

**NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**



Format, Data Requirements, and Content Guidance
For Digital Drawings Submitted to EEP

The EEP utilizes ArcGIS as its primary mapping and geospatial analysis tool. EEP recognizes that the wetland and stream design community typically utilizes digital drawing programs such as AutoCAD (.dwg) and MicroStation (.dgn) as their primary design tools. This document is designed to provide specifications regarding the formatting of a subset of feature objects typically rendered in digital drawings that will make the digital submissions more useful to EEP in various asset verification and analysis applications in ArcGIS. This document is not intended to dictate how to render these feature/objects in the printed deliverables nor does it introduce new or unfamiliar features outside the typical experience of EEPs consultant pool.

- 1.0 Any digital drawing or mapping files submitted must comply with the following:
 - 1.1 Digital drawings must be submitted in DXF/DWG (AutoCad1), DGN (Microstation), ArcGIS shapefile or ArcGIS geodatabase format.
 - 1.2 All providers of digital drawing files are to read the ESRI guidance document entitled "Creating Compatible CAD Data for ArcGIS ® Software An ESRI ® Technical Paper October, 2003" found on the EEP website in the same section as this document or at the URL below. This document details how best to manage digital drawing files for eventual conversion and use in ArcGIS.

<http://www.esricanada.com/documents/Creating-Compatible-CAD-Data-for-ArcGIS.pdf>
 - 1.3 Drawings must be geo-referenced using the state plane coordinates system (NAD 83), with feet as the preferred unit of measure. If the case that another coordinate system is used, the type of coordinate system must be specified (see sample form in the Appendix for this section).
 - 1.4 All files submitted directly in GIS will be submitted with complete metadata (.txt or .xml) and projection files (*.prj). EEP uses ESRI ArcGIS software, and requires that metadata be compatible with importation into ArcCatalog. Consultants will use ArcCatalog to create metadata or must create a FGDC compliant metadata text file. (DO NOT use MSWORD to create metadata.) For those consultants who do not wish to use ArcCatalog to create metadata,

Information on creating FGDC compliant metadata can be found at:
http://www.fgdc.gov/metadata/documents/workbook_0501_bmk.pdf

Free metadata editors and validation tools can be downloaded from:
<http://www.fgdc.gov/metadata/geospatial-metadata-tools#availabletools>

At a minimum the metadata must contain the following information:

- 1.4.1. Citation
 - 1.4.2. Description
 - 1.4.3. Time Period of Content
 - 1.4.4. Spatial Domain
 - 1.4.5. Point of Contact
 - 1.4.6. Process steps and source citations
 - 1.4.7. Entity and Attribute Information
- 1.5 For submittals in formats other than GIS, the consultant is to use the checklist/form found in the appendix. The form will include the following:
- 1.5.1 Company Name, designer, contact information.
 - 1.5.2 Surveyor name and contact info (The surveyor can be different than the designer).
 - 1.5.3 Coordinate system
 - 1.5.4 For field data, the date of data collection.
 - 1.5.5 Description of file layers
- 1.6 In general, lines or polylines used to depict a polygon must be closed into a polygon and lines must not be dashed, but be a solid, contiguous line. However, the printed deliverable needs to permit clear interpretation and differentiation of features. If the ability exists to display the features with different line styles/patterns while the underlying feature is actually in compliance with the above, this might be ideal in terms of file size management. However, if that is not possible, then both a solid line and a dashed line needs to be created to meet both the needs expressed in this document and the clarity/interpretation of the printed deliverable. The solid lines could then be turned off for display in the printed deliverable (as long as it could be later accessed and extracted in ArcGIS), but would exist in the underlying file with the formatting described in Table 2.
- 1.7 Georeferenced layers and their contents must be defined, described and easily distinguished such that features can be readily selected individually or extracted according to logical feature categories/groups in ArcGIS. Files will not be submitted with large, undistinguished layers or feature classes/types that cross all sorts of logical groupings without clear differentiation in the underlying data/attribute tables. Table 2 provides a listing of some features that EEP needs to be able to easily differentiate and extract. It provides a coding structure and required shape type(s). This obviously does not represent the full extent of features produced in digital drawings produced for EEP projects. Features not in Table 2 can use existing NCDOT/NCDENR feature labeling/coding conventions, but the overarching requirement of submitting digital files with discernable underlying data tables that permit ready selection and differentiation in an ArcGIS environment, still applies. The degree to which any digital drawing submission deviates from the formatting listed in Table 2 will be proportional to the degree to which the producer will have to provide a separate key in the form of a spreadsheet that enables EEP to interpret the data and related coding. EEP may accept the latter approach for projects that are in

transition at the point of this guidance release, but will not accept detached key spreadsheets over the long-term.

2.0 File Naming Conventions

File naming convention – The following provides an example of the desired file naming format for digital drawing files. ProjName_ProjNum_Phase_Firm_Draft/FinalStatus

| Table I. Digital Drawing File Naming Conventions | | |
|--|--------------|---|
| Name Component | Phase Coding | Description |
| ProjName | NA | Provide project name without spacing |
| ProjNum | NA | Project number provided by EEP |
| Firm | NA | Firm Abbreviation |
| Phase | CE | Easement: Use <u>CE Prop</u> for proposed and <u>CE-Final</u> |
| | C* | Conceptual drawing |
| | RP* | Restoration Plan drawing |
| | FD | Construction (Final Design) drawing |
| | AB | As-built drawing |
| | MY1 | Monitoring Year1 – Problem Area Plan View |
| | MY2 | Monitoring Year2 – Problem Area Plan View |
| | MYX | Etc. |
| | RD | Repair design drawing |
| | RAB | Repair As-built |
| * Although submission of digital drawing files will not routinely be required until the draft construction drawings are prepared, the coding for these earlier stages was included as well in the event they are specifically requested in certain cases | | |

Examples:

JumpingRun_137_AB_ABC_D(Draft)

Project: Jumping Run
 Project Number: 137
 Phase: As-built
 Firm: ABC
 Draft Status: Draft

A digital drawing file might only require the single file. A full ArcGIS submission would minimally include 3 shapefiles with the above naming convention for each of the 3 shape types (point, polyline, polygon).

3.0 Other Guidance/Notes

- 3.1 The items listed in Table 2 are not designed to supplant any detail in digital submissions that the designer/provider typically includes for proper interpretation of the printed deliverable. For example, it is very useful to have the engineered stream structures rendered on plan drawings in forms that are recognizable such as rootwads and vanes, but EEP also requires a point feature (attributed as indicated below) associated with those feature objects.
- 3.2 The monitoring unit of EEP is currently building layers that provide this formatting for objects related to post-construction performance, which includes areas and features of the channel and buffer. They will be included in a future version of this and other documents. Performers/providers contracted under this version (version 1.0) will be encouraged, but not required to address those performance features.

| Feature Category | Category ¹ Text Tag/Coding | Distinct Feature ² or Layer Type | Text Tag ² /Coding | Unique ID ? ³ | Shape Type | GIS ⁴ Shapefile | FD Task ⁵ Milestone | DDB ⁵ Milestone | Description |
|------------------------------------|---|--|-------------------------------------|-----------------------------|-------------------|-------------------------------|--------------------------------------|--|--|
| Site Points | Site | Site Location | SL | N | Point/Polyline | Required | Proposal | 1 st site visit | Wetlands: ~ centroid of proj. acreage. Streams: Polyline. Attribute with project name, firm, point type, RFS# |
| | Reference | Reference Location | RL | Y | Point or Polyline | Required | 3 | R | Wetlands: ~ centroid point of acreage. Streams: Polyline. Attribute with project name, firm, Ref site name, RFS# |
| Cultural | Cultural | Cultural Resources | CR | Y | Polygon | Useful | Task 1 | ERTR | Label in digital attribute table by type of resource |
| Biological | Biological | Rare-Endangered | RES | Y | Polygon/Point | Useful | Task 1 | ERTR | Label in digital attribute table by type. Should only exist if a particular area/zone contains rare, threatened, endangered species ID in the ERTR |
| Property Boundary Features | Boundary | Parcel | P | Y | Polygon | Required | Task 2 | PO1 Form | Property/Parcel Boundary. Need tabular attribute data from county plus EEP project name and ID number |
| | Boundary | Easement | CE | N | Polygon | Required | Task 2 | PO1 Form | Conservation easement as a closed polygon (GIS and CAD formats) GIS at milestone indicated |
| | Boundary | Fencing | F | N | Polygon | Preferred | 3,6 | RP,FD,AB | Fencing boundary as a polygon |
| | Boundary | Utility Easement | UE | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Label by type using pre-existing NCDOT and NCDENR coding/annotation |
| | Boundary | Built Structure | S | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Any pre-existing structure within the easement, which might impact asset/buffer acreage calculations; use DOT symbology and labeling conventions |
| Crossing Features | Boundary | Access Corridor | AC | N | Polygon | Preferred | 3,6 | RP,FD,AB | Not a construction access, but a corridor, which will likely be included in the easement language that will permit future access |
| | Crossings | Ford Crossing | FC | Y | Polygon | Preferred | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | Crossings | Culvert Crossing | CC | Y | Polygon | Preferred | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | Crossings | Bridge | B | Y | Polygon | Preferred | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| Contours | Crossings | Other | O | Y | Polygon | Preferred | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | Contour | X-contours | X-C | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | X = interval (1,2,5 foot etc) for contour |
| Channel Features | Channel | Reach Boundary ⁶ | RB | Y | Polygon | Preferred | 3,6 | RP,FD,AB | A polygon that delineates each project stream design segment creating the distinct assets found in Table I of plan documents. |
| | Channel | Centerline ⁷ | CL | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Channel centerline |
| | Channel | Thalweg ⁷ | TL | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Channel thalweg |
| | Channel | Edge of water ⁷ | EW | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Could be line generated from long pro where EW was included as a survey point or a pair of lines estimating base flow. |
| | Channel | Bank toe ⁷ | BT | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Toe of slope on channel bank |
| | Channel | Bankfull | BKF | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Channel bankfull |
| | Channel | Top of Bank | TOB | N | Polyline&Polygon | Preferred | | | Top of Bank features made available both as closed polygon(s) (area calculations) and Polyline for topographic integration |
| | Channel | Terrace toe | TT | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Toe and top of terrace feature if present within the range of the layout |
| Engineered Stream Structures | Channel | Top of terrace | TOT | N | Line/Polyline | Useful | 3,6 | RP,FD,AB | Toe and top of terrace feature if present within the range of the layout |
| | ESS | Cross Vane | CV | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Double Drop Vane | DDV | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | W-Weir | W | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Single Arm Vane | SAV | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | SingleArmVane w/Sill | SAVS | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | J-Hook | J | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | J-Hook | JDD | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | J-Hook with 2 nd sill |
| | ESS | Sill | S | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | Buried Sill (e.g. riffle head) |
| | ESS | Elevated Sill | ES | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | (e.g. log sill) |
| | ESS | Buried Grade Sill | BS | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | (e.g. riffle header sill) |
| | ESS | Rootwad | RW | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Root Wrap | RWP | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | More than 3 consecutive wads |
| | ESS | Boulder | B | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Toe Log | TL | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Cover Log | CL | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Wing Deflector | D | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Double Wing Deflectr | DWD | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Step Pool | SP | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| | ESS | Constructed Riffle | CR | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering |
| ESS | Channel Plug | CP | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering | |
| ESS | Brush Mattress | BM | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering | |
| ESS | AOP Structure | AOP | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering or further typing (e.g. fish ladder) | |
| ESS | Other | O | Y | Polygon & Point | Useful | 3,6 | RP,FD,AB | If multiple, may be of use to provide numbering | |
| Wetland Features | WET | Surface Water | SW | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Existing surface water feature within the project extent or one of hydrologic influence on the project |
| | WET | Pool Feature | P | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Constructed Riparian or Vernal Pool |
| | WET | Wetland Tract | WT | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Boundary of a wetland feature that is the subject of wetland restoration |
| | WET | Wetland Feature | WF | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Boundary of a wetland feature that is not the subject of targeted restoration or enhancement |
| Vegetation Features | VEG | Vegetated Buffer | VB | N | Polygon | Preferred | 3,6 | RP,FD,AB | Sections of easement with existing vegetation <u>not</u> requiring any planting or vegetative augmentation (including invasives removal/control) |
| | VEG | Planted buffer | PB | N | Polygon | Preferred | 3,6 | RP,FD,AB | Extent of buffer that was planted = planted acreage |
| | VEG | Planting zones | PZ | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Planting and vegetative augmentation (e.g. invasive removal) zones as per planting plan |
| | VEG | 30_Foot | 30 | N | Polygon | Preferred | 3,6 | RP,FD,AB | 30 foot boundary feature from Top of Bank |
| | VEG | 50_Foot | 50 | N | Polygon | Preferred | 3,6 | RP,FD,AB | 50 foot boundary feature from Top of Bank |
| VEG | 200_Foot | 200 | N | Polygon | Preferred | 3,6 | RP,FD,AB | 200 foot boundary feature from top of Bank (necessary if any part of easement extends beyond 50 foot standard) | |

| Feature Category | Category ¹ Text Tag/Coding | Distinct Feature ² or Layer Type | Text Tag ² Coding | Unique ID ? ³ | Shape Type | GIS ⁴ Shapefile | FD ⁵ Task Milestone | DDB ⁵ Milestone | Description |
|--|---------------------------------------|---|------------------------------|--------------------------|------------------|----------------------------|--------------------------------|----------------------------|---|
| Best Management Practice Stormwater & Agr | BMP | Bioretention Cell | BR | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Stormwater Wetland | SW | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Dry Detention Pond | DDP | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Wet Detention Pond | WDP | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Swale | S | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Shade House | SH | N | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Natural Infiltrat Area | NI | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| | BMP | Other | O | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Just the polygon boundary of the BMP, which might impact buffer acreage calculations, not structural components, utilize DOT standards for latter |
| Monitoring and Survey | MS | Benchmark/Control | BM | Y | Point | Preferred | 3,6 | RP,FD,AB | Label as property, design, permanent, temporary etc. |
| | MS | Cross-Section | XS | Y | Point & Polyline | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Start of Long Profile | SLP | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | End of Long Profile | ELP | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Groundwater Gauge | GG | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Crest Gauge | CG | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Stream Gauge | SG | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Precipitation Gauge | PG | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Vegetation Plot ⁴ | VP | Y | Polygon | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Photo Points | PP | Y | Point | Preferred | 3,6 | RP,FD,AB | Include vector in point |
| | MS | Water Quality Samp | WQ | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Biological Samp Point | B | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Radius of curvature | RC | Y | Point & Polyline | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |
| | MS | Other | O | Y | Point | Preferred | 3,6 | RP,FD,AB | Unique ID field (see footnote 3) |

1 = Expected name for major feature groupings of interest. This will be the first level of organization and will be housed in a field in the underlying table regardless of digital format.

2 = Next layer of feature organization. If submitting in ArcGIS, a single shapefile for each shape can be submitted with differentiation provided by the fields/attributes discussed here.

3 = A final layer of differentiation that may be useful for any feature type that has more than one occurrence, it could be reach names, parcel names or numerical sequencing for engineered stream structures (e.g. Cross Vane 1,2,3 etc.) or veg plots (VP1, VP2 etc.) A "Y" indicates that feature type is likely to require added differentiation.

4 = Given EEPs use of ArcGIS, submission of both GIS shapefiles and the consultants preferred drawing file format for all features would be useful and is encouraged unless the level of effort represents a significant increase in the scoped hours for a particular firm/provider. This field specifies whether an actual GIS file format is required, preferred or useful. The features listed as requiring a GIS file format are key property, boundary and easement items. Those listed as preferred are integral to asset verification and those designated as useful have other analysis applications.

5 = Pretty much every feature can be considered to have a temporal aspect. That is, features will exist in proposed and preliminary states which will evolve into more formal or finalized states and these can be associated with phases, milestones and their associated deliverables. The milestones that apply to a given feature for design-bid-build and full delivery projects are listed in the Table 1 fields referenced above with this footnote (5). This temporal aspect to the features/object will then generate another field in the actual digital tables, which captures the phase of the digital submission. The coding conventions for different phases will be the same as those used in the file naming conventions described in the Table below.

6 = Applies to streams and provides for project segmentation into the restoration/mitigation components (assets) typically reflected in table 1 of the design plan documents. Labeling should follow reach ID's established by the designer. It is analogous to the wetland tracts for wetland assets.

7 = Care should be taken to make certain that the ability to visually distinguish the channel is not diminished by the inclusion of all of these feature categories. If these features can be distinguished in some manner either through pattern and/or color so that the channel can be clearly observed, then all of these feature/layer categories can be displayed. If not, the Centerline and bank toe are preferred for display over the thalweg and edge of water, but all these features should be included in the underlying digital table in the formats listed above.

Sample/example digital table data records (These do not represent the extent of the fields that the digital table would include, but just several that were the focus of this guidance document)

| Project Phase | Coding for phase field in digital table |
|--|---|
| Easement: Use <u>CE-Prop</u> for proposed and <u>CE-Final</u> for Final | CE |
| Conceptual drawing | C* |
| Restoration Plan drawing | RP* |
| Construction (Final Design) drawing | FD |
| As-built drawing | AB |
| Monitoring Year1 – CCPV | MY1** |
| Monitoring Year2 – CCPV | MY2** |
| Etc. | MYX** |
| Repair design drawing | RD |
| Repair As-built | RAB |
| *Although submission of digital drawing files will not routinely be required until final design drawings are prepared, the coding for these earlier stages was included as well in the event they are specifically requested in certain cases | |
| **Although the features in table 2 will be used during the monitoring phase in their As-built state, actual revision of these feature objects during monitoring is not anticipated/expected and as such were not included in the population of the milestone fields (footnote 5) in Table 2 above, but the digital tables submitted for a particular monitoring year should include a populated phase field (see example records to the right) | |

| Example Point Table at RP Phase (May be a polygon analog in the polygon layer of the digital drawing files that depicts the structures in their display forms) | | | | | |
|---|---------------------------------------|---|--------------------------|-------|------------------|
| Object ID | Category ¹ Text Tag/Coding | Distinct Feature ² or Layer Type | Unique ID ? ³ | Phase | Reach Designator |
| 15 | ESS | J | 16 | RP | Reach-1 |
| 16 | ESS | CV | 4 | RP | Reach-2 |

| Example Polygon Table at AB Phase | | | | | |
|-----------------------------------|---------------------------------------|---|--------------------------|-------|------------------|
| Object ID | Category ¹ Text Tag/Coding | Distinct Feature ² or Layer Type | Unique ID ? ³ | Phase | Reach Designator |
| 75 | Boundary | F | 16 | AB | Reach-1 |
| 76 | Crossings | CC | 4 | AB | Reach-2 |
| 77 | BMP | DDP | 6 | AB | Reach-2 |

Appendix

