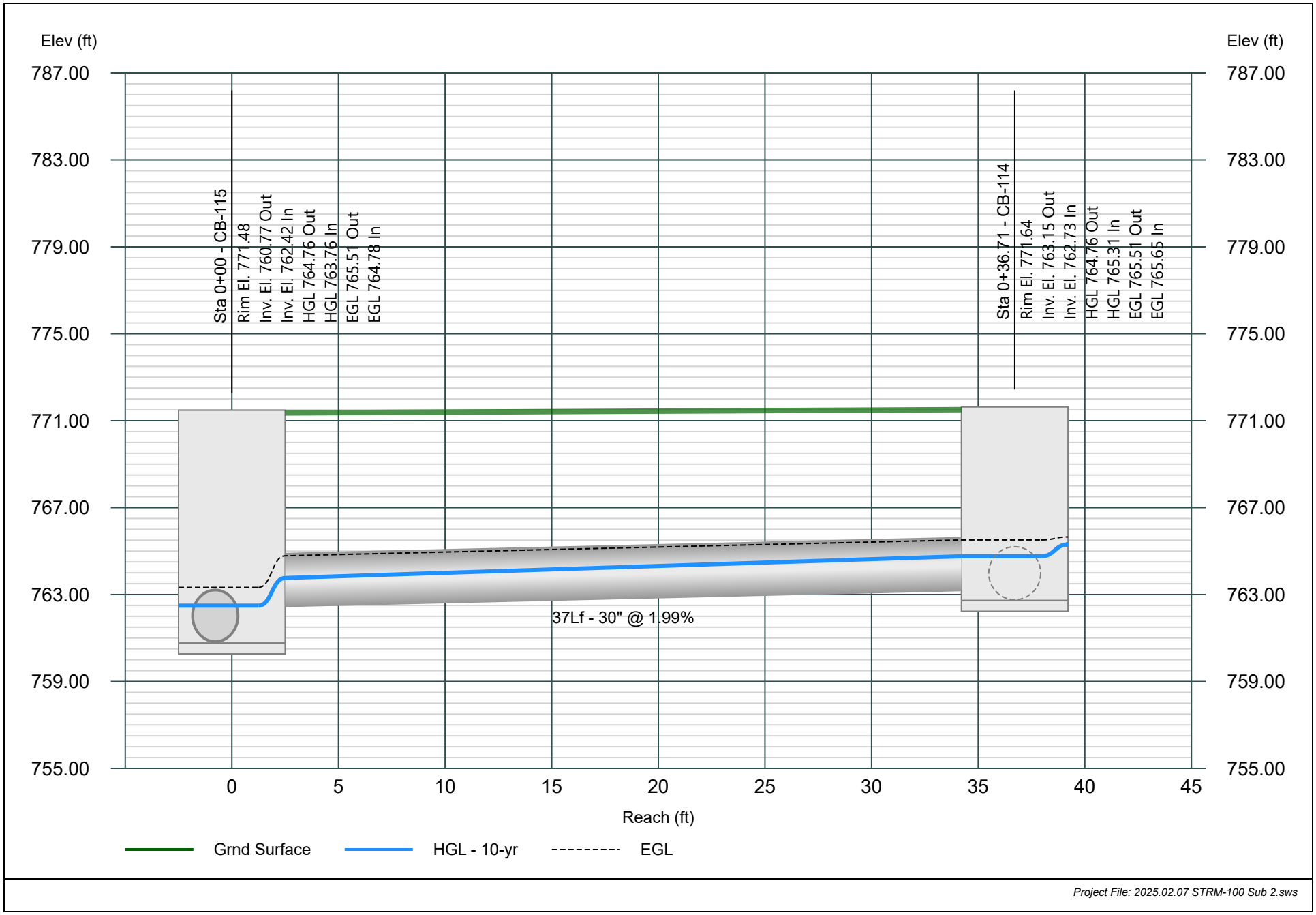
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 4 - 115-114

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



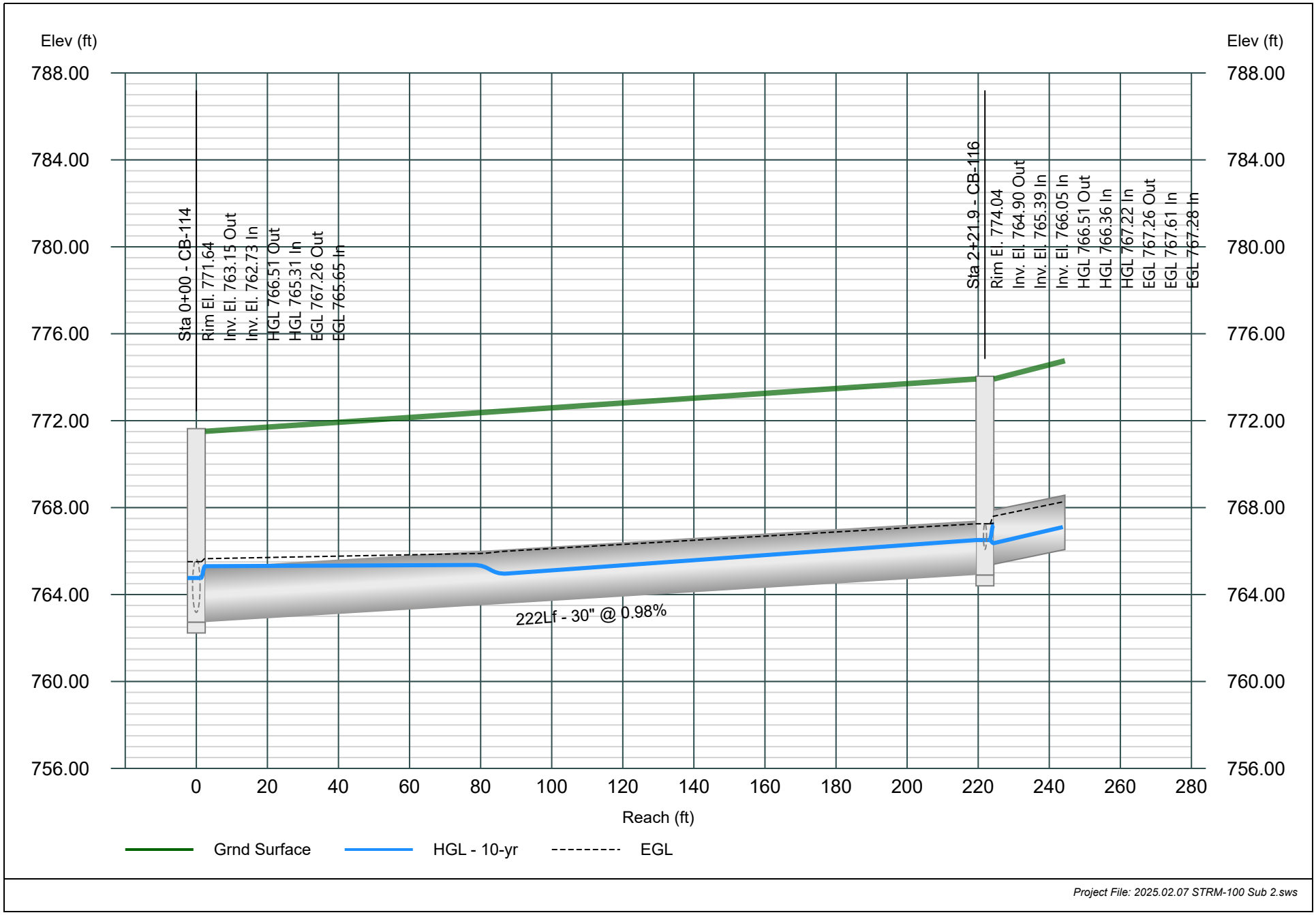
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 5 - 116-114

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



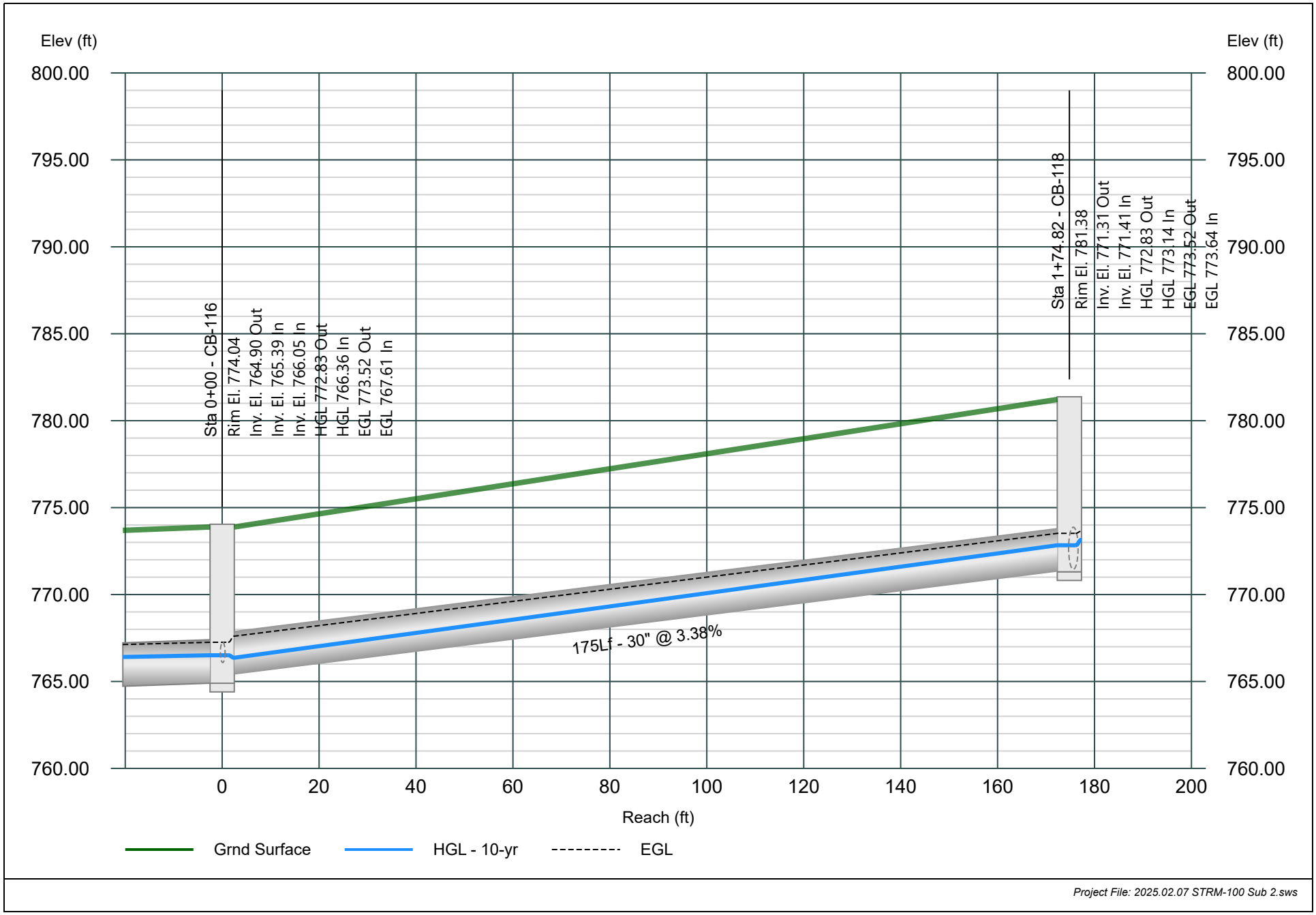
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 6 - 118-116

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



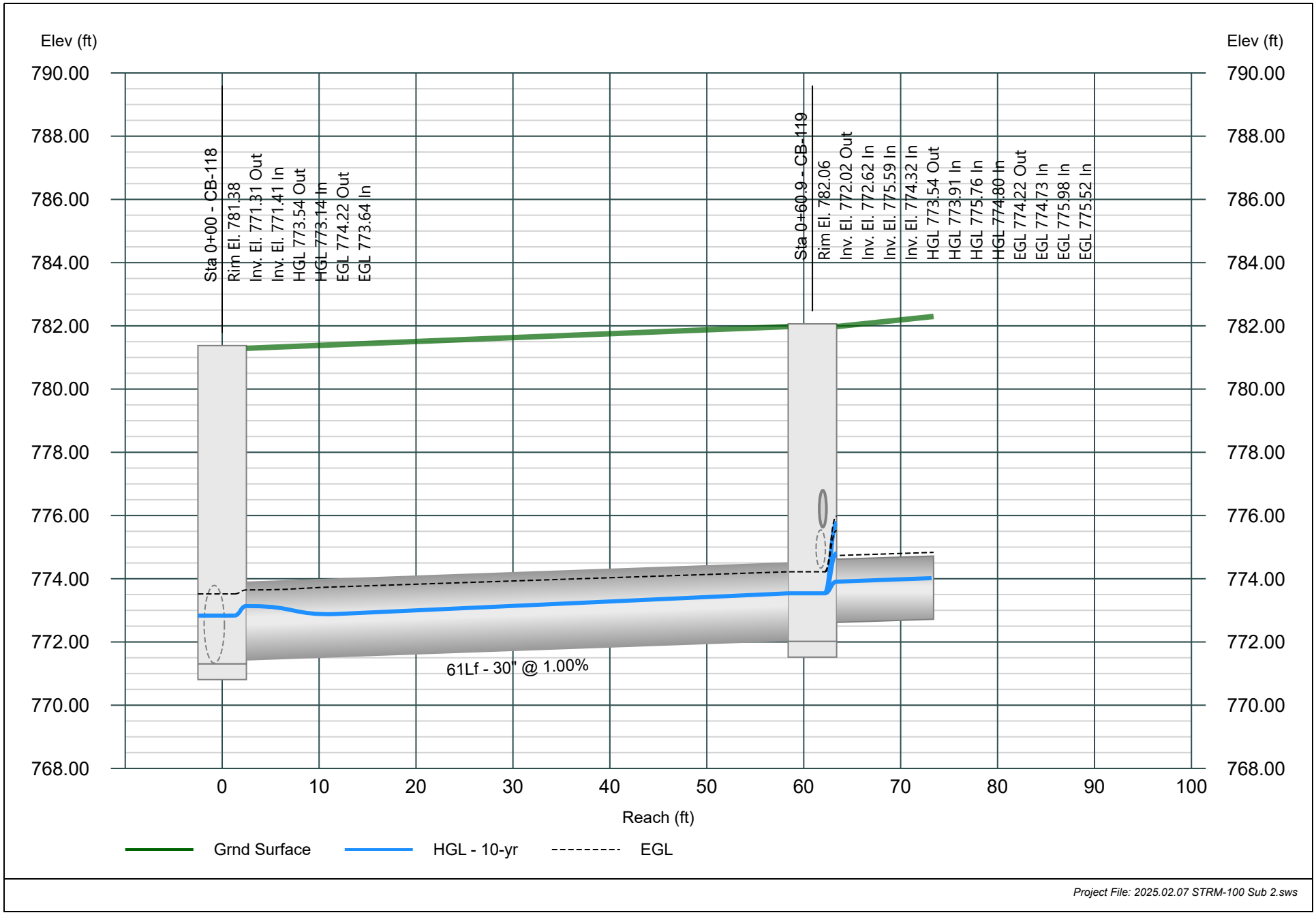
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 7 - 119-118

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



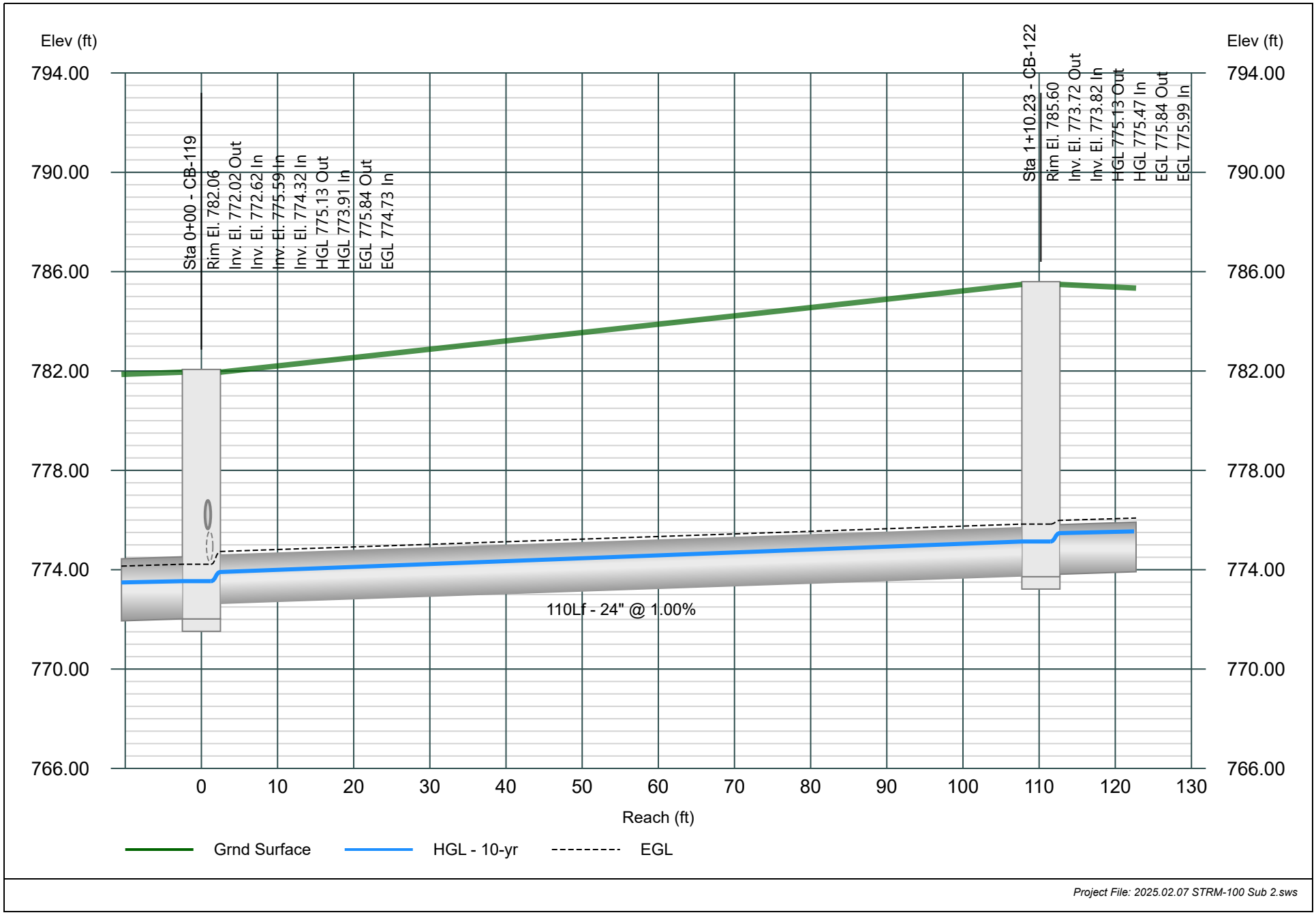
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 8 - 122-119

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



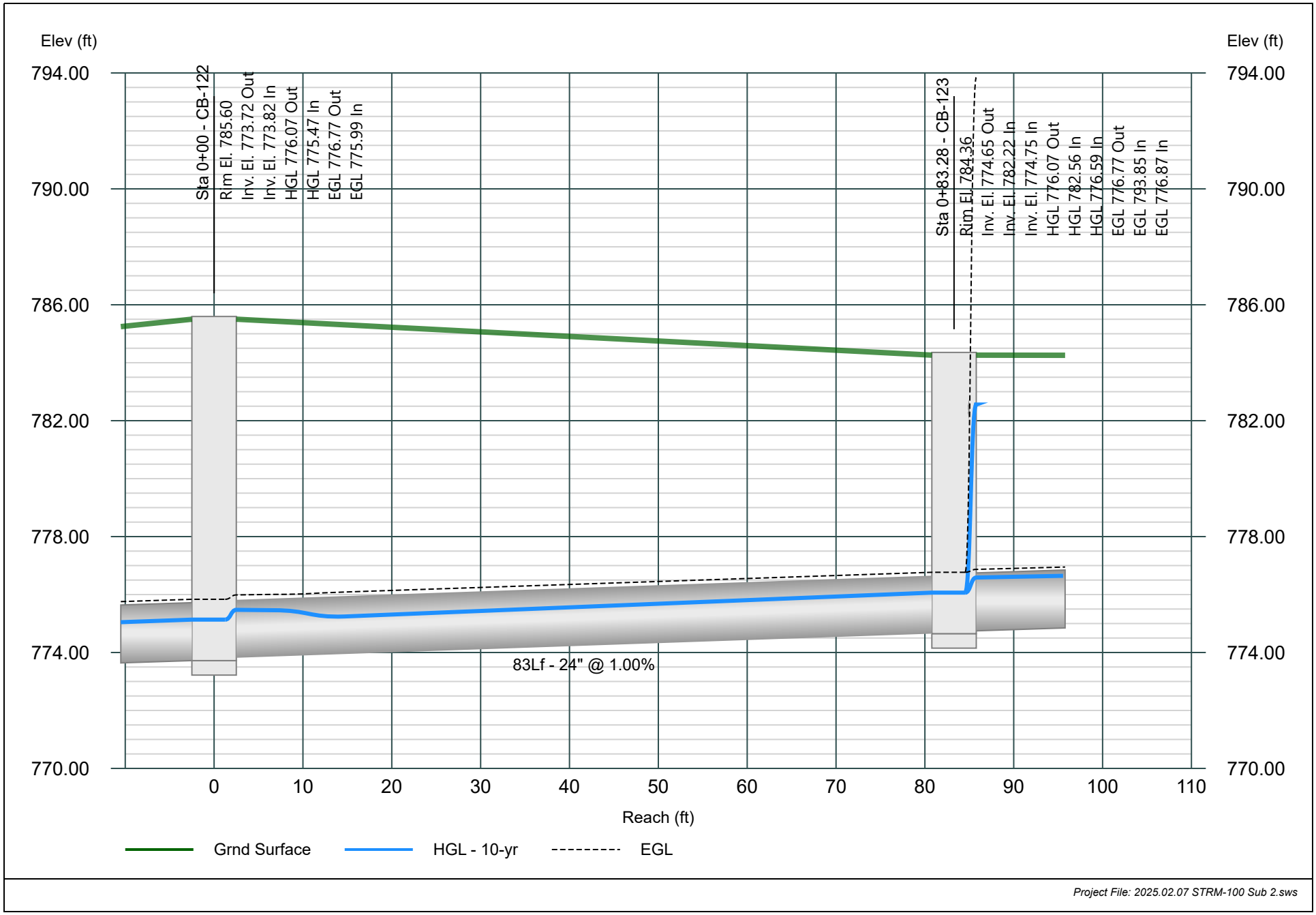
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 9 - 123-122

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



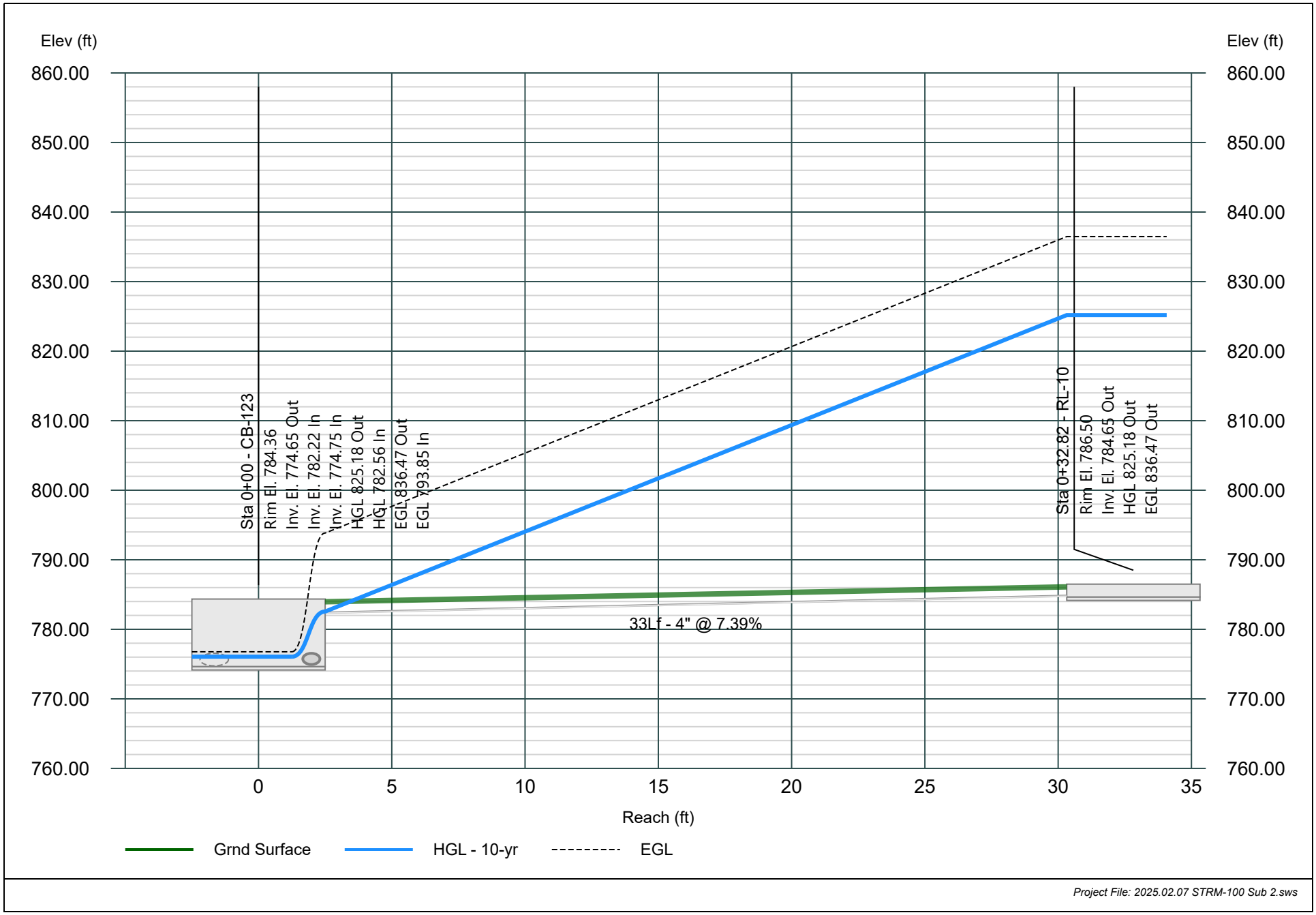
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 10 - RL-10

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



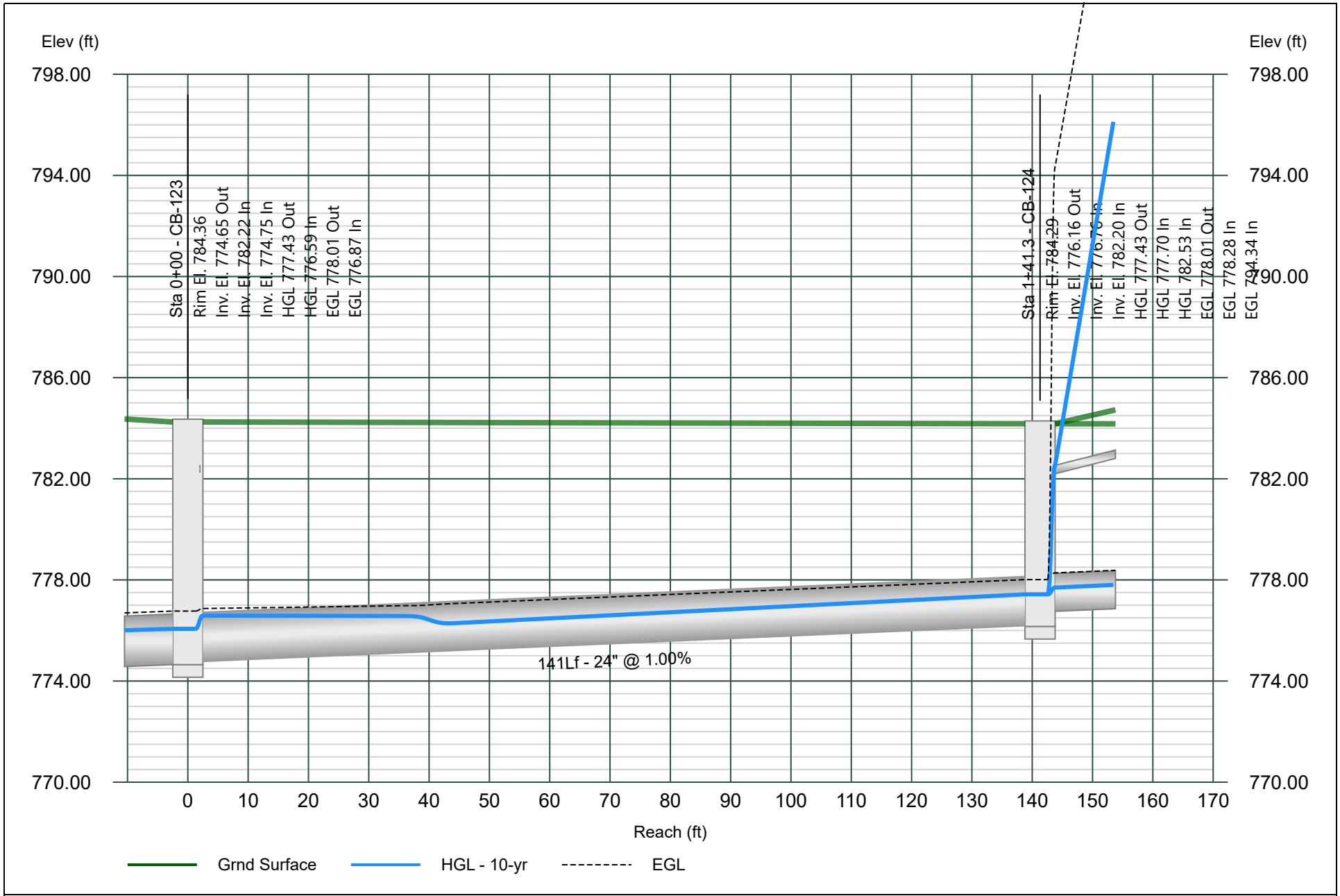
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 11 - 124-123

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



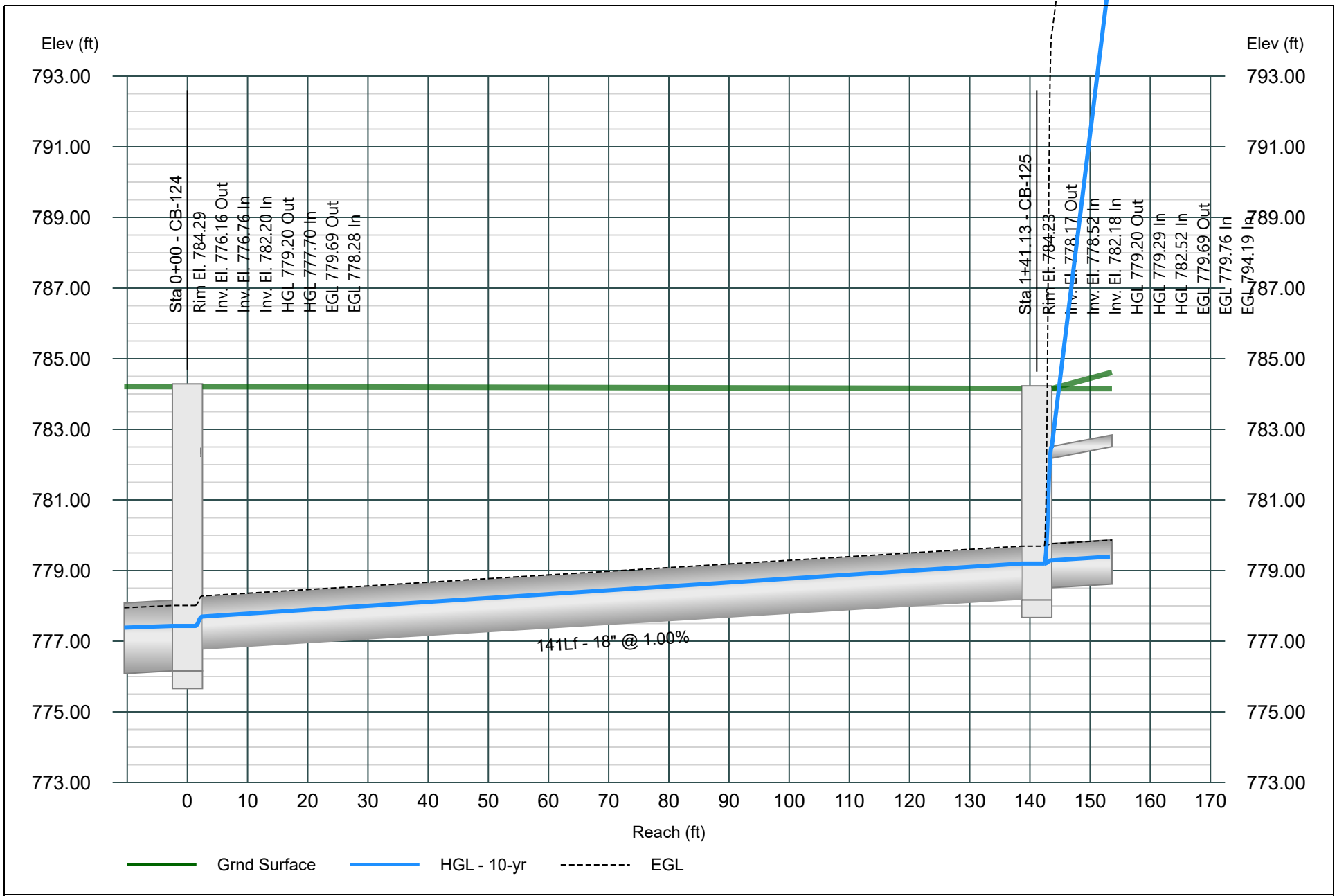
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 12 - 125-124

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



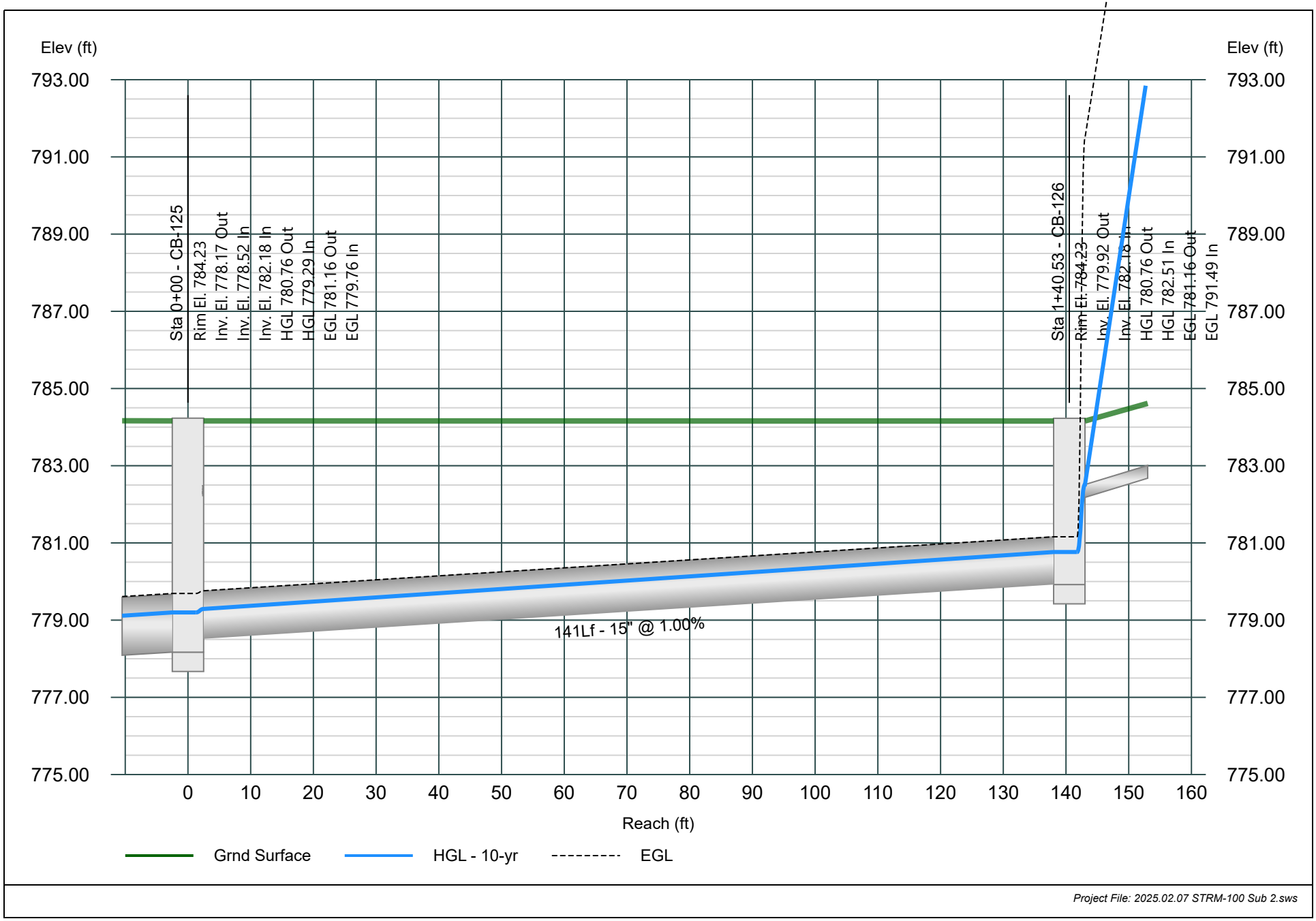
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 13 - 126-125

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



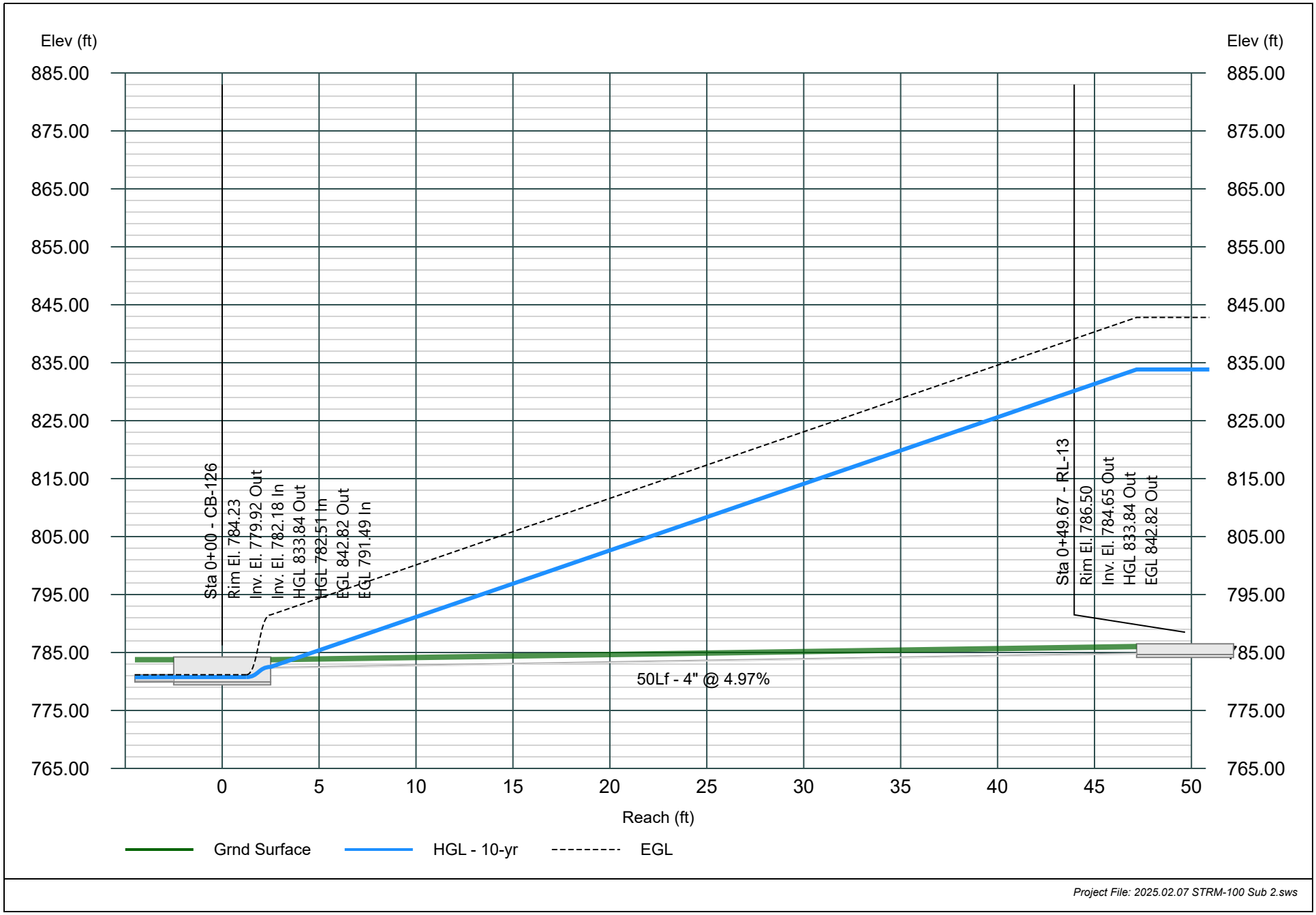
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 14 - RL-13

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



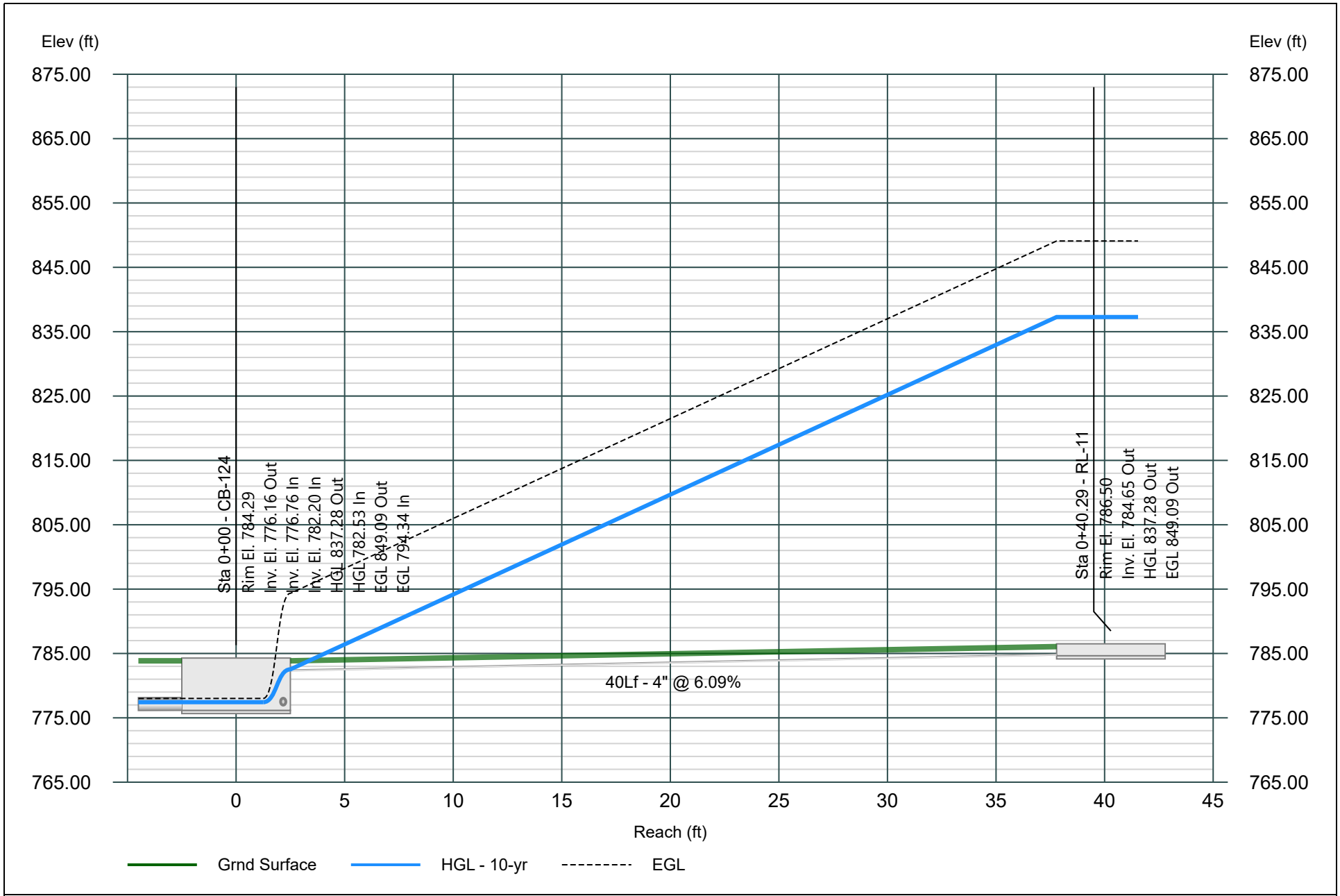
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 15 - RL-11

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



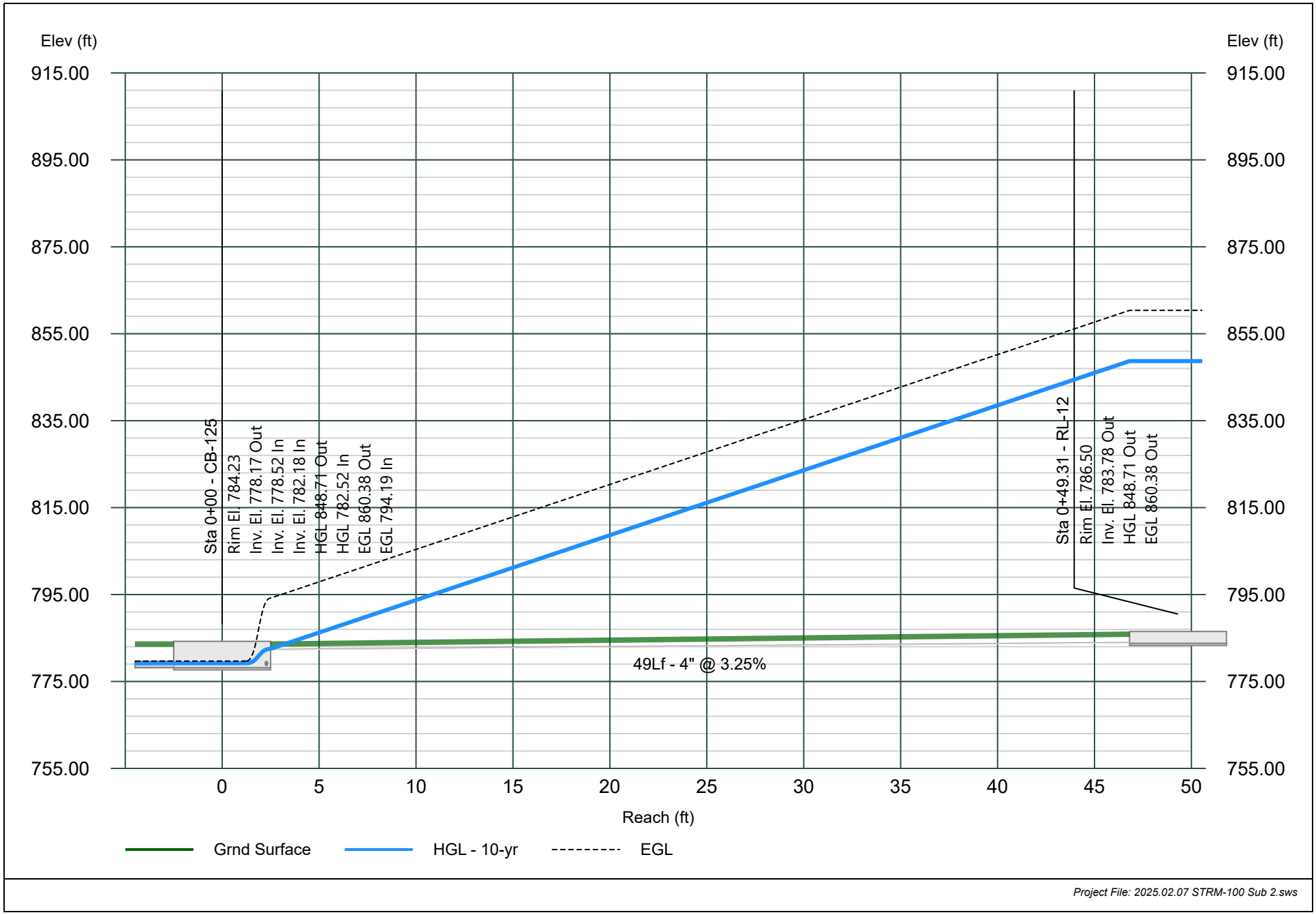
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 16 - RL-12

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



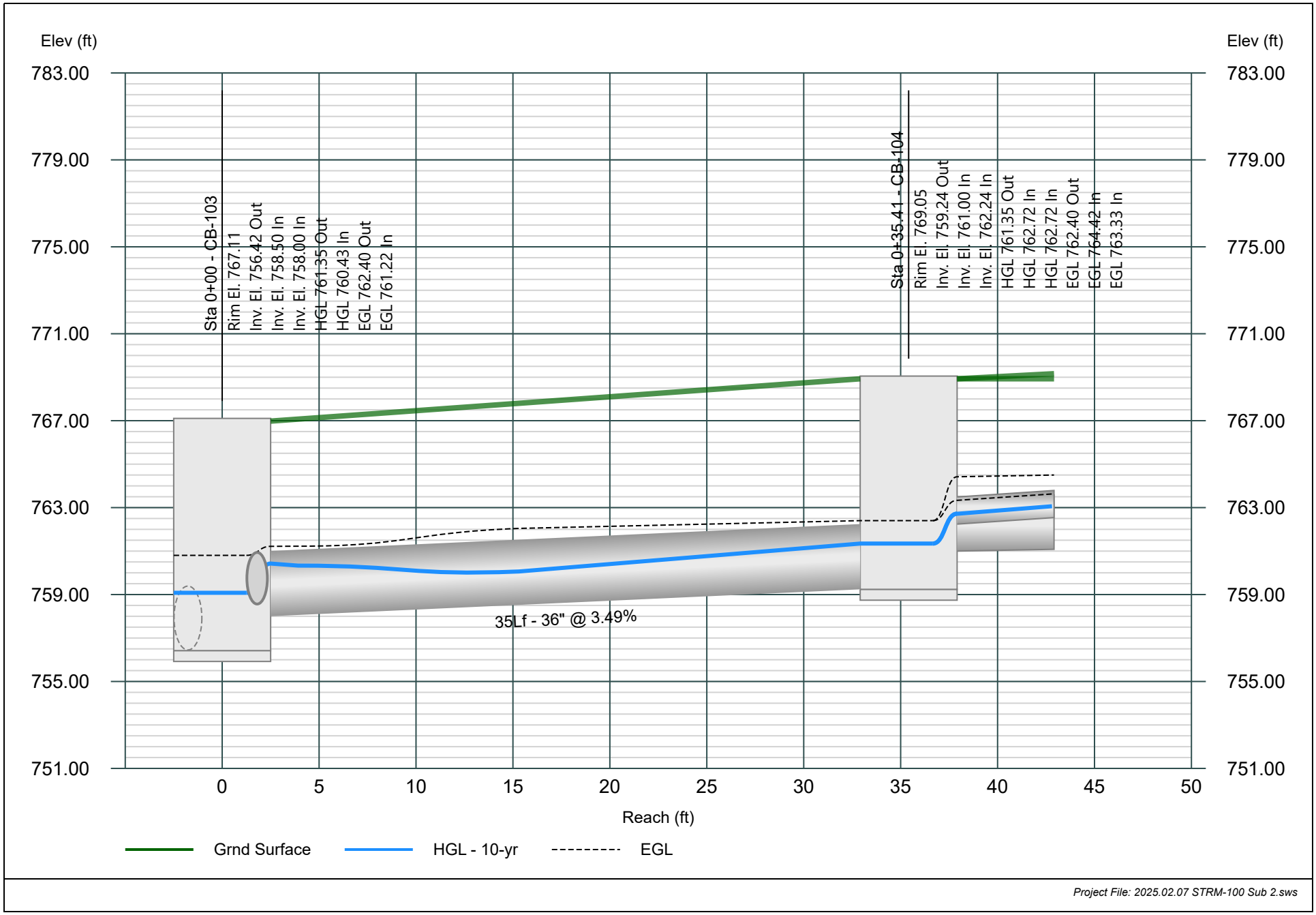
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 17 - 104-103

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



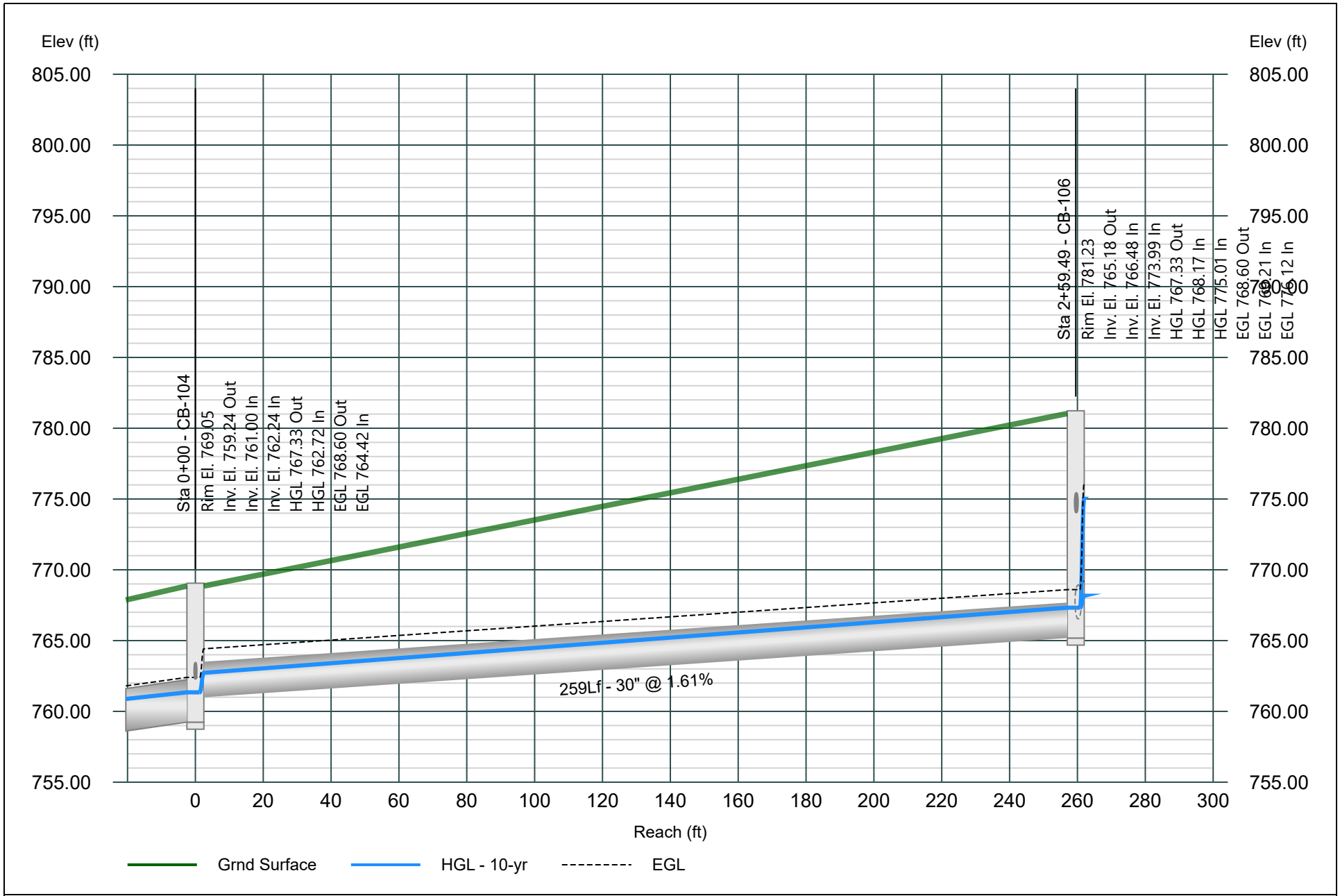
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 18 - 106-104

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



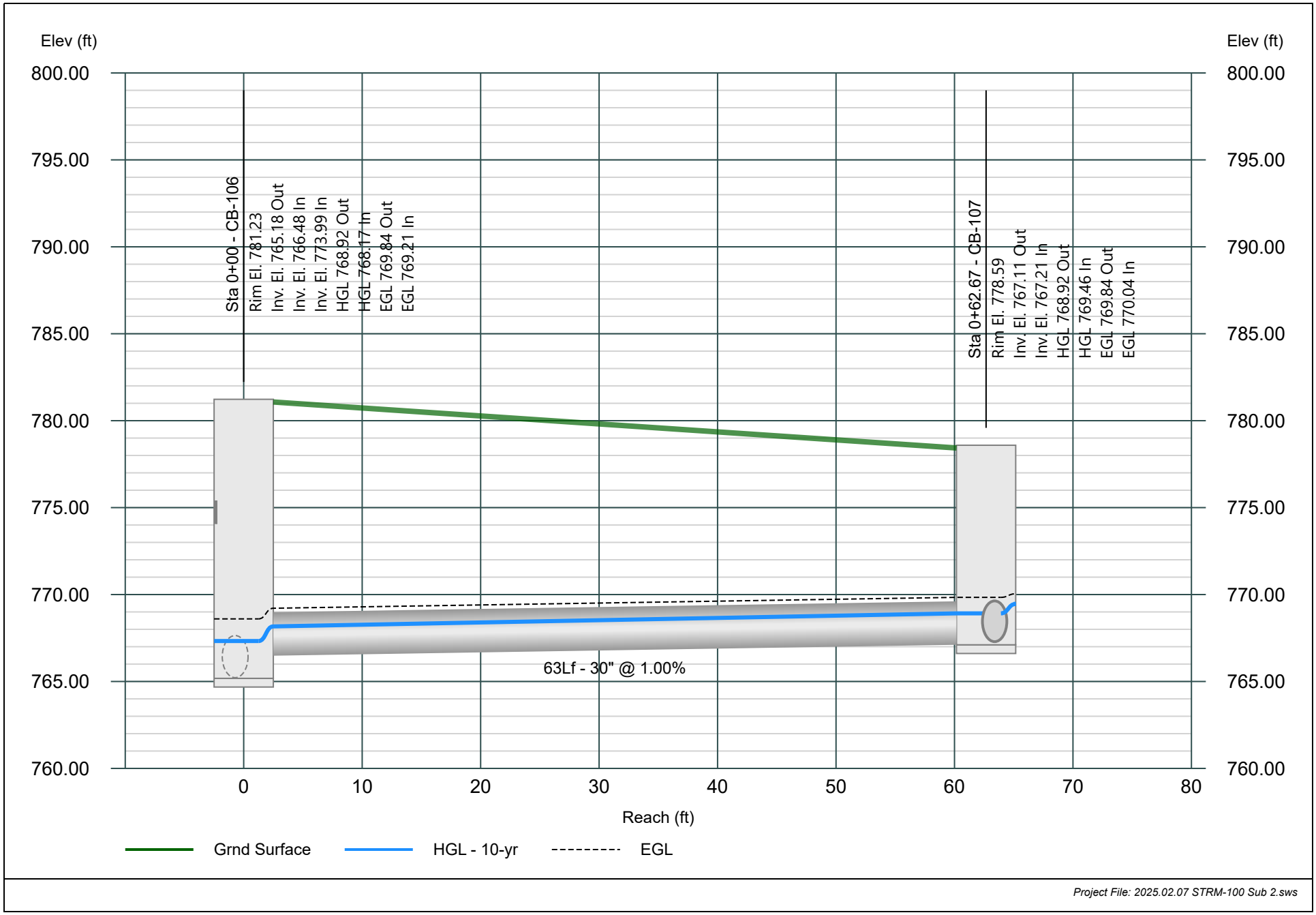
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 19 - 107-106

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



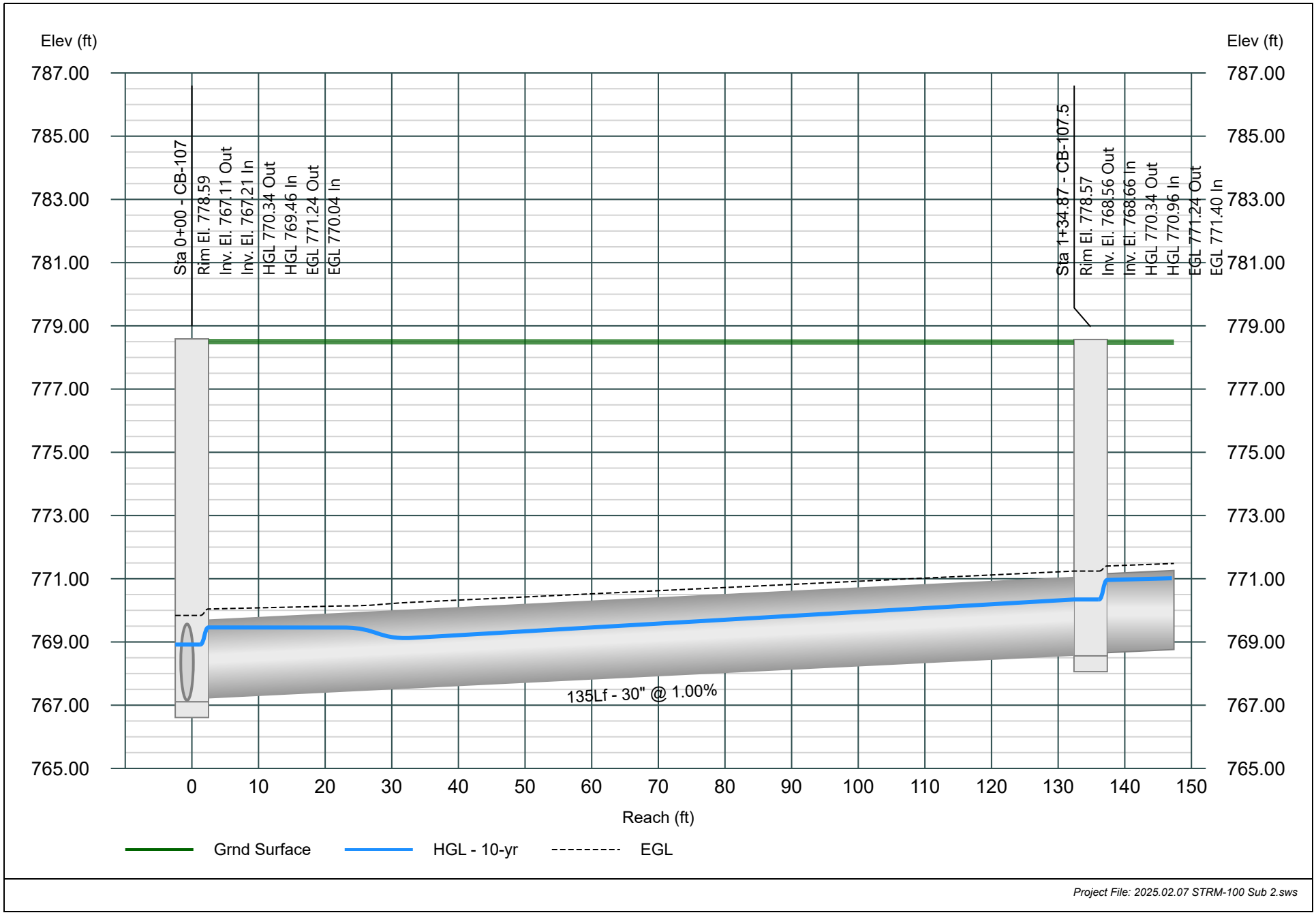
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 20 - 108-107

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025

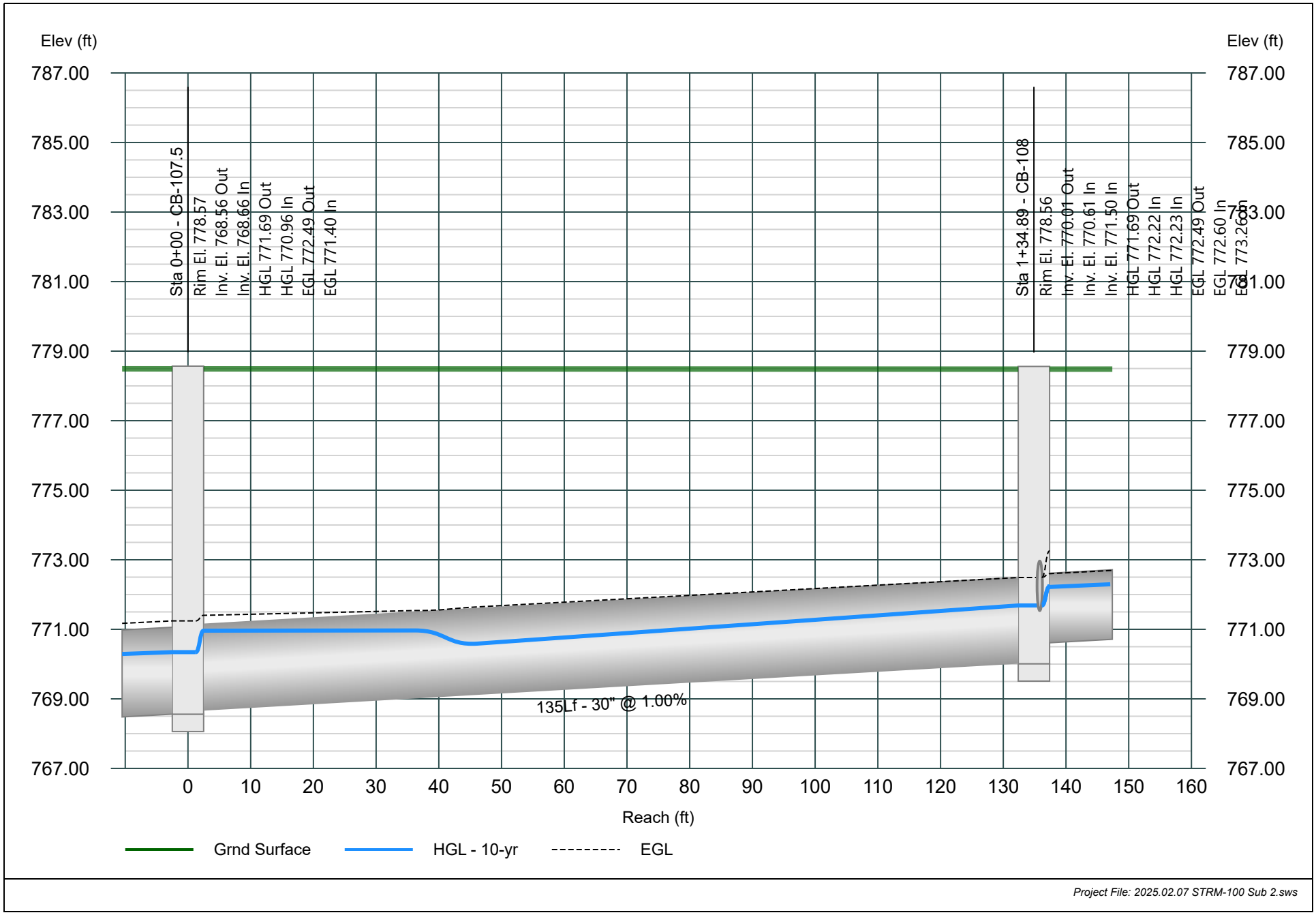


Line 21 - 108-107 (1)

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



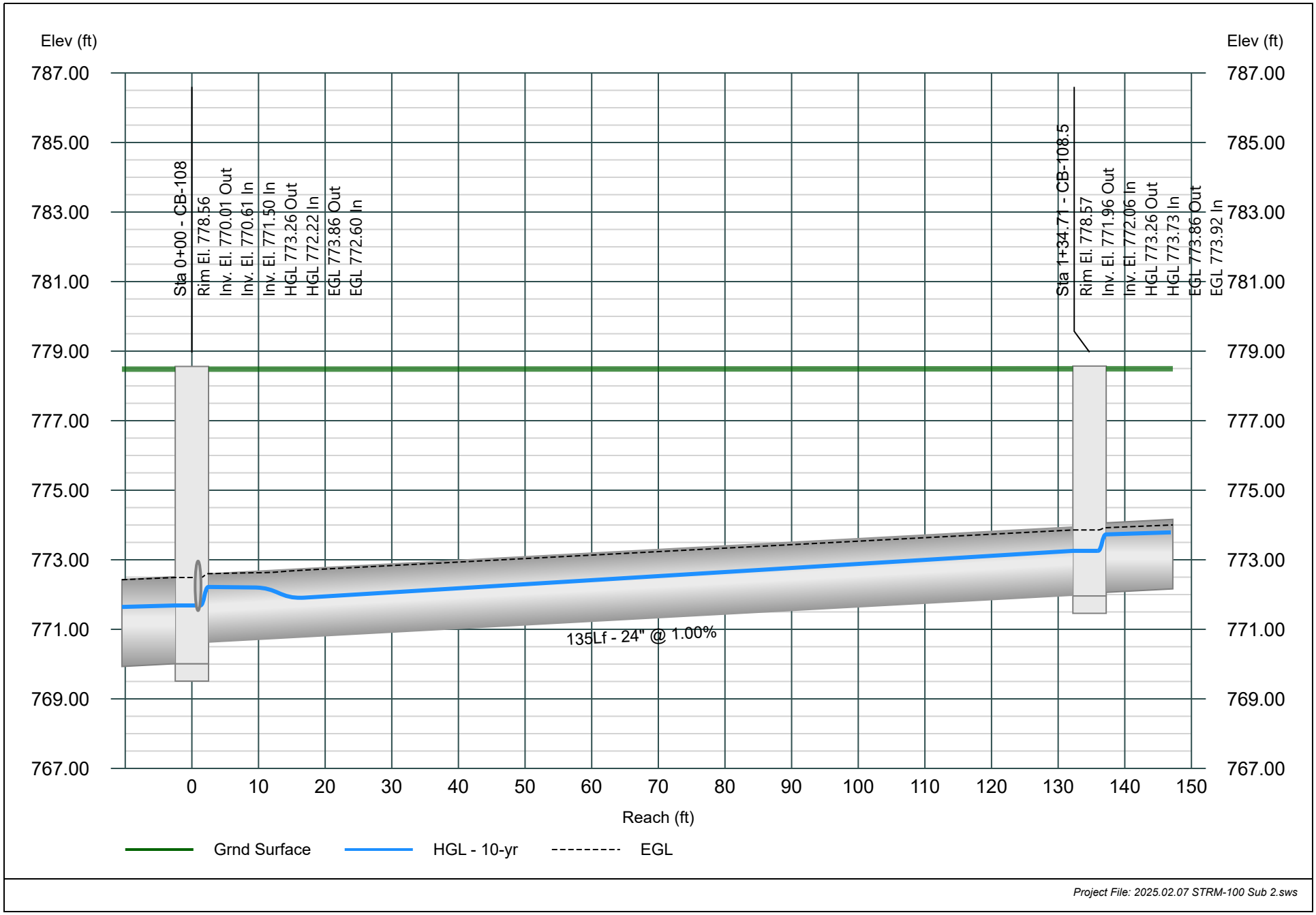
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 22 - 109-108

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



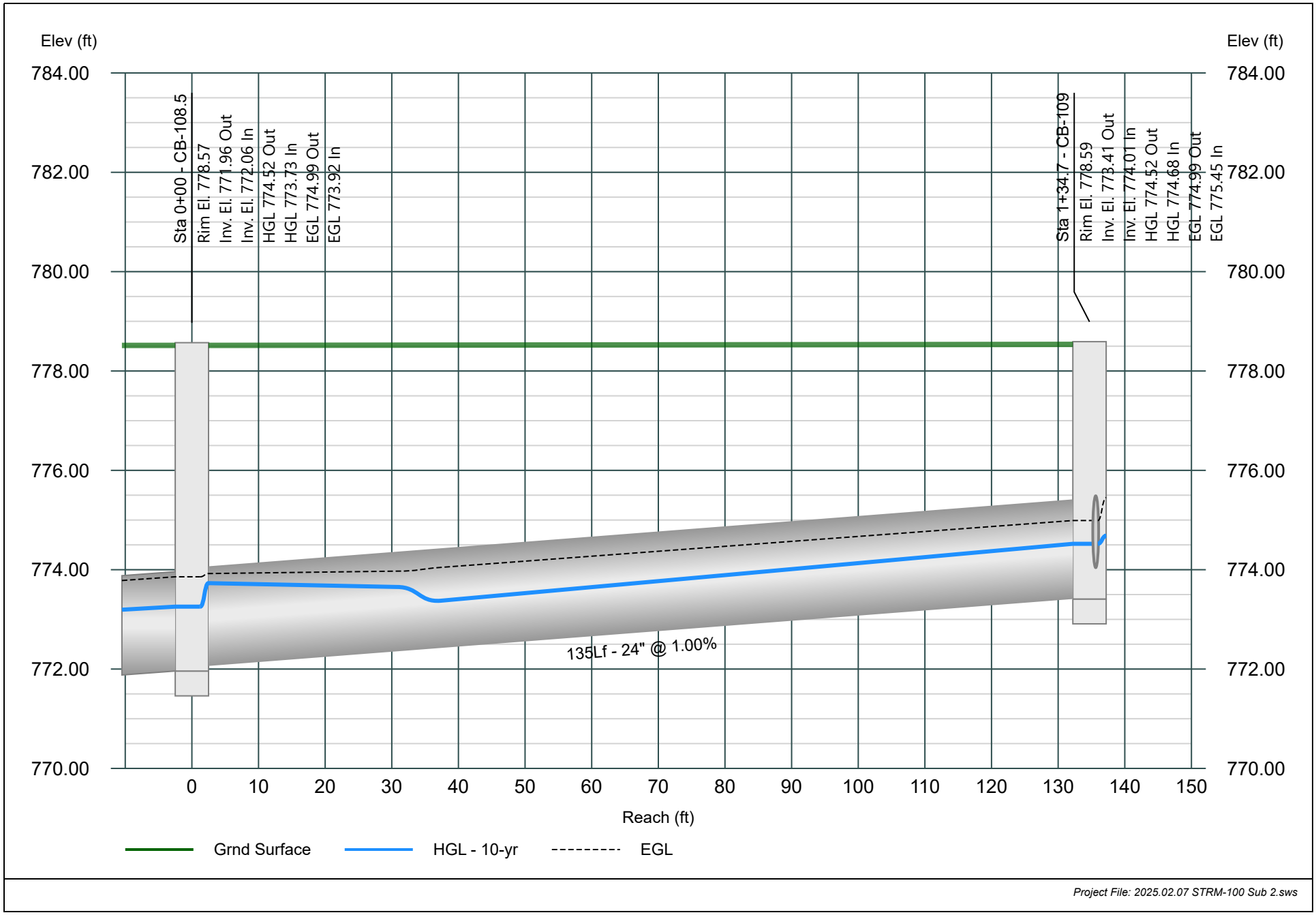
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 23 - 109-108 (1)

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



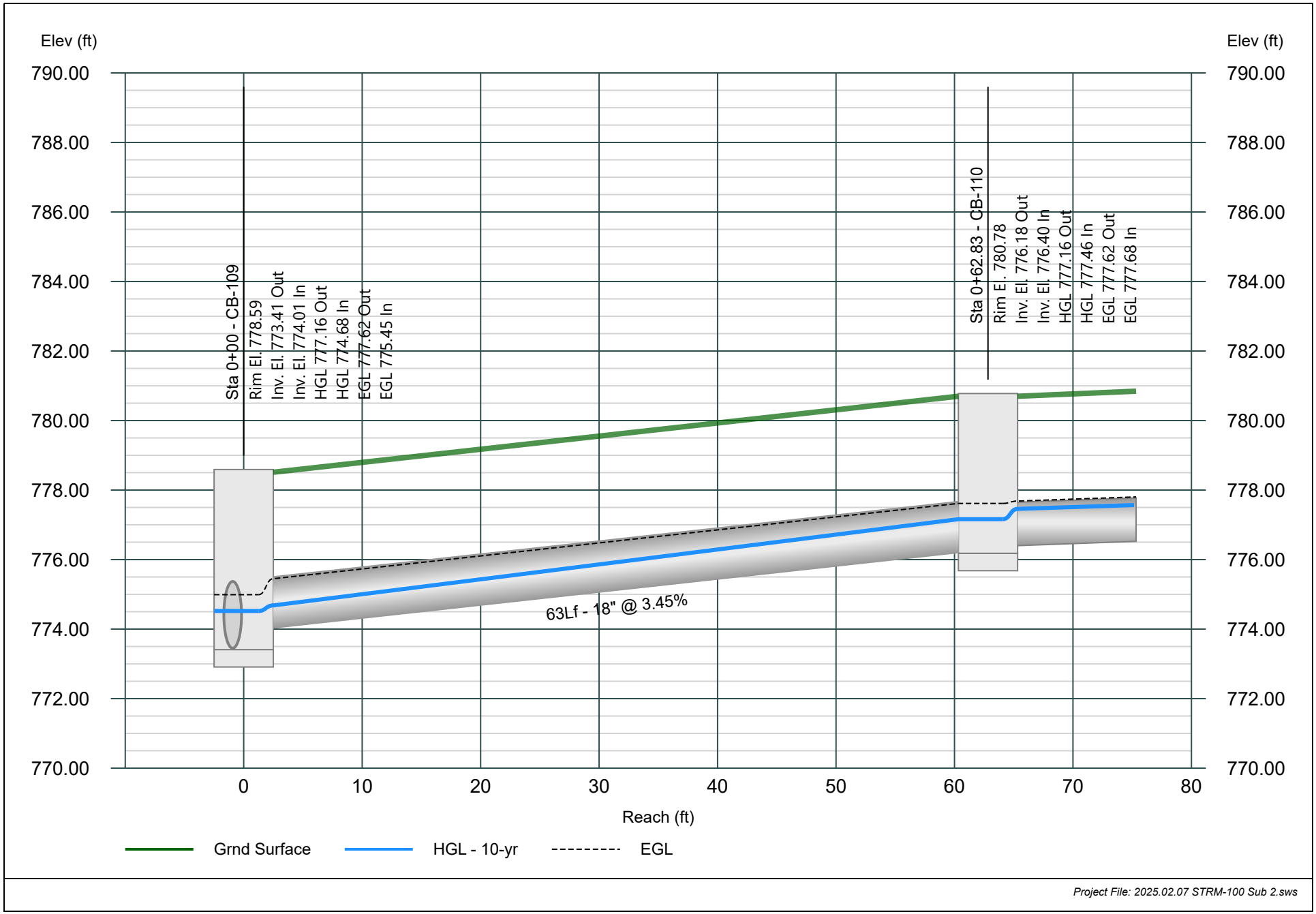
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 24 - 110-109

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



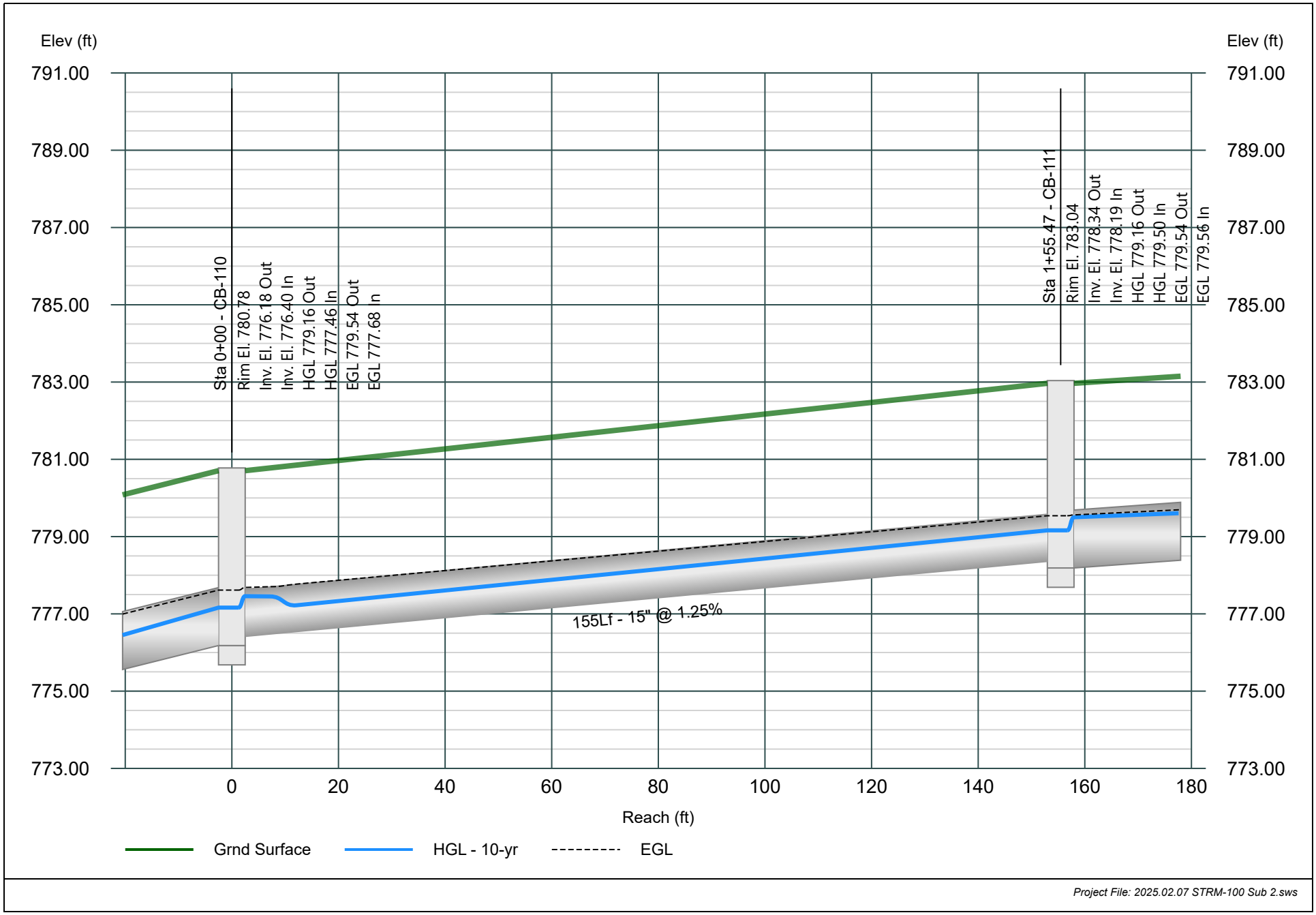
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 25 - 111-110

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



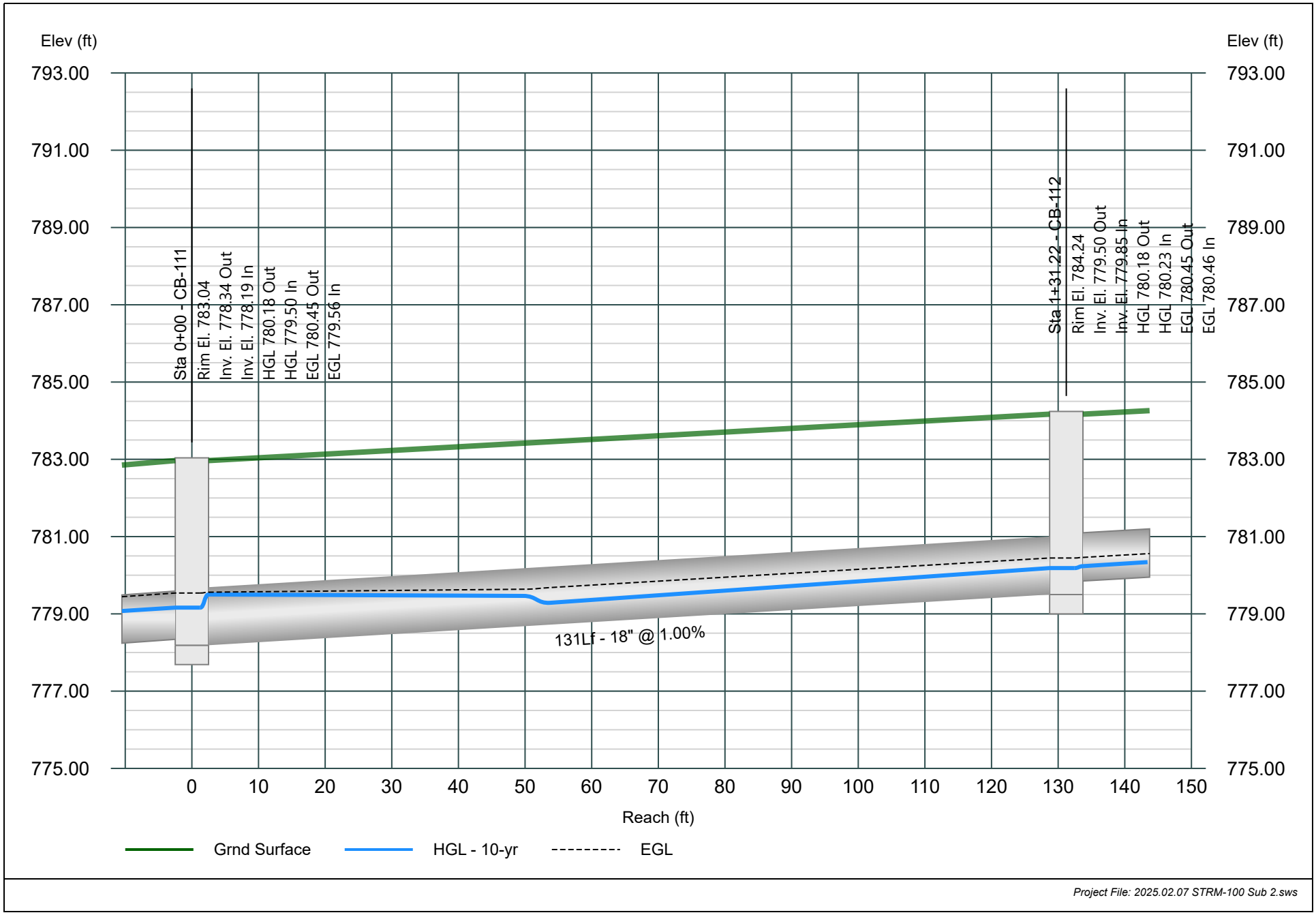
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 26 - 112-111

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



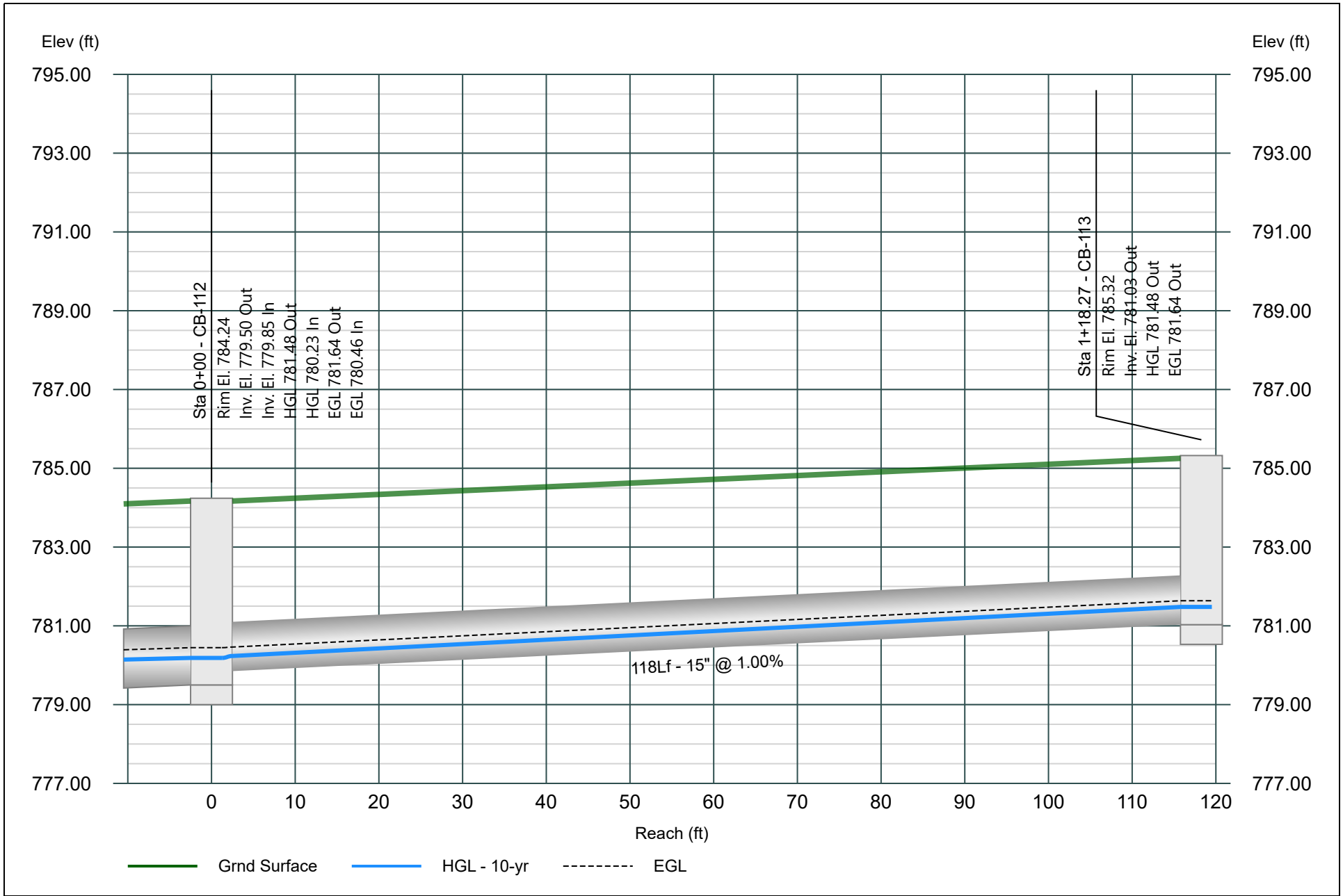
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 27 - 113-112

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



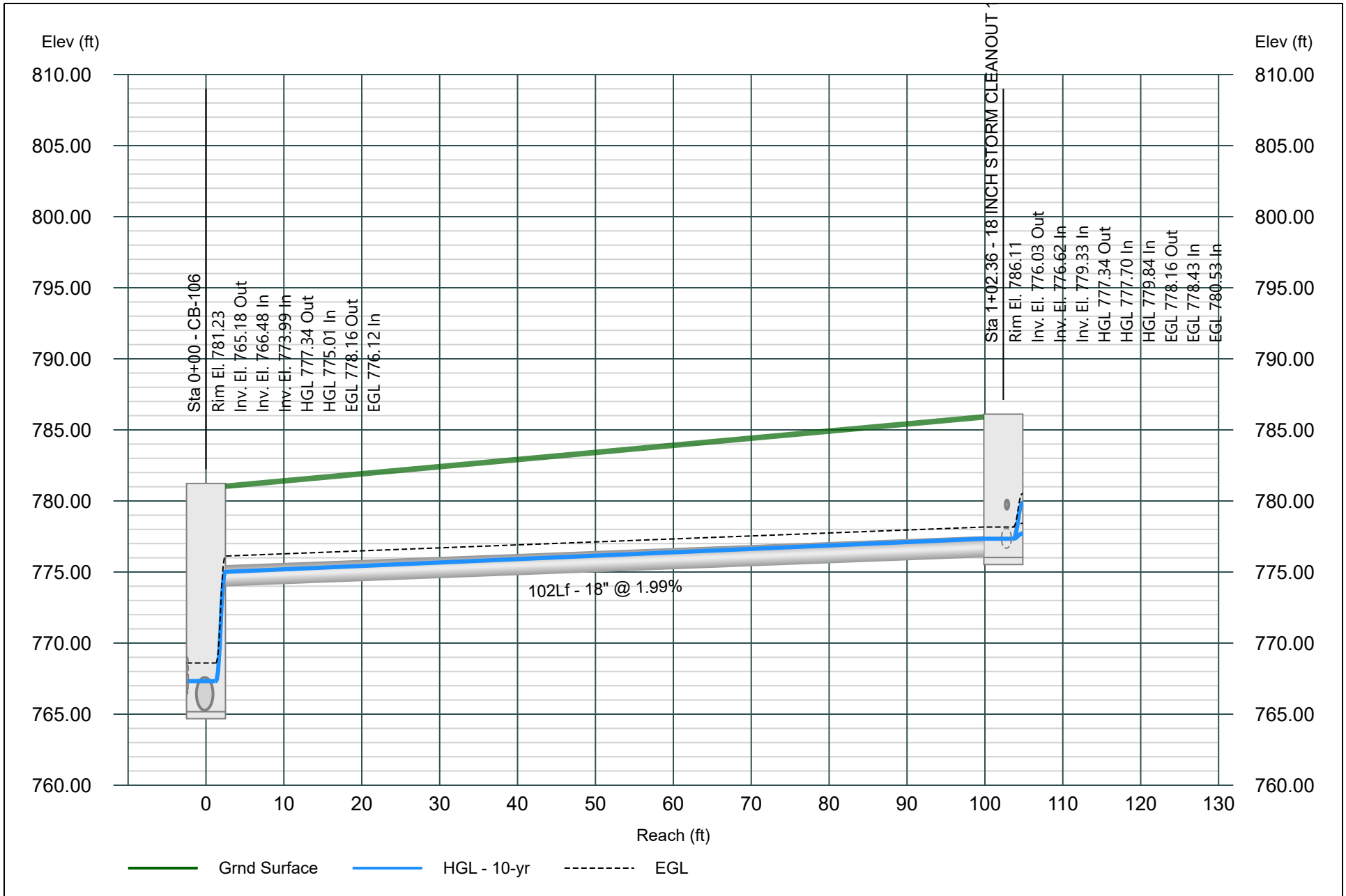
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 28 - CO1-106

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



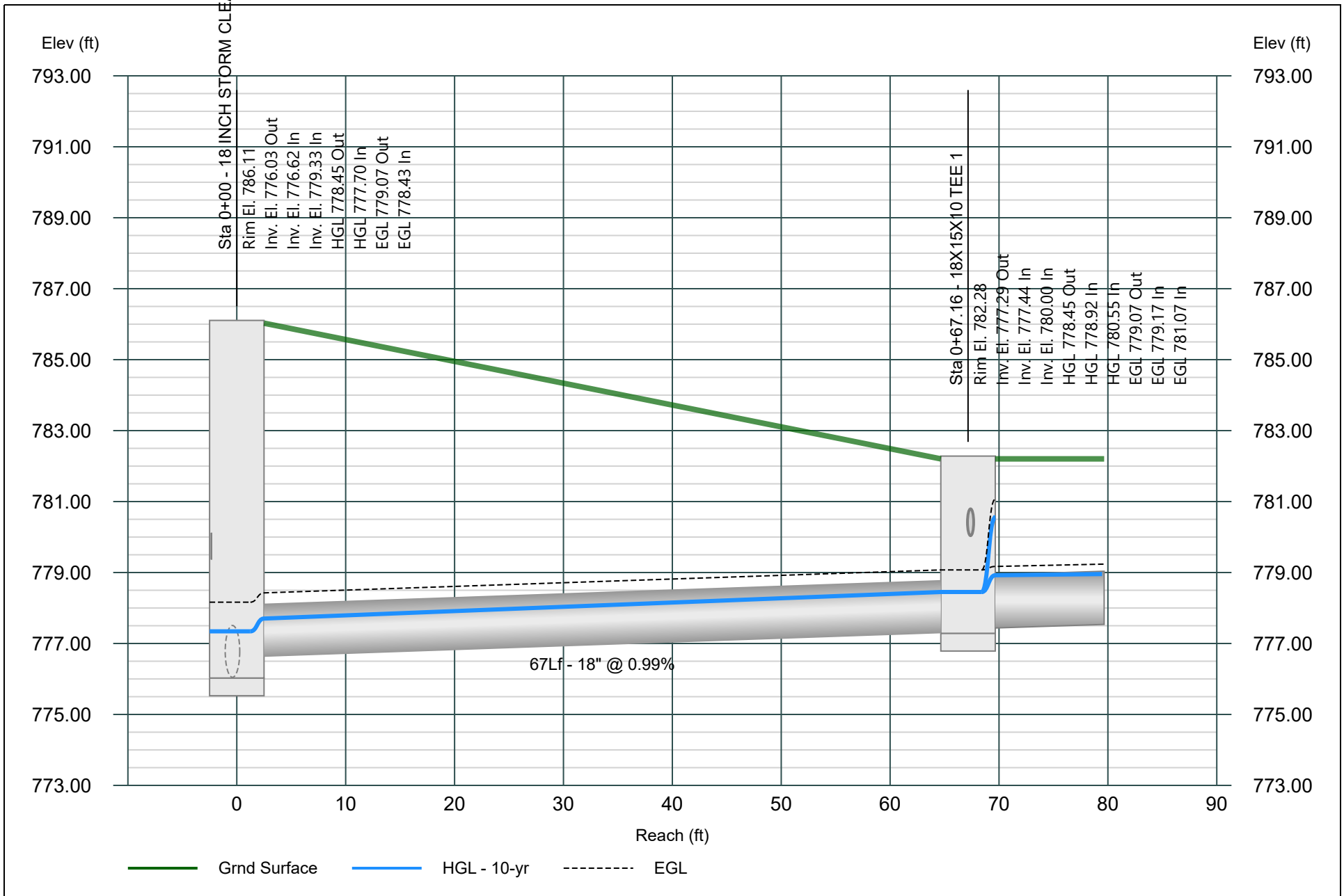
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 29 - TEE 1-CO1

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



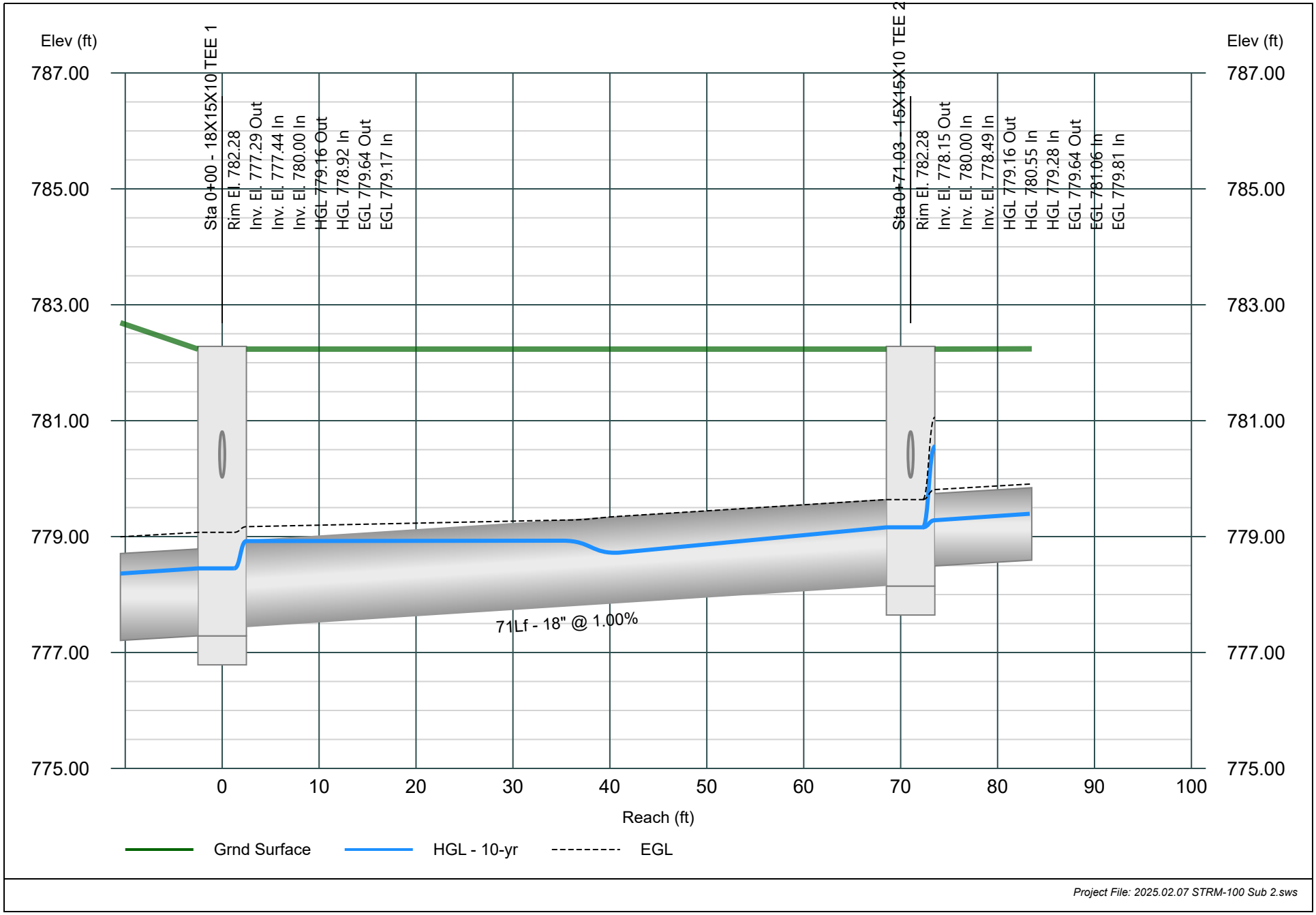
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 30 - TEE 2-TEE 1

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



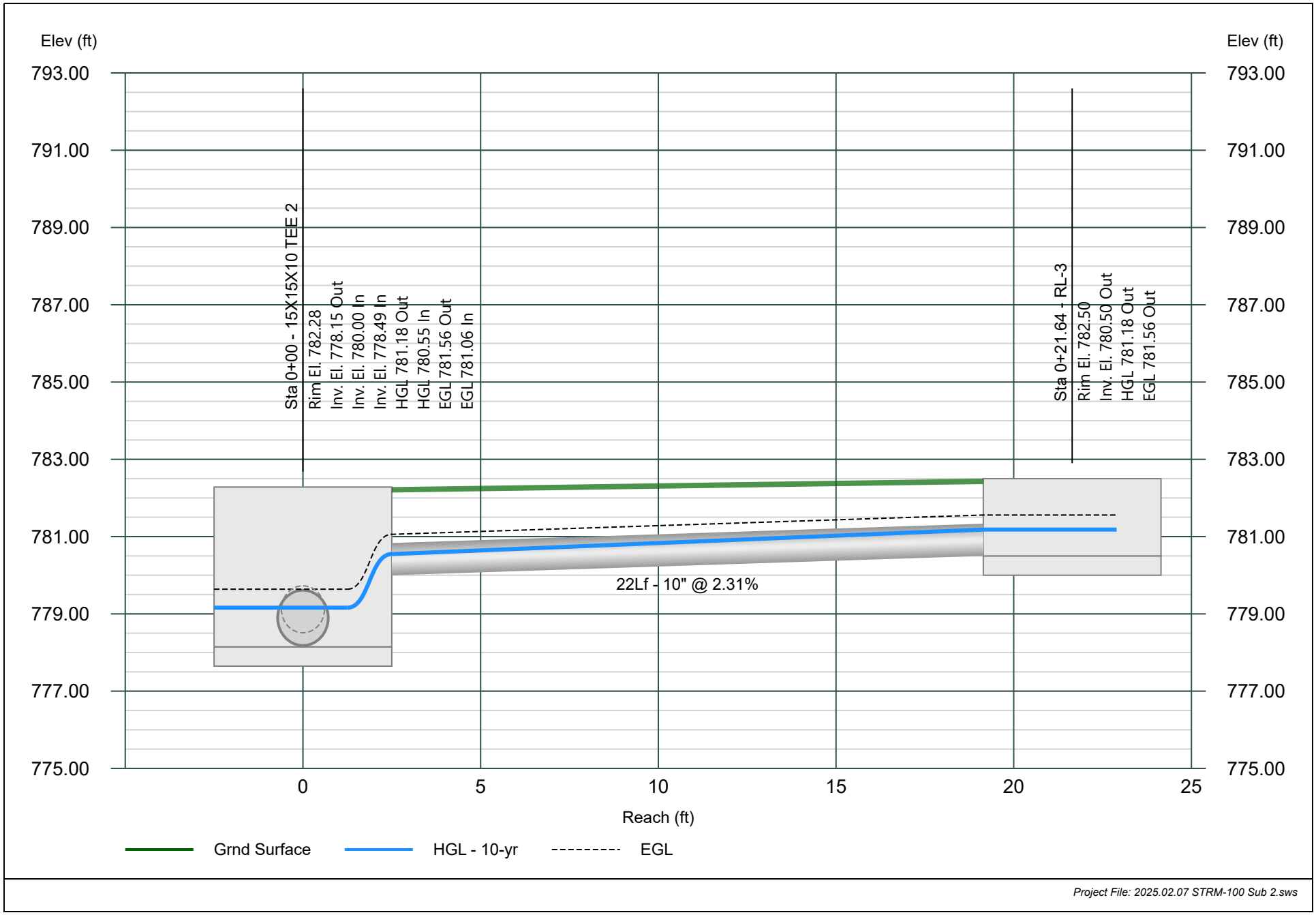
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 31 - RL-3

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



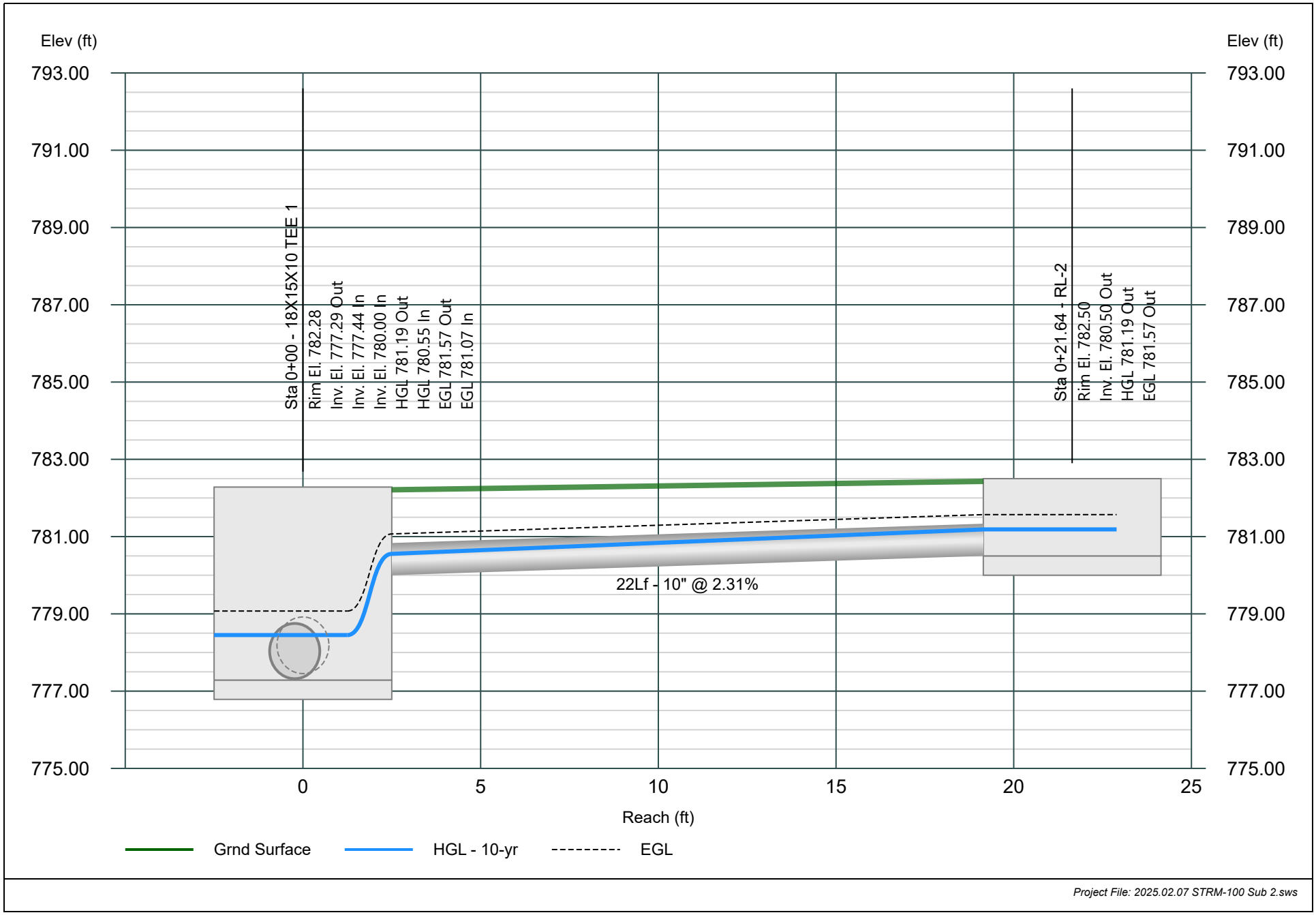
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 32 - RL-2

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



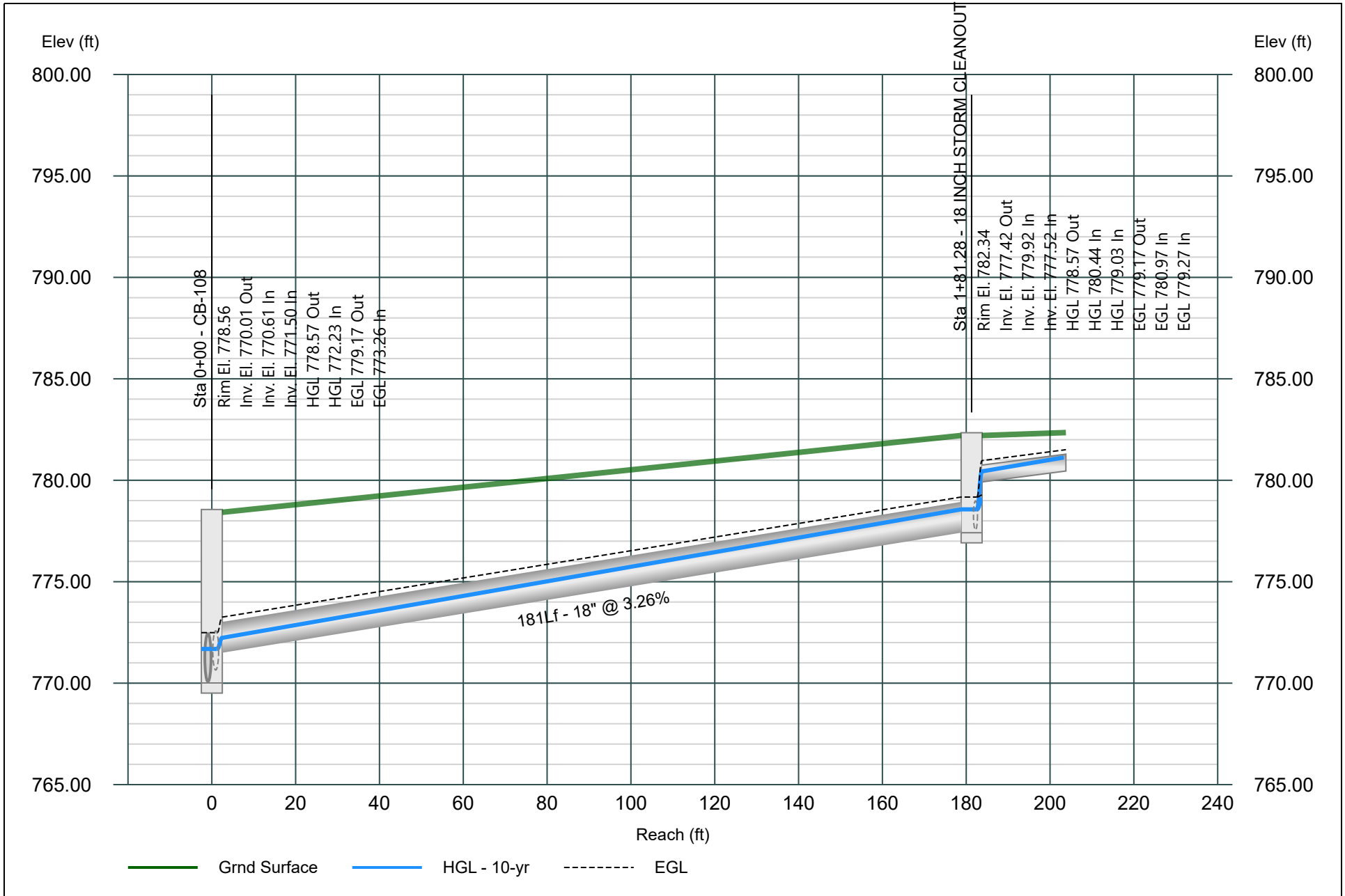
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 33 - CO3-108

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



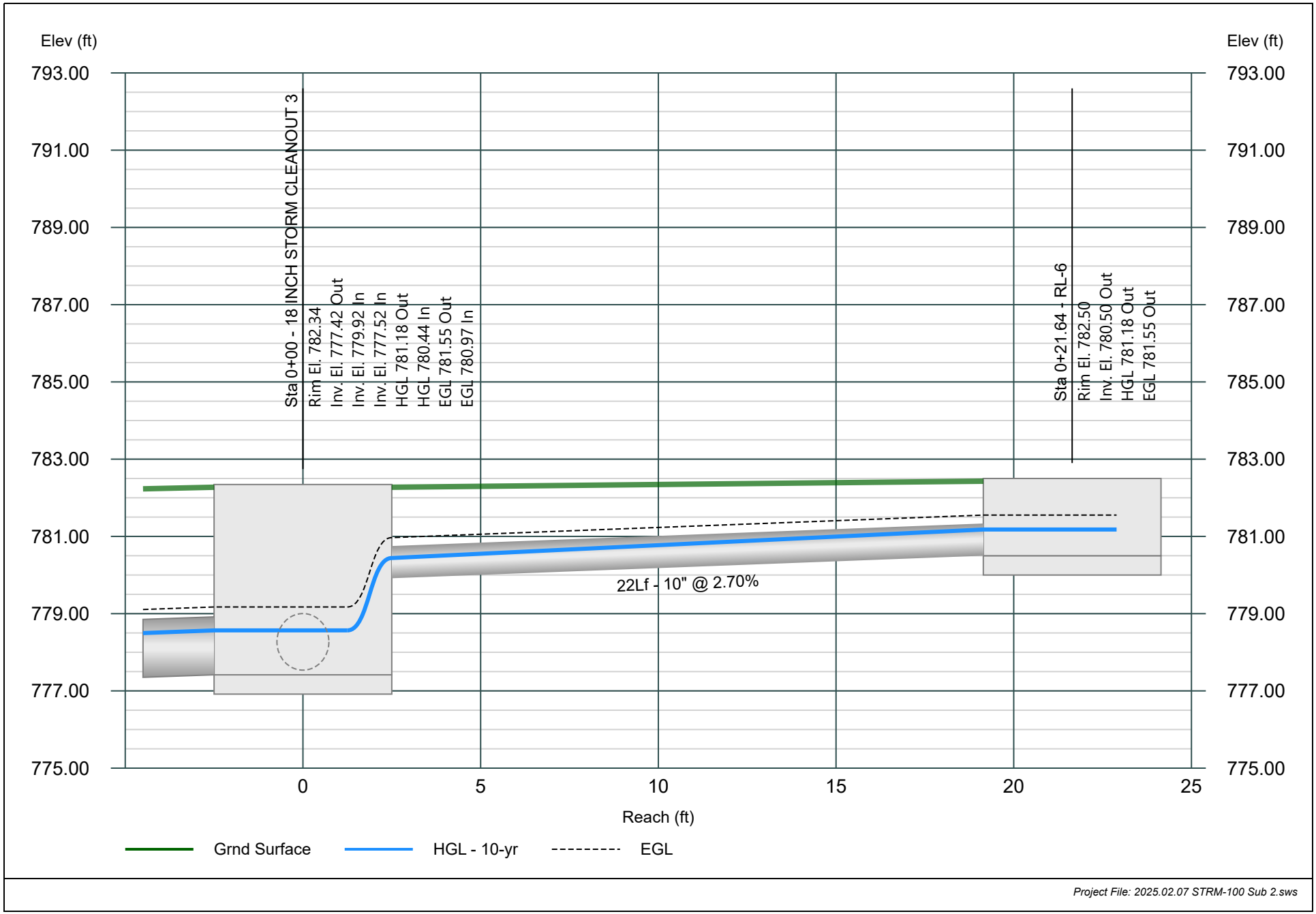
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 34 - RL-6

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



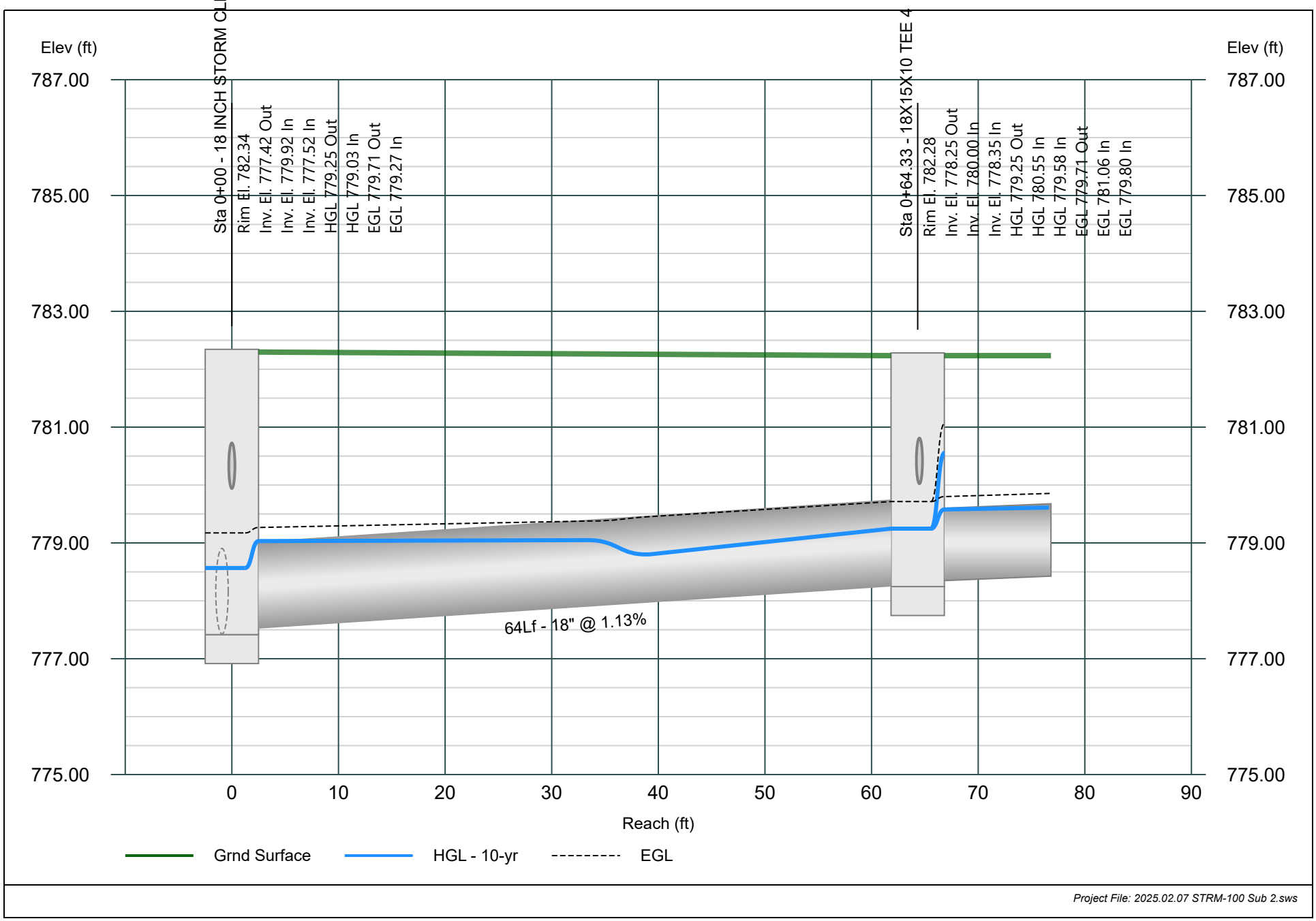
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 35 - TEE 4-CO3

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



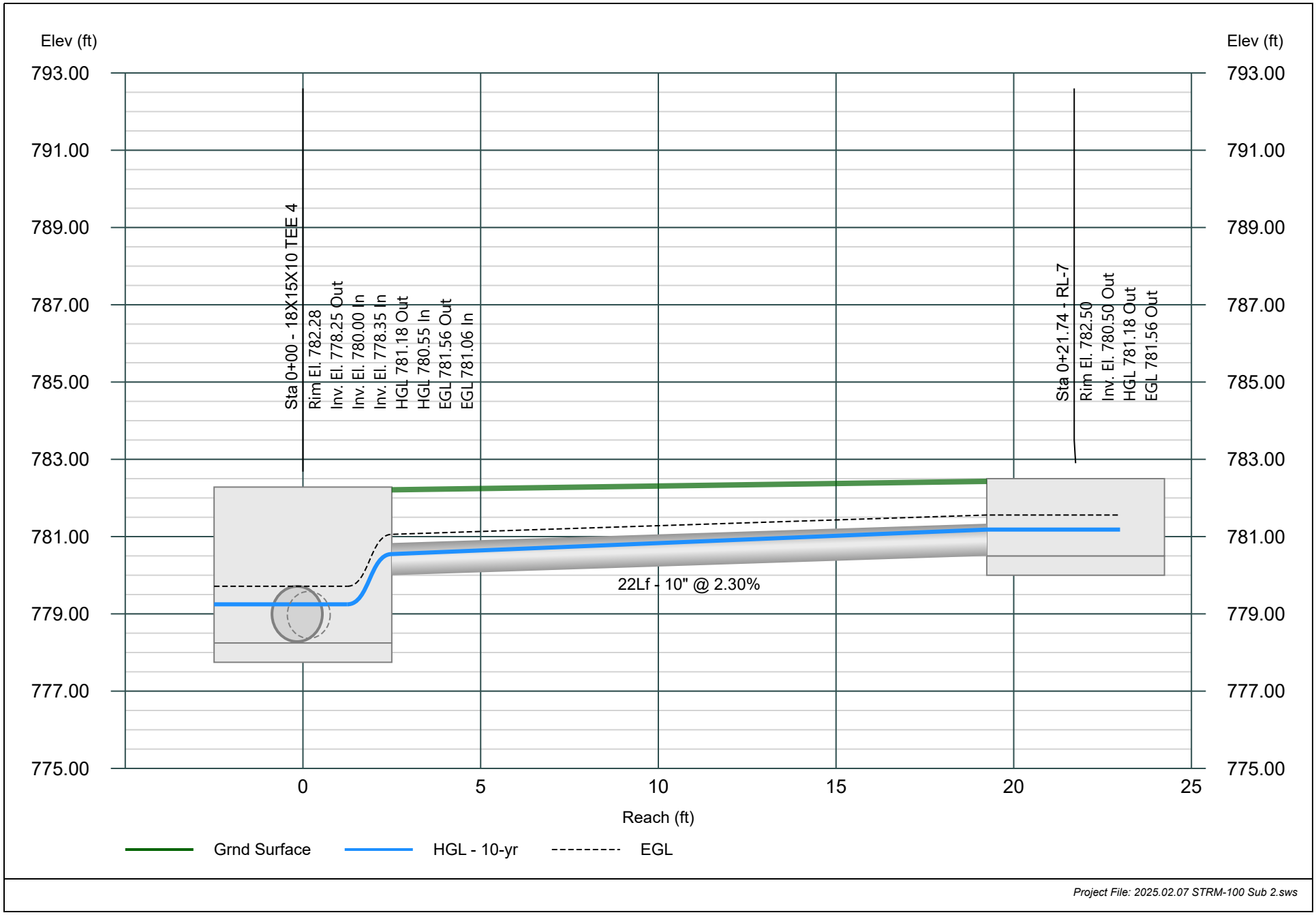
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 36 - RL-7

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



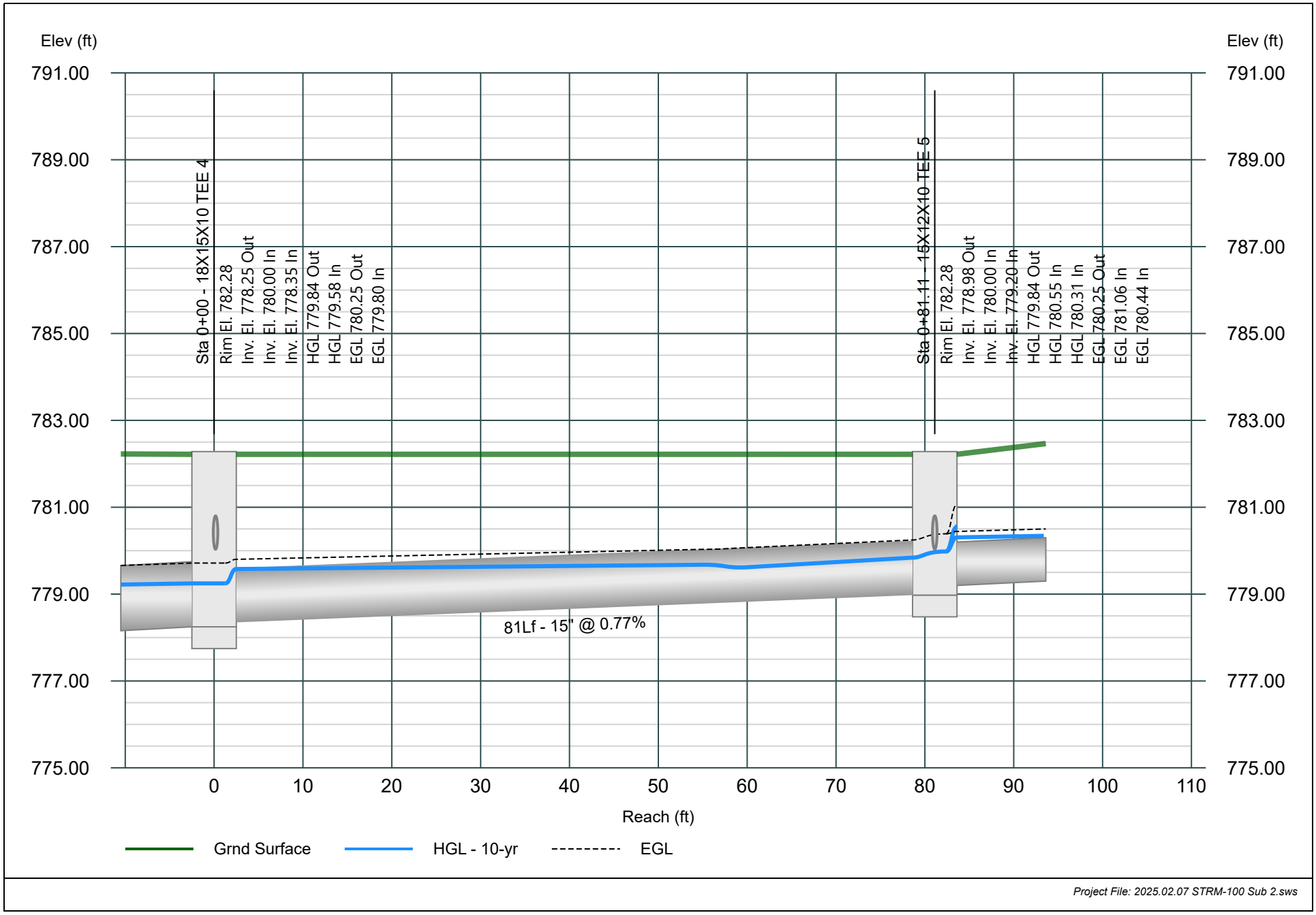
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 37 - TEE 5-TEE 4

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



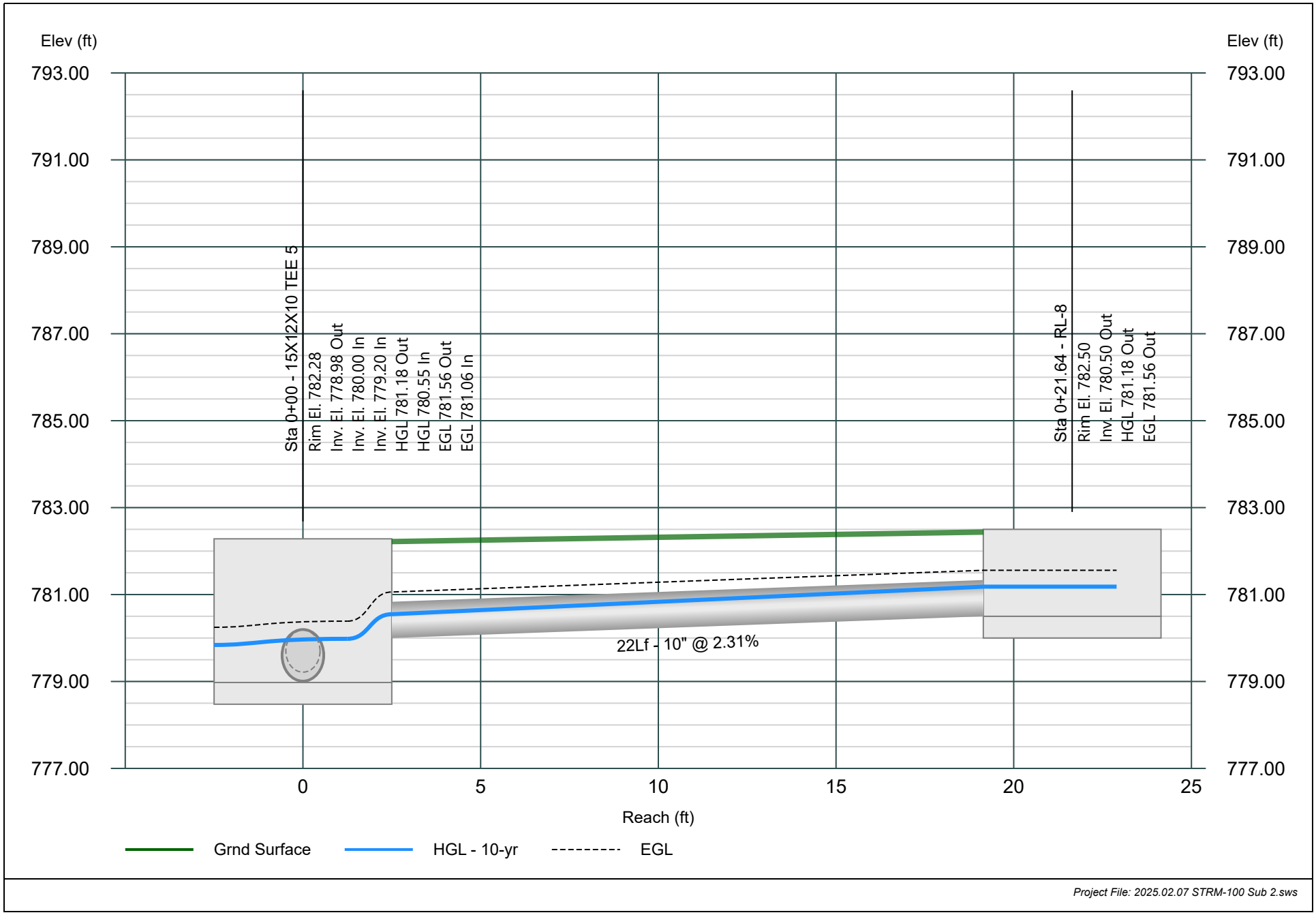
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 38 - RL-8

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



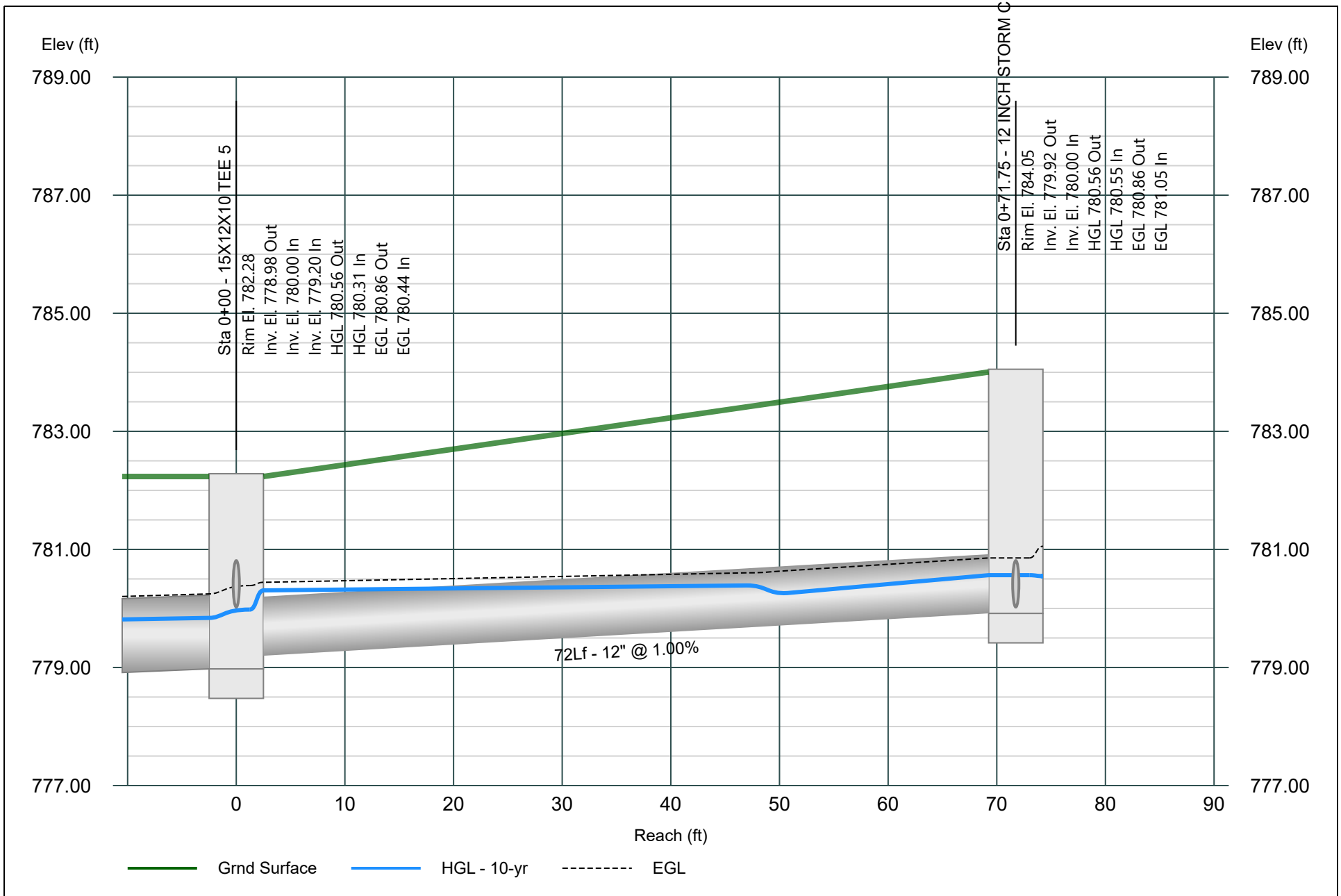
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 39 - CO4-TEE 5

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



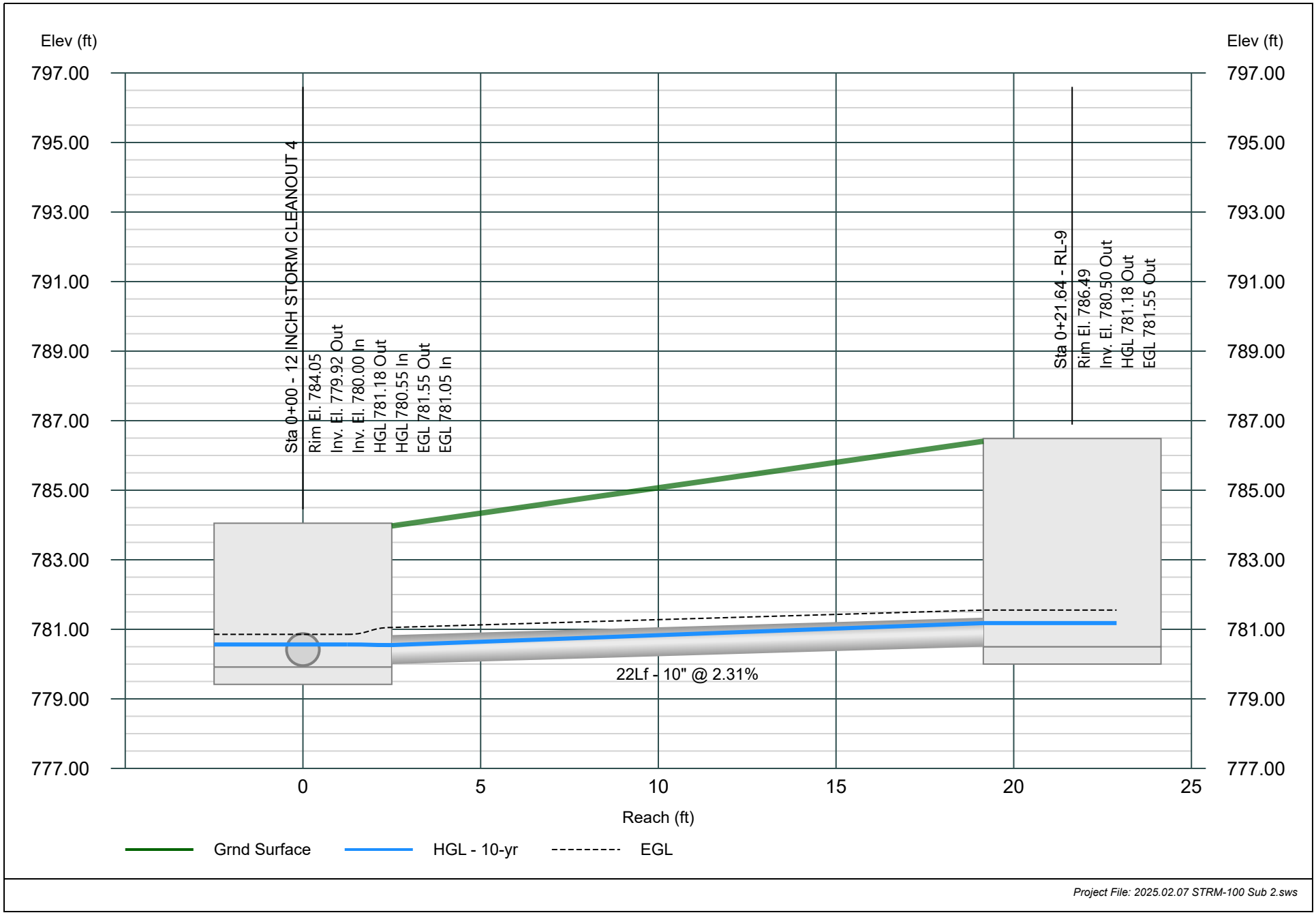
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 40 - RL-9

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



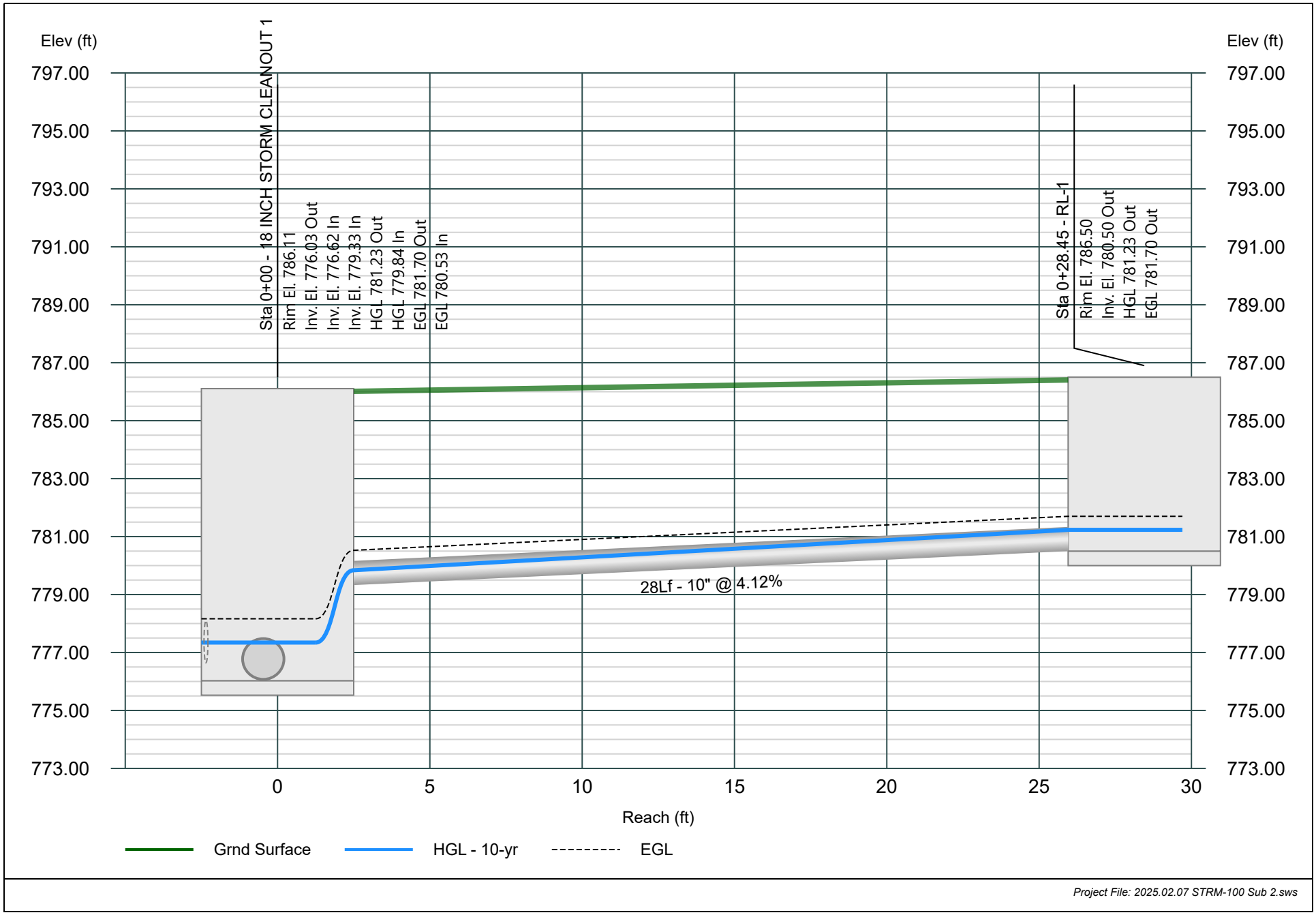
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 41 - RL-1

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



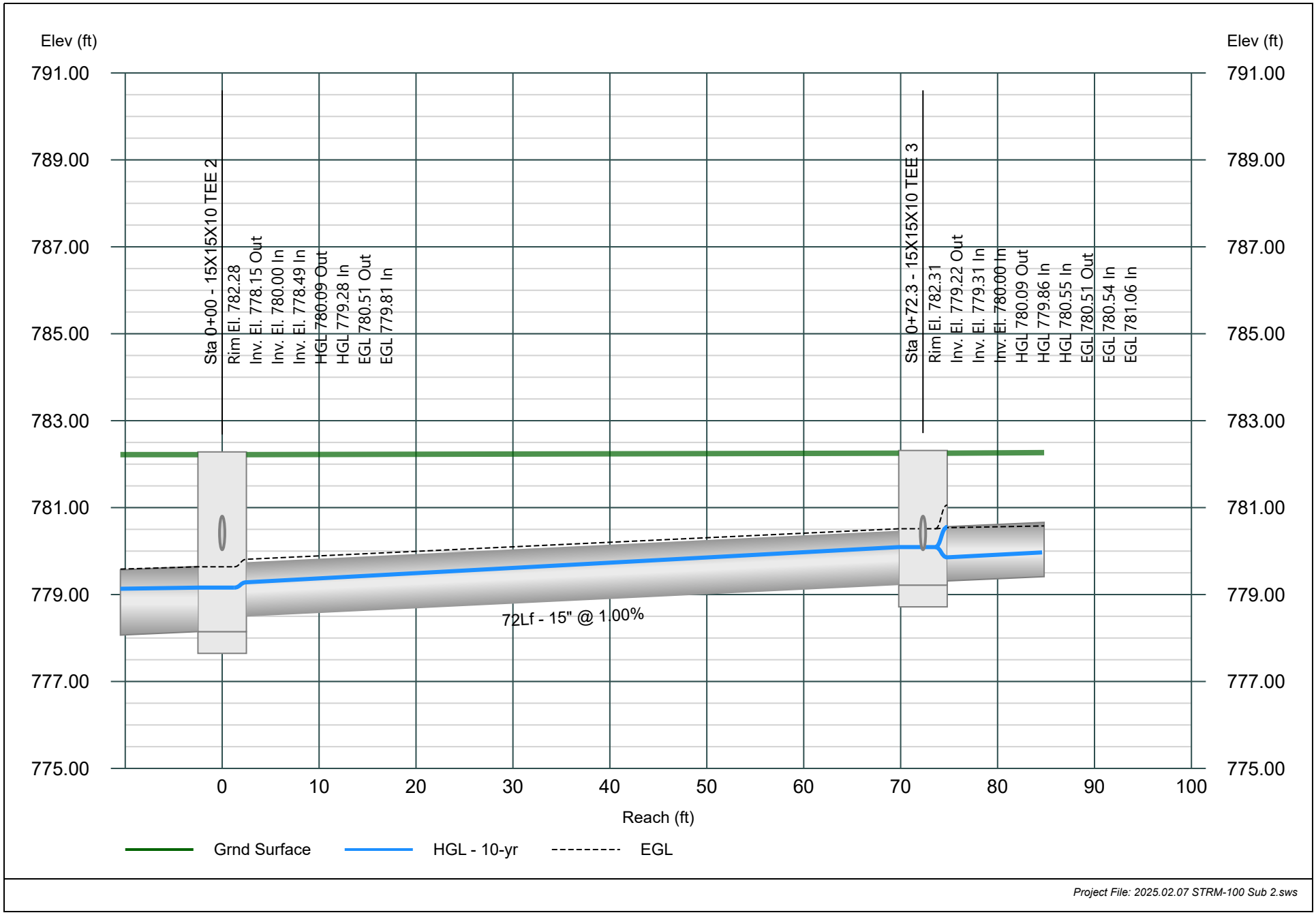
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 42 - TEE 3-TEE 2

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



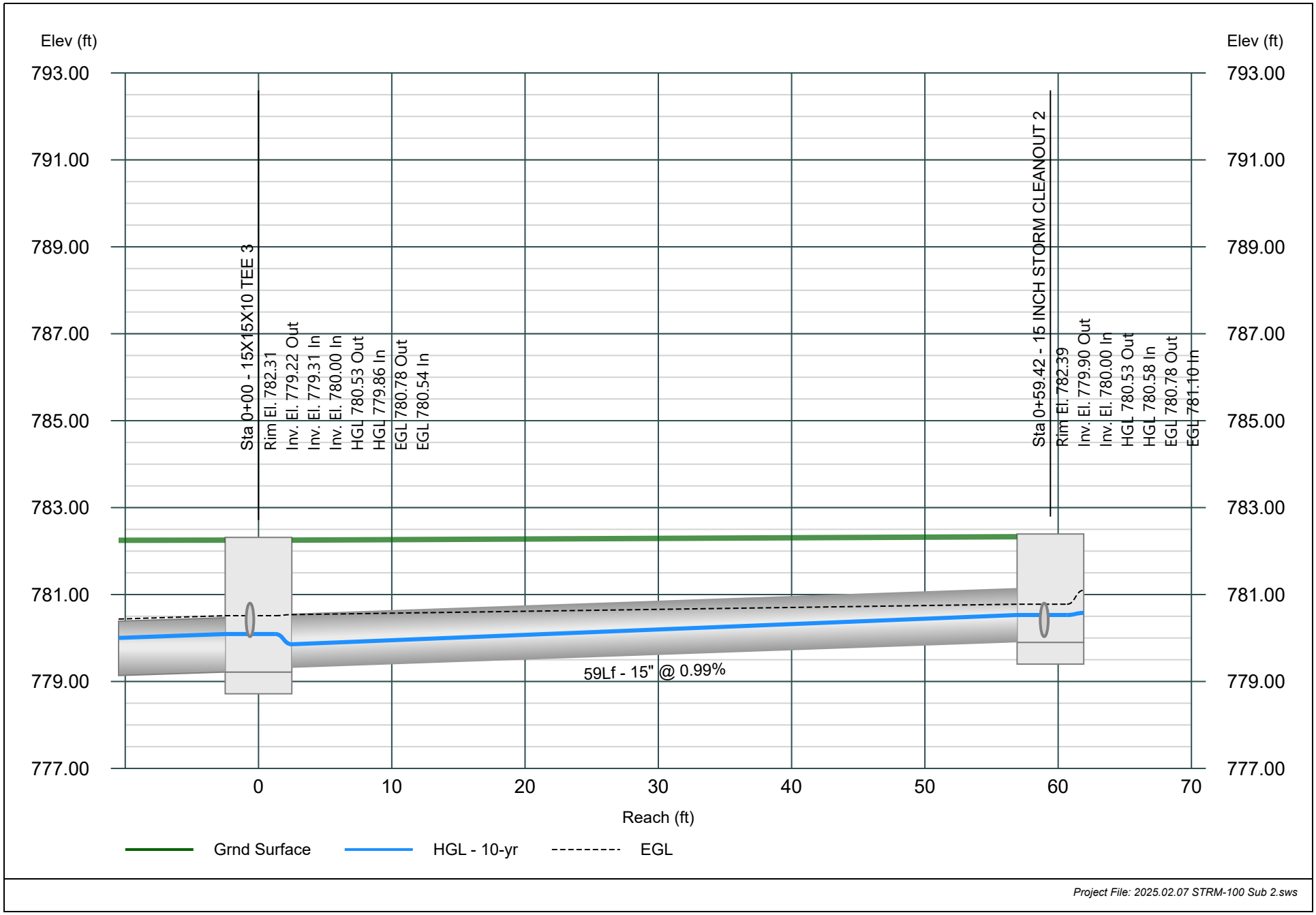
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 43 - CO2-TEE 3

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



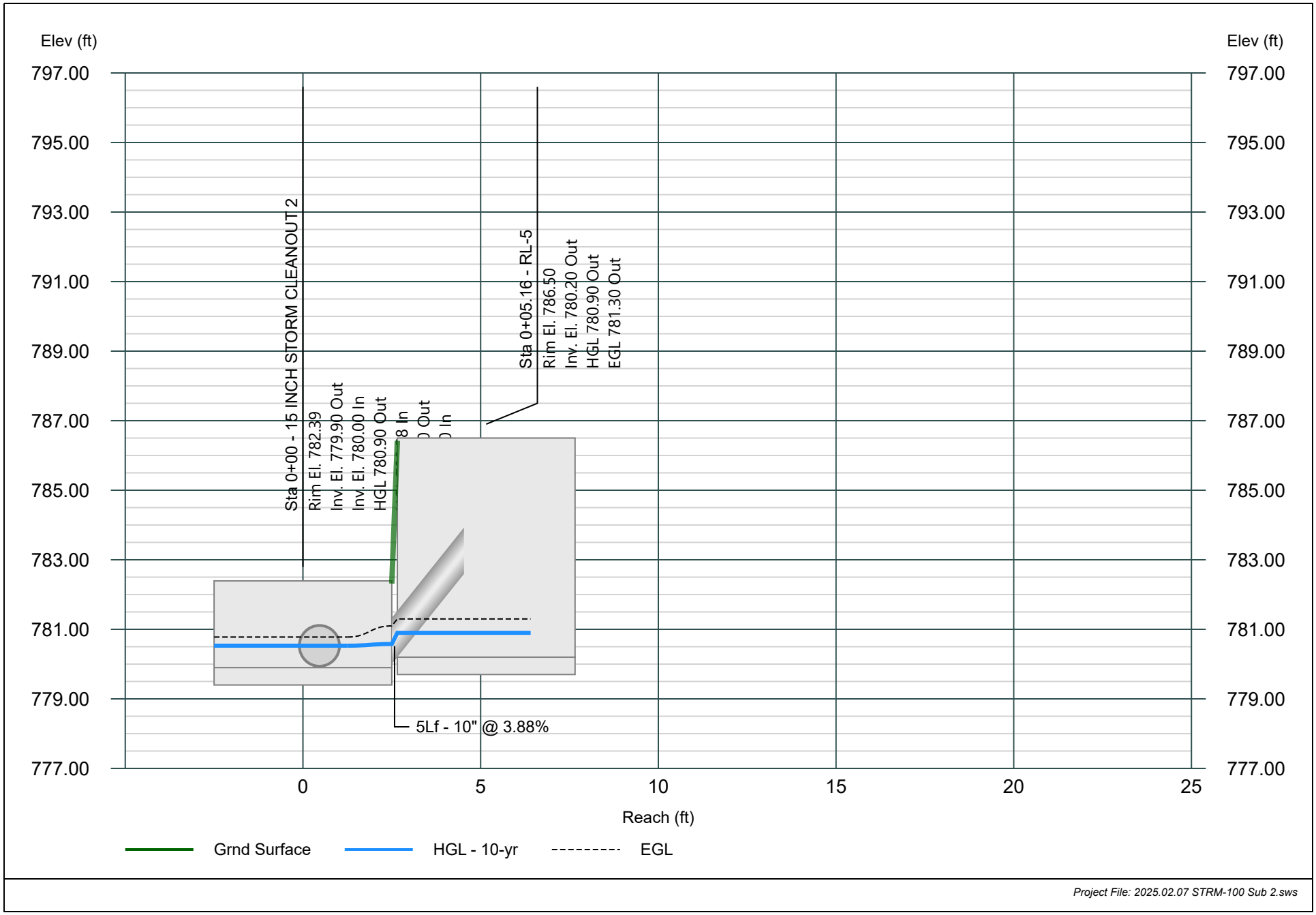
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 44 - RL-5

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



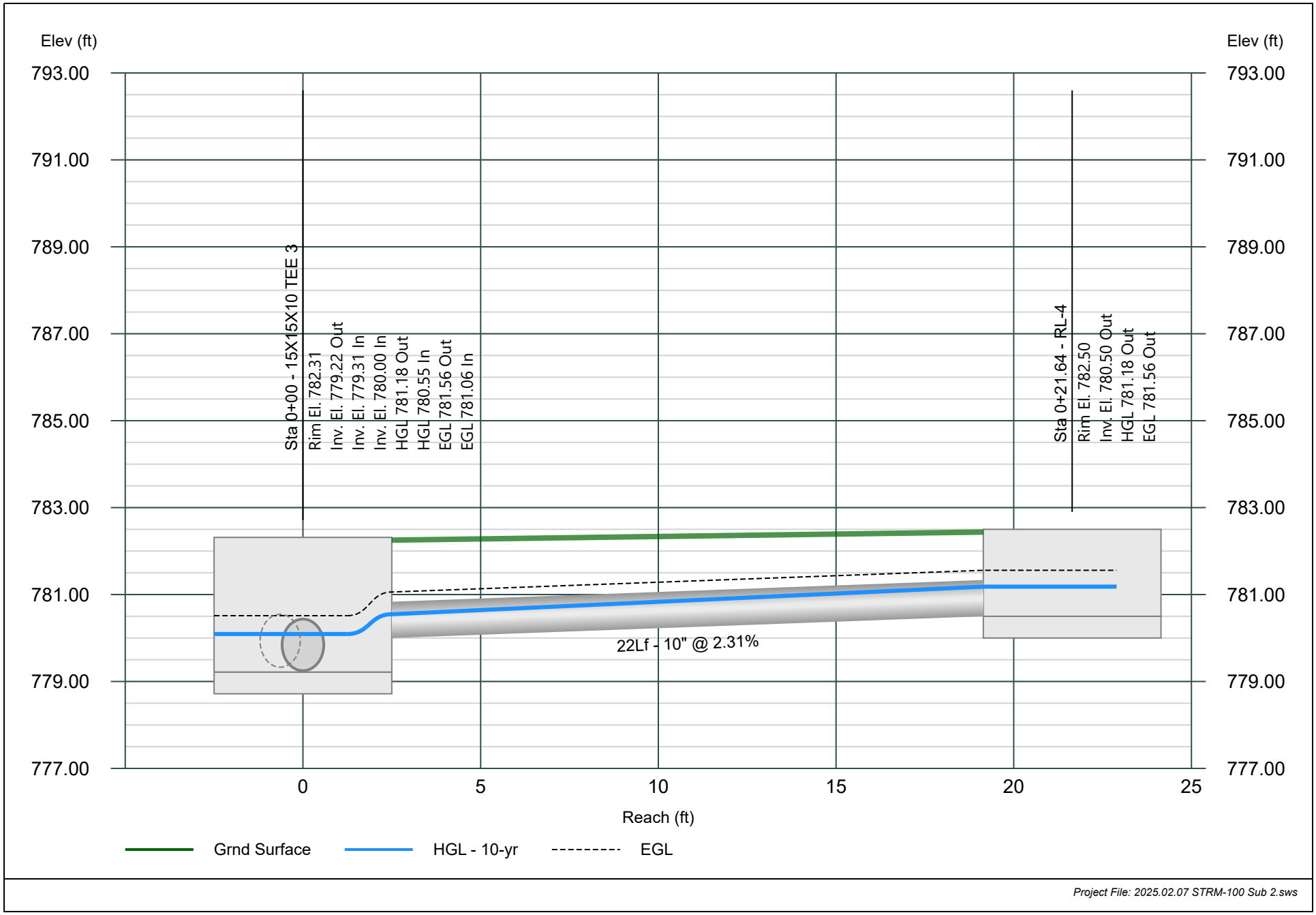
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 45 - RL-4

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



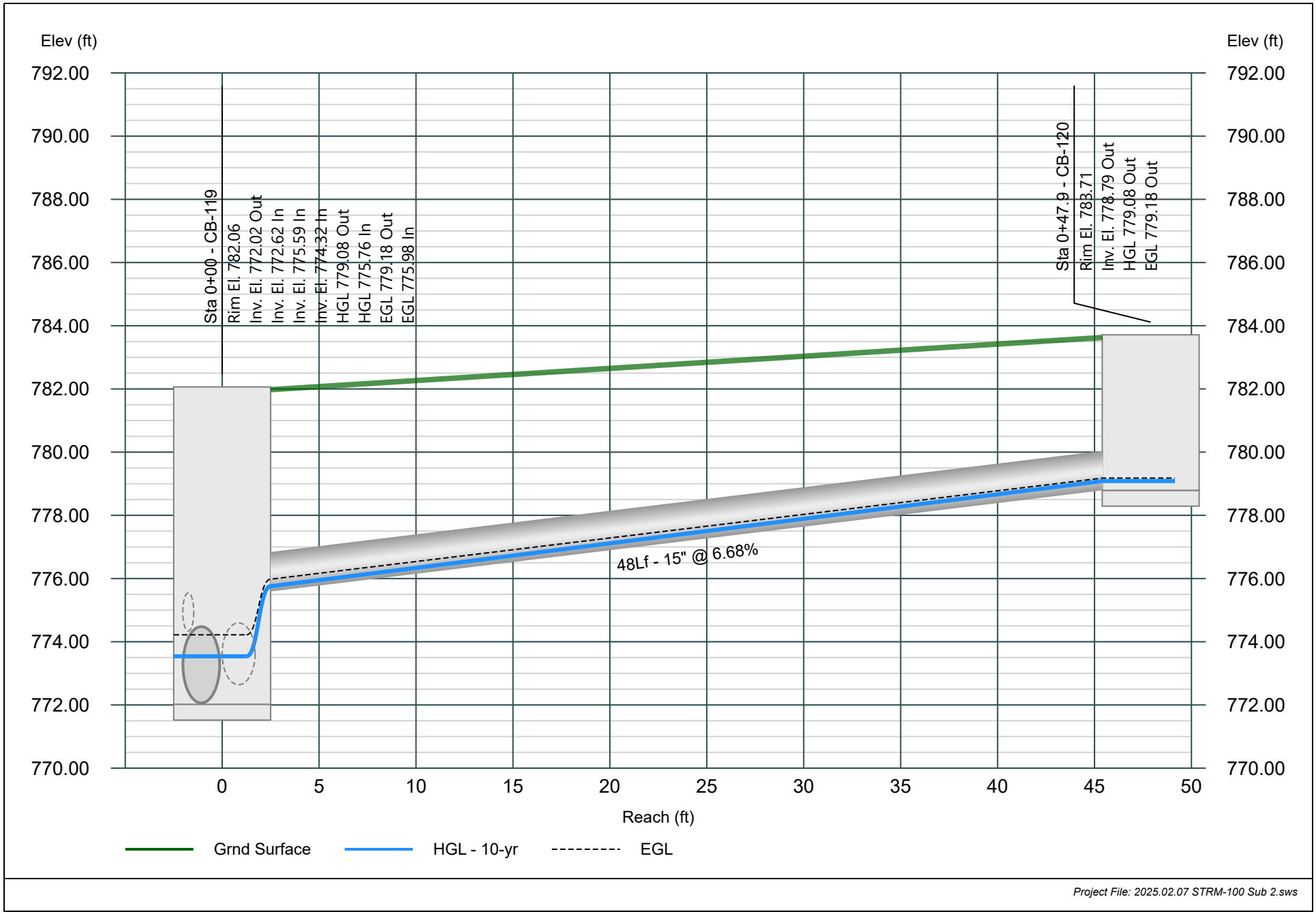
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 46 - 120-119

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



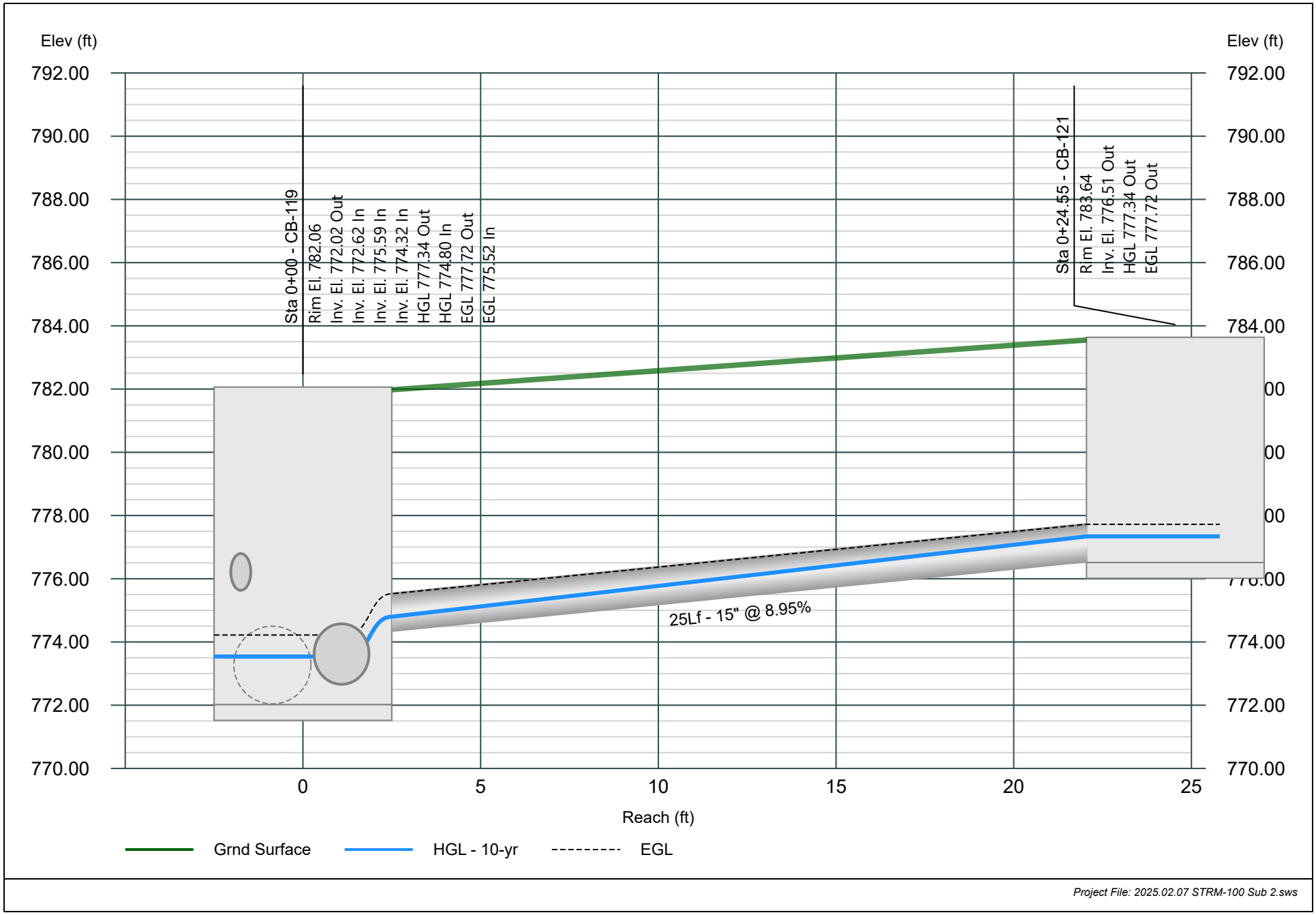
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 47 - 121-119

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



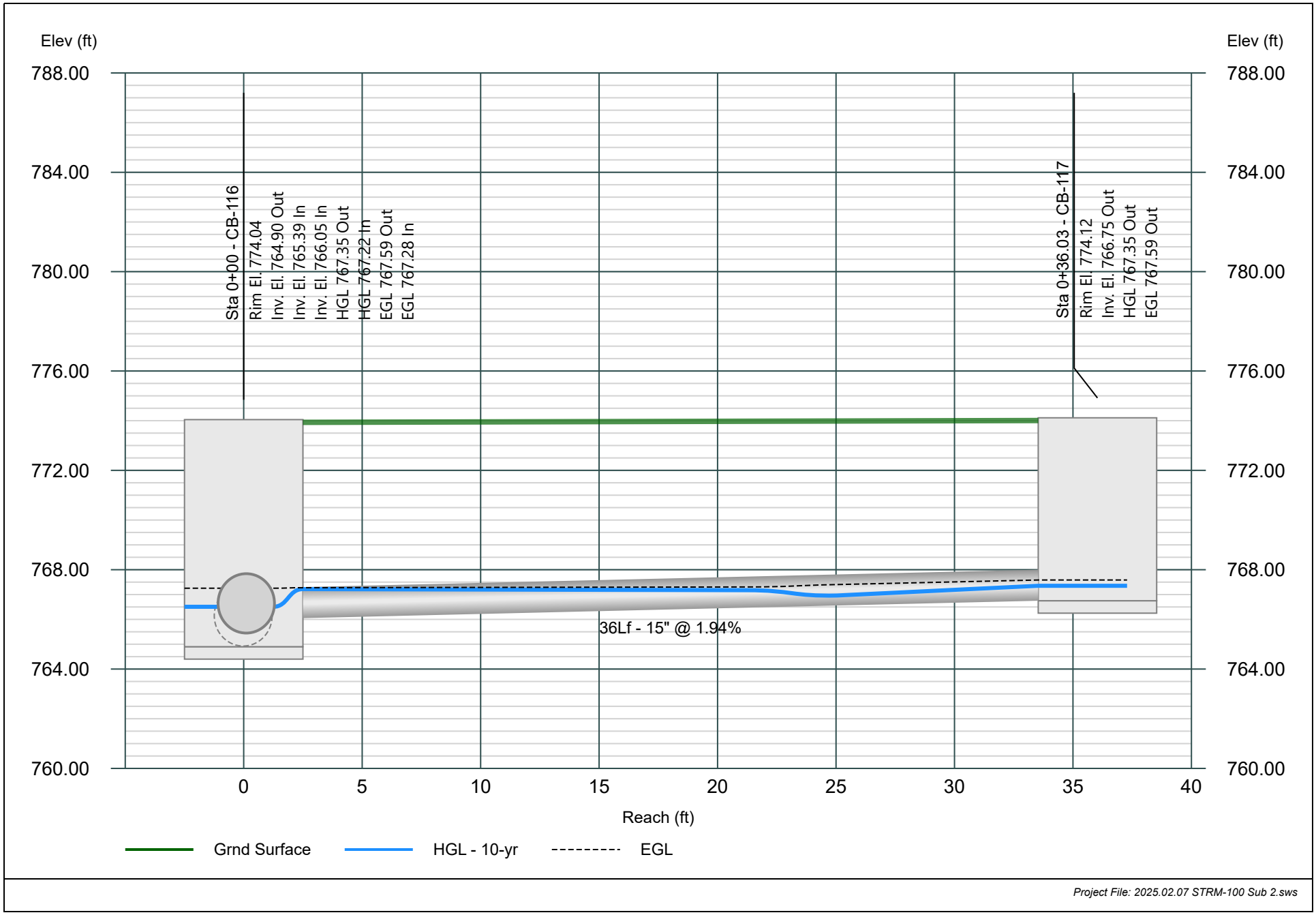
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 48 - 117-116

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



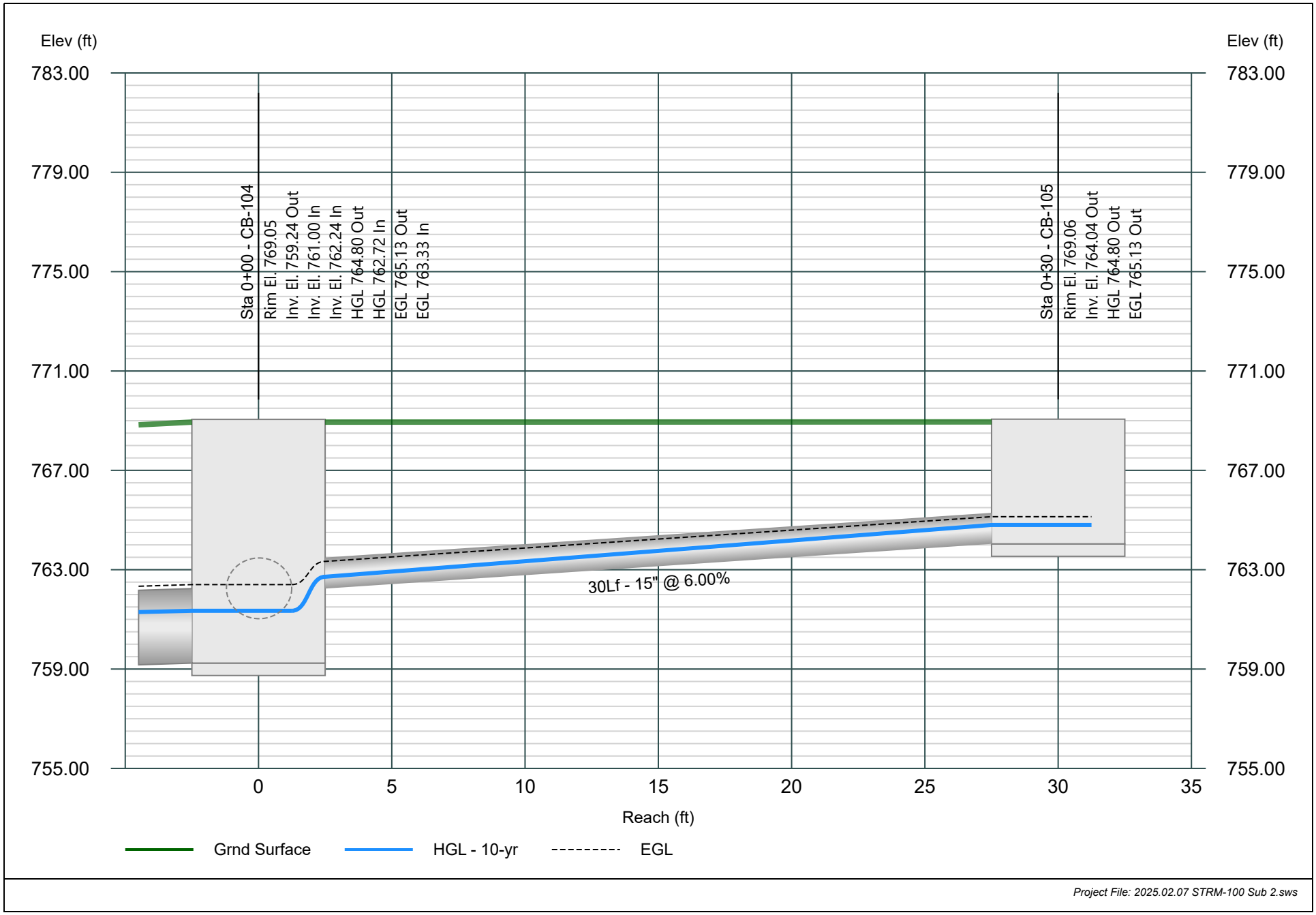
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 49 - 105-104

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



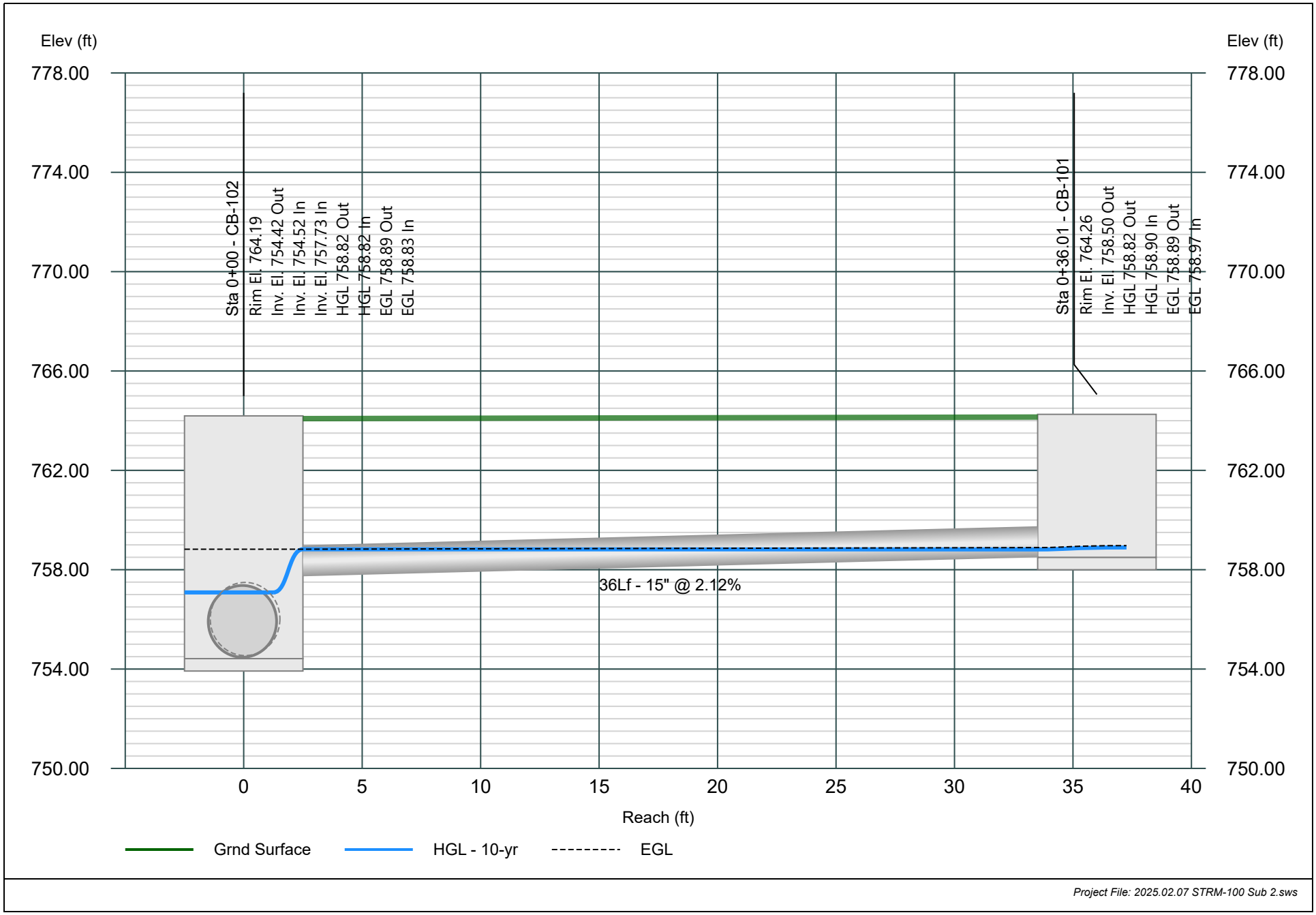
Project File: 2025.02.07 STRM-100 Sub 2.sws

Line 50 - 102-101

Stormwater Studio 2024 v 3.0.0.35

Project Name: STRM-100

02-07-2025



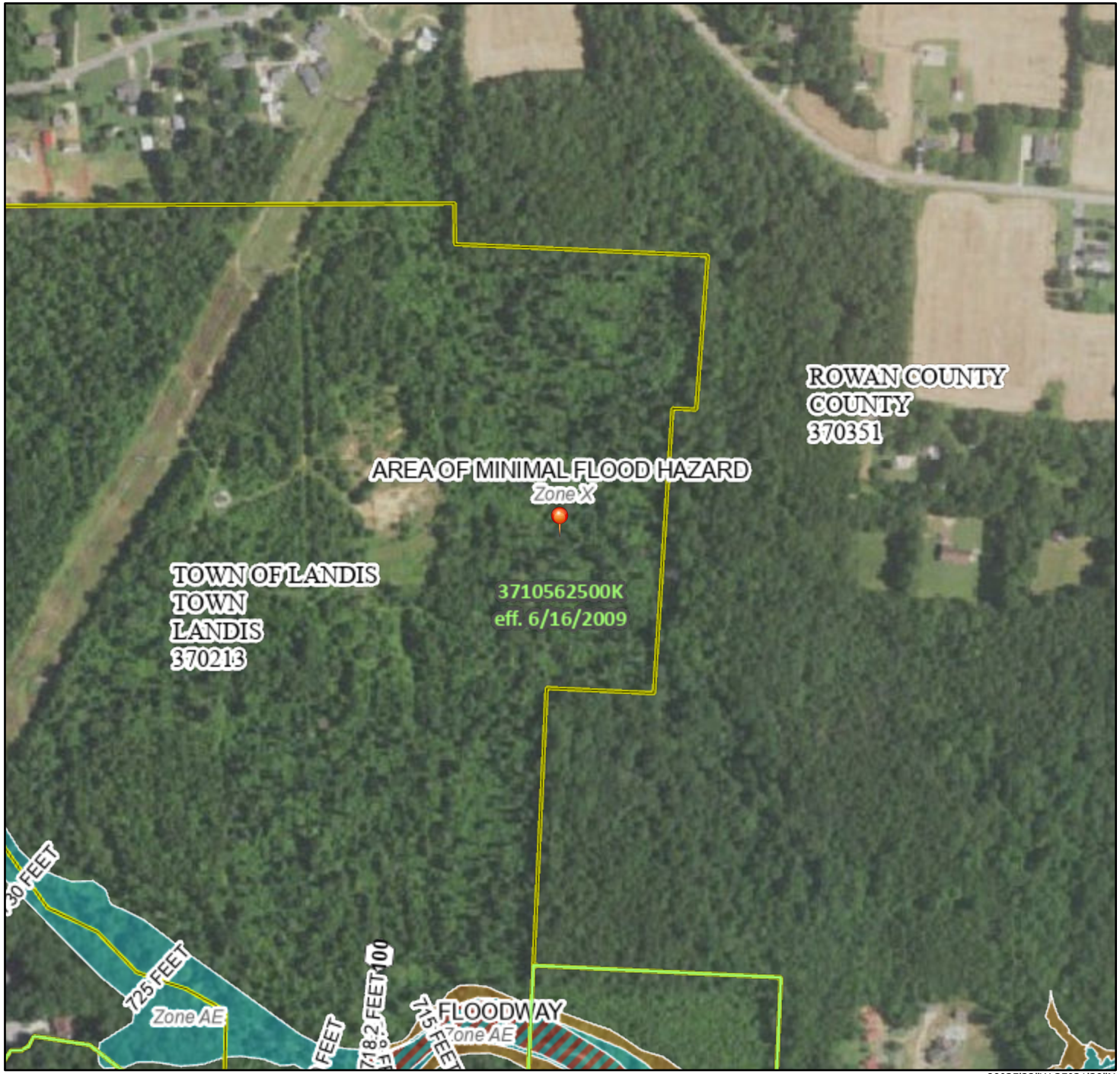
Project File: 2025.02.07 STRM-100 Sub 2.sws

APPENDIX F.
FEMA MAP

National Flood Hazard Layer FIRMette

FEMA

80°35'59"W 35°32'9"N



80°35'22"W 35°31'39"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/14/2024 at 2:54 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX G. EROSION CONTROL SWALE CALCULATIONS

North American Green
5401 St. Wendel-Cynthiana Rd.
Poseyville, Indiana 47633
Tel. 800.772.2040
>Fax 812.867.0247
www.nagreen.com
ECMDS v7.0

CHANNEL ANALYSIS

> > > Swale #1

Name	Swale #1
Discharge	20.03
Channel Slope	0.0283
Channel Bottom Width	5
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Fair 50-64%
Soil Type	Clay Loam (CL)

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	20.03 cfs	4.35 ft/s	0.66 ft	0.036	2 lbs/ft2	1.16 lbs/ft2	1.72	STABLE	D
Underlying Substrate	Straight	20.03 cfs	4.35 ft/s	0.66 ft	0.036	2.18 lbs/ft2	0.89 lbs/ft2	2.46	STABLE	D

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	20.03 cfs	3.63 ft/s	0.76 ft	0.047	4 lbs/ft2	1.34 lbs/ft2	2.99	STABLE	--
Underlying Substrate	Straight	20.03 cfs	3.63 ft/s	0.76 ft	0.047	3.45 lbs/ft2	0.99 lbs/ft2	3.47	STABLE	--

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ECMDS v7.0

CHANNEL ANALYSIS

> > > Swale #2

Name	Swale #2
Discharge	90.53
Channel Slope	0.0268
Channel Bottom Width	7
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Fair 50-64%
Soil Type	Clay Loam (CL)

SC250

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC250 Unvegetated	Straight	90.53 cfs	7.01 ft/s	1.21 ft	0.032	3 lbs/ft2	2.03 lbs/ft2	1.48	STABLE	E
Underlying Substrate	Straight	90.53 cfs	7.01 ft/s	1.21 ft	0.032	3.27 lbs/ft2	1.47 lbs/ft2	2.22	STABLE	E
SC250 Reinforced Vegetation	Straight	90.53 cfs	6.09 ft/s	1.35 ft	0.039	10 lbs/ft2	2.25 lbs/ft2	4.44	STABLE	E
Underlying Substrate	Straight	90.53 cfs	6.09 ft/s	1.35 ft	0.039	3.53 lbs/ft2	1.6 lbs/ft2	2.2	STABLE	E

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	90.53 cfs	7.08 ft/s	1.2 ft	0.031	2 lbs/ft2	2.01 lbs/ft2	0.99	UNSTABLE	D
Underlying Substrate	Straight	90.53 cfs	7.08 ft/s	1.2 ft	0.031	2.18 lbs/ft2	1.46 lbs/ft2	1.49	STABLE	D

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	90.53 cfs	6.09 ft/s	1.35 ft	0.039	4 lbs/ft2	2.25 lbs/ft2	1.78	STABLE	--
Underlying Substrate	Straight	90.53 cfs	6.09 ft/s	1.35 ft	0.039	2.35 lbs/ft2	1.6 lbs/ft2	1.47	STABLE	--

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ECMDS v7.0

CHANNEL ANALYSIS

> > > Swale #3

Name	Swale #3
Discharge	76.85
Channel Slope	0.0167
Channel Bottom Width	0
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Fair 50-64%
Soil Type	Clay Loam (CL)

SC250

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC250 Unvegetated	Straight	76.85 cfs	5.61 ft/s	2.14 ft	0.035	3 lbs/ft2	2.23 lbs/ft2	1.35	STABLE	E
Underlying Substrate	Straight	76.85 cfs	5.61 ft/s	2.14 ft	0.035	3.27 lbs/ft2	1.06 lbs/ft2	3.1	STABLE	E
SC250 Reinforced Vegetation	Straight	76.85 cfs	4.66 ft/s	2.34 ft	0.044	10 lbs/ft2	2.44 lbs/ft2	4.1	STABLE	E
Underlying Substrate	Straight	76.85 cfs	4.66 ft/s	2.34 ft	0.044	4.58 lbs/ft2	1.16 lbs/ft2	3.96	STABLE	E

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	76.85 cfs	5.62 ft/s	2.13 ft	0.034	2 lbs/ft2	2.22 lbs/ft2	0.9	UNSTABLE	D
Underlying Substrate	Straight	76.85 cfs	5.62 ft/s	2.13 ft	0.034	2.18 lbs/ft2	1.06 lbs/ft2	2.07	STABLE	D

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	76.85 cfs	4.66 ft/s	2.34 ft	0.044	4 lbs/ft2	2.44 lbs/ft2	1.64	STABLE	--
Underlying Substrate	Straight	76.85 cfs	4.66 ft/s	2.34 ft	0.044	3.05 lbs/ft2	1.16 lbs/ft2	2.64	STABLE	--

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www.nagreen.com
ECMDS v7.0

CHANNEL ANALYSIS

> > > Swale #3B

Name	Swale #3B
Discharge	34.67
Channel Slope	0.027
Channel Bottom Width	3
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Fair 50-64%
Soil Type	Silt Loam (SM)

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	34.67 cfs	5.47 ft/s	1.04 ft	0.034	2 lbs/ft2	1.75 lbs/ft2	1.15	STABLE	D
Underlying Substrate	Straight	34.67 cfs	5.47 ft/s	1.04 ft	0.034	1.47 lbs/ft2	1.12 lbs/ft2	1.31	STABLE	D

Unreinforced Vegetation

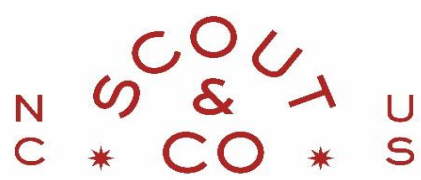
Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	34.67 cfs	4.59 ft/s	1.16 ft	0.043	4 lbs/ft2	1.96 lbs/ft2	2.04	STABLE	--
Underlying Substrate	Straight	34.67 cfs	4.59 ft/s	1.16 ft	0.043	1.7 lbs/ft2	1.23 lbs/ft2	1.38	STABLE	--

APPENDIX H.
SEDIMENT BASIN 3 CALCULATIONS

"SEDIMENT BASIN 3" IS THE NAME GIVEN BY OTHERS. THIS IS THE ONLY EROSION BASIN BEING USED FOR THIS DEVELOPMENT

ARCO DESIGN/BUILD

"SEDIMENT BASIN 3" IS THE NAME GIVEN BY OTHERS. THIS IS THE ONLY EROSION BASIN BEING USED FOR THIS DEVELOPMENT



Sediment Basin 3 Design Calcs

Project Information

Project:	Project Beacon - Landis Ridge Phase 2A
Location:	Town of Landis
Project Number:	
Date:	December 13, 2024
Designed:	LWC
Checked:	GJZ

Site Information

Sub-Area Location:	Skimmer Sediment Basin 3		
Developed Area:	22	acres @ C=	0.9
Disturbed Undeveloped Area:	25.63	acres @ C=	0.5

Required Minimum Sediment Storage:	85,734	cf

Required Minimum: 1800 cf/ac

Stage-Storage

Contour	Area (sf)	Incremental Volume (cf)	Total Volume (cf)	Stage (ft)
734.00	52,550	0	0.00	0.00
735.00	56,593	54,572	54,572	1.00
736.00	61,626	59,110	113,681	2.00
737.00	68,340	64,983	178,664	3.00
738.00	73,922	71,131	249,795	4.00
739.00	79,423	76,672	326,467	5.00
740.00	84,885	82,154	408,621	6.00

Temp. Pool Lower Elevation:	735.00	ft
Temp. Pool Upper Elevation:	736.00	ft
Temp. Pool Lower Volume:	54571.50	cf
Temp. Pool Upper Volume:	113,681	cf
Sediment Cleanout Volume:	85,734	cf
Sediment Cleanout Elevation:	735.53	ft

Pond Surface Area Check

Rainfall Intensity for 25-yr Storm:	6.26	in/hr	
Q25 Peak Inflow (Q=CIA):	204.17	cf	
Surface Area Required:	66,355	sf	
Surface Area Provided:	68,340	sf	**PASS**

Required Minimum: 325 sf/cf

Length to Width Ratio Check

Length of Flow Path at Spillway:	623	ft	
Width of Flow Path at Spillway:	109	ft	
L/W Ratio:	5.72		**PASS**

* NCDEQ Required: 2:1 to 6:1

Skimmer Sizing

Required Basin Volume:	85,734	cf	
Skimmer Size:	5	in	
Orifice Diameter:	4.50	in	
Dewatering Time:	3.5	days	**PASS**

Spillway Sizing

Rainfall Intensity for 25-yr Storm:	6.26	cfs	
Required Flow Q25:	204.17	cfs	
Spillway Elevation:	737	ft	
Top of Berm Elevation:	740	ft	
Material:	SC250	ft	
Depth:	0.55	ft	
Length:	98	ft	
Freeboard:	2.45	ft	**PASS**

SEDIMENT BASIN DESIGN SUMMARY

Basin Name:	Skimmer Sediment Basin 3	
Basin Length:	623	ft
Basin Width:	109	ft
Basin Side Slopes (X:1):	3	
Bottom of Basin Elevation:	734.00	ft
Spillway Elevation:	737.00	ft
Top of Berm Elevation:	740.00	ft
Storage Depth:	3.00	ft
Storage Required:	85,734	cf
Storage Provided:	178,664	cf
Surface Area Required:	66,355	sf
Surface Area Provided:	68,340	sf
Skimmer Main Crest Elevation:	737.00	ft
Skimmer Size:	5	in
Skimmer Orifice Diameter:	4.5	in
WSEL Across Spillway:	737.55	ft
Freeboard:	2.45	ft
Spillway Length:	98	ft