HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

COSTAIN

CAPITA

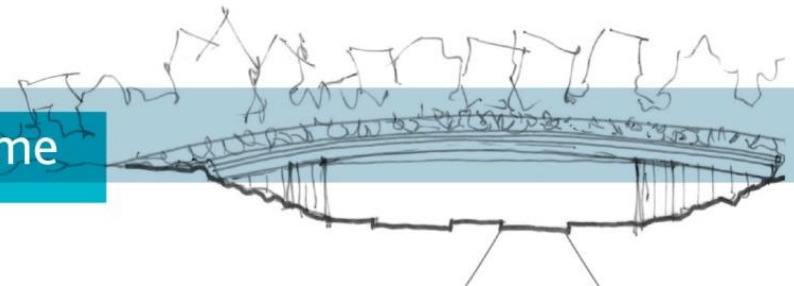
LEVEL 2 ON TRIAL

Practical Delivery of COBIE
at
BRE / BUILDINGSMART

By: David Owens – Costain Design & BIM Manager

A556

Knutsford to Bowdon Improvement Scheme



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WHY BIM…..

"This Government's four year strategy for BIM implementation will change the dynamics and behaviours of the construction supply chain, unlocking new, more efficient and collaborative ways of working. This whole sector adoption of BIM will put us at the vanguard of a new digital construction era and position the UK to become the world leaders in BIM."

Francis Maude
Minister for the Cabinet Office

The hypothesis is:

Government as a client can derive significant improvements in cost, value and carbon performance through the use of open sharable asset information. See http://www.bimtaskgroup.org/bim-faqs/

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LEVEL 2 ON TRIAL

Presentation Topics:

- No EIRs… Don't Panic
- Level of Definition… Detail… Whatever !
- Asset Unknown's
- 3D Design - not just Revit
- Data, data, data

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Knutsford to Bowdon Improvement scheme

Carriageway

- T 11% HGV
- High

Proposed

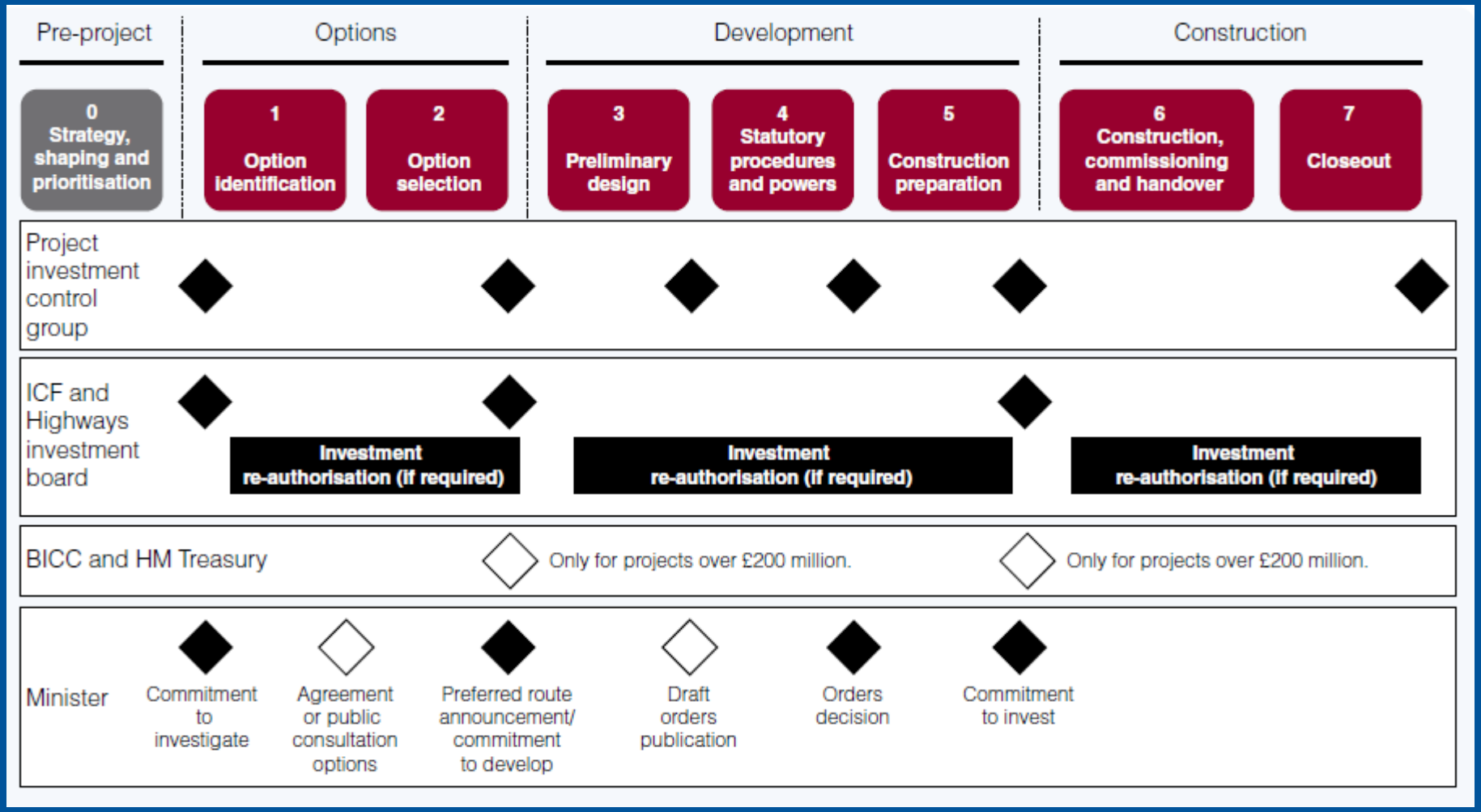
- 7.5km Dual Carriag
- In excess of 750, 000 m³ c
- Re-modelling of the M56
- 7 new Over-bridg
- Improveme
- Mai
- sting A556 to
- to 2 lanes and provide a
- oute along its length.

Prog me

- Design: Sept 2013 - Nov 2014
- Onsite: Nov 2014 - 2017

HA BIM E
BIM Level 2 ... please
Adopter

No EIRs…. No Problem



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No EIRs…. No Problem…

Why !

- Business Management Standards:
  - ISO 9001 | BS7000-4 | BS1192:2007 |PAS1192-2 | ISO 55000
- Data Standards
  - ISO 12006 - Uniclass | ISO 16739 – IFC | BS1192-4 ???? - COBie

- CPIx Protocol from CPIC - Construction Project Information Committee
  - BIM Execution Plan | BIM Assessment Form
  - Supplier IT Assessment Form | Resource Assessment Form
- CIC BIM Protocol

Client Specific

- Highways Agency Project Control Framework (PCF)
- Asset Data Management Manual (ADMM)
- NEW !
  - IANxxxx/14 - HA Data & CAD Standard
  - IAN182/14 - Enabling Handover into Operation and Maintenance

No EIRs…. No Problem…

Respond in kind

- Process - Design Management Handbook including
  - Project BIM Strategy & Post Contract BIM Execution Plan
  - MIDP – Master Information Delivery Plan (eg combines Doc Register & Programme)
  - Volume Strategy

- Technology
  - CDE - Bentley ProjectWise
  - Design - Autodesk AutoCAD Map 3D / Civil 3D & Revit
  - Quality – SQL db & Mobile (Field BIM)

But of course

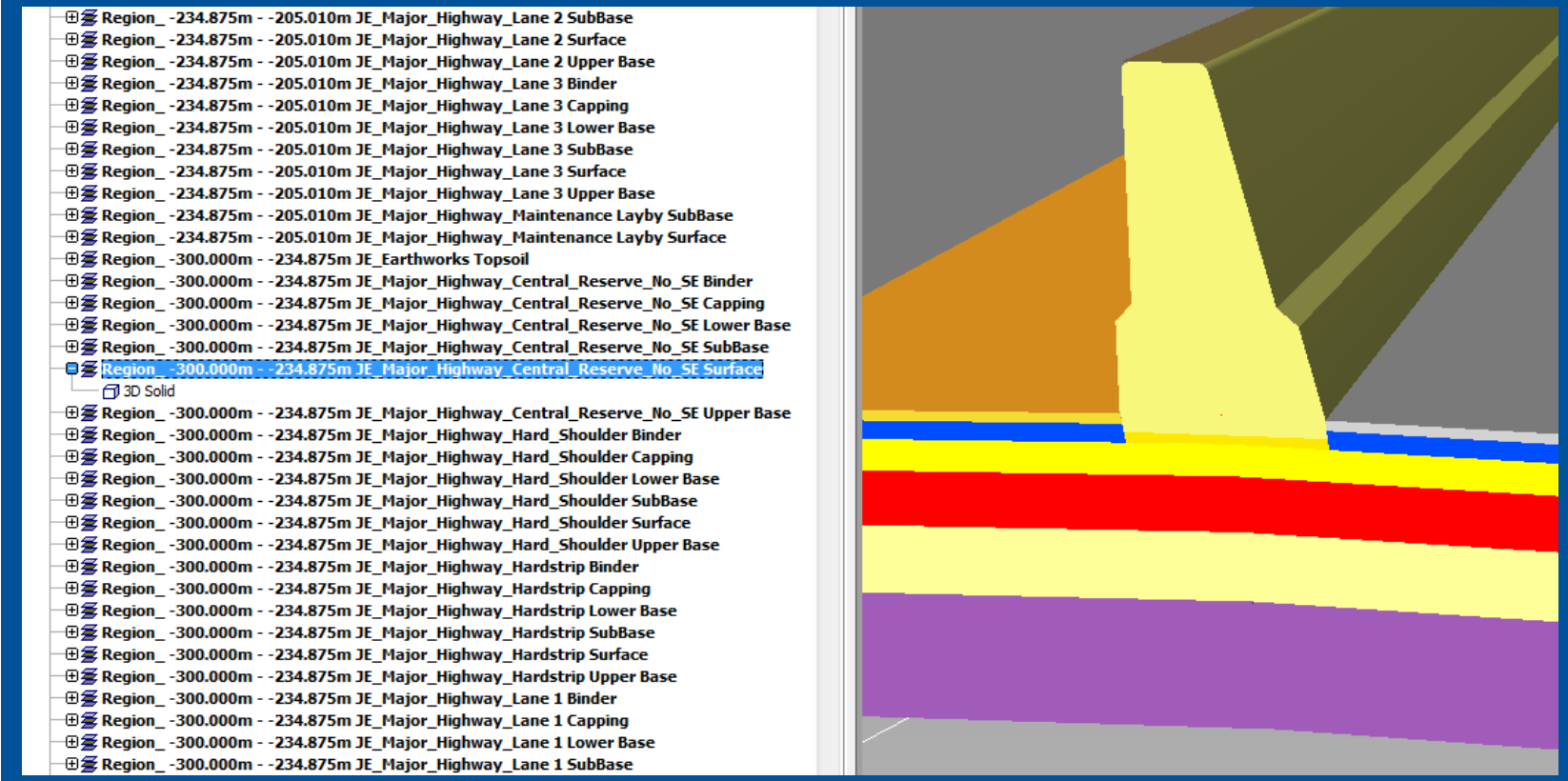
- Prepare Guidance needed to implement
- Help the client along the journey – HA Interim Advice Note (like a PAS)

LEVEL OF DEFINITION… WELL 'DETAIL' REALLY

Discipline	Tool	LoD	Comments
Pavement & Earthworks	Map/C3D	LOD 3	Embedded info; Construction layers and Chainage of regions included
Bridges	Revit	LOD 3	Concrete + Steel face but no rebar
Gantries	??	LOD 3	Unknown until supplier on board
Retaining Walls	Revit	LOD 3	Few retaining wall on scheme
Site Clearance	Map/C3D	LOD 4	Info created in 3D but with linked data
Boundary Fences	Map/C3D	LOD 2	Simple geometric representation of space required
Safety Barrier	Map/C3D	LOD 2	Simple geometric representation of space required
Drainage	C3D+ Windes	LOD 4	C3D attributed data migrates into Navis
Signs	PDS	LOD 4	Test files look promising and inc attributed data
Lines	PDS	LOD 4	Test file look promising
Lighting	KeyLights	LOD 4	2D & 3D blocks with attributed data

From A556 BIM Guidance Note 03 – Level of Detail

Level of Definition



Pavement - LoD 3

C3D Model: Very detailed in terms of earthworks/pavement construction by carriageway and chainage.

From A556 BIM Guidance Note 03 – Level of Detail

LEVEL OF DEFINITION

Gantries - LoD 3
Image represents the aspiration for A556
Gantry manufacturer might provide accurate detailed model?

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Integrated Asset Management Information System

Highways Agency Pavement Management System AND Scheduled Road Works

Highways Agency Drainage Data Management System

Structures Management Information System

Highways Agency Geotechnical Data Management System

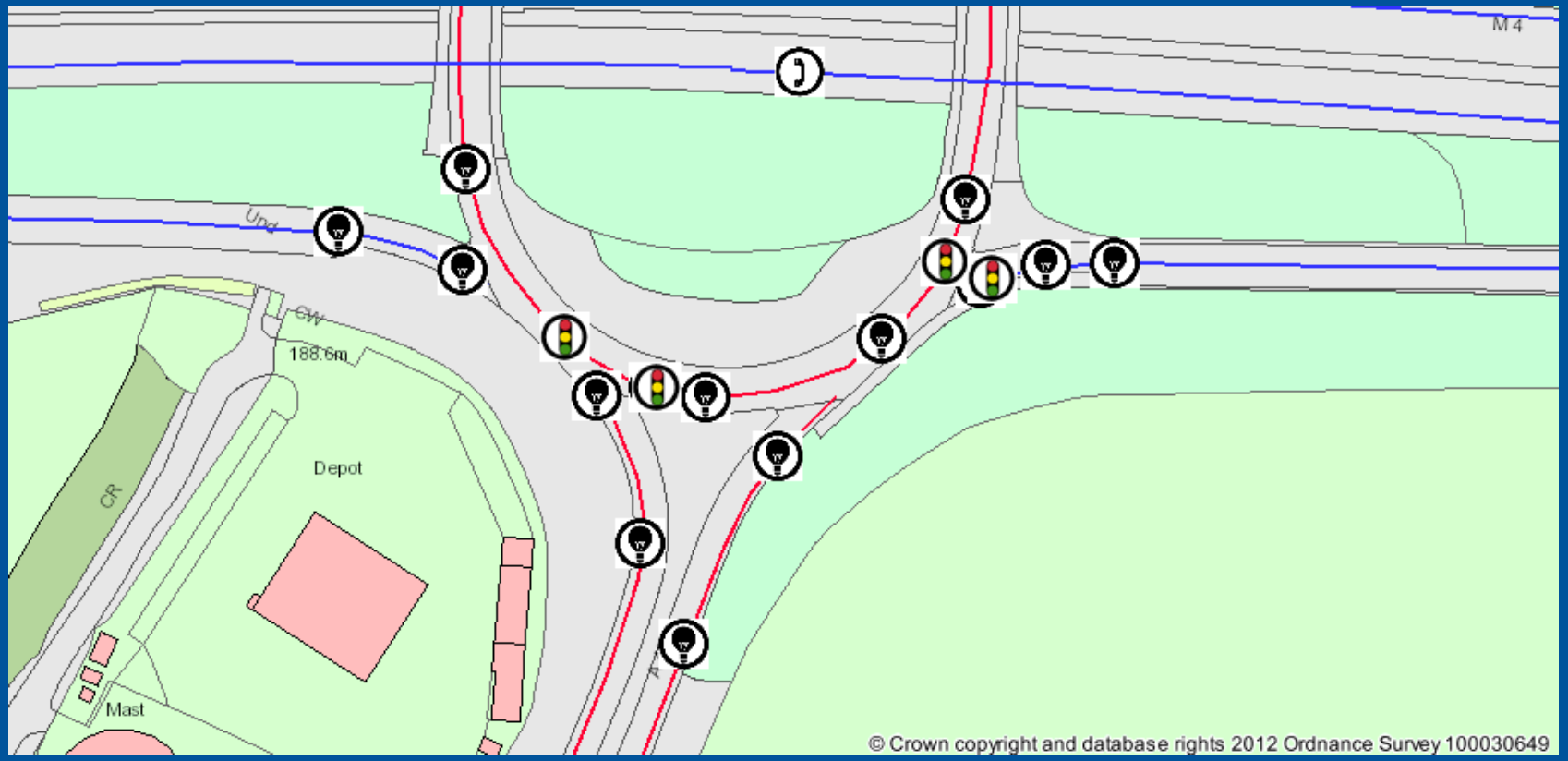
Routine Maintenance Management Systems

Bentley Exor based system

IAM-IS will replace 17 Agency and supply chain systems

ASSET UNKNOWN'S…. NOT ANY MORE

IAM-IS…. A GRAPHICAL INFORMATION SYSTEM



E.5.52 Vehicle Restraint System

Asset Code:	VRS	Description:	Vehicle Restraint System

Vehicle Restraint Systems (VRS) or Safety Fences appear on the road network in several forms and are most prevalent but not confined to motorways, dual-carriageways, junctions and approaches to roundabouts. The main purpose of Vehicle Restraint Systems is to restrain or redirect errant vehicles from crossing central reservations into the path of other vehicles or from leaving the highway following accidents or collisions. The purpose of which is to prevent harm to vehicle occupants or other road users.

The most common form of Vehicle Restraint Systems consists of permanent steel posts supporting steel beams another type consists of fabricated wire cables, commonly known as wire rope barriers. Other forms of permanent retention systems can be identified as continuous smooth surface Safety Barriers, the most common form is constructed of concrete.

Asset Metadata Configuration

The asset metadata configuration defines the behaviour of an asset type e.g. whether the Asset type is a Point or Continuous feature or whether Asset of this type is Replaceable when network elements are end-dated.

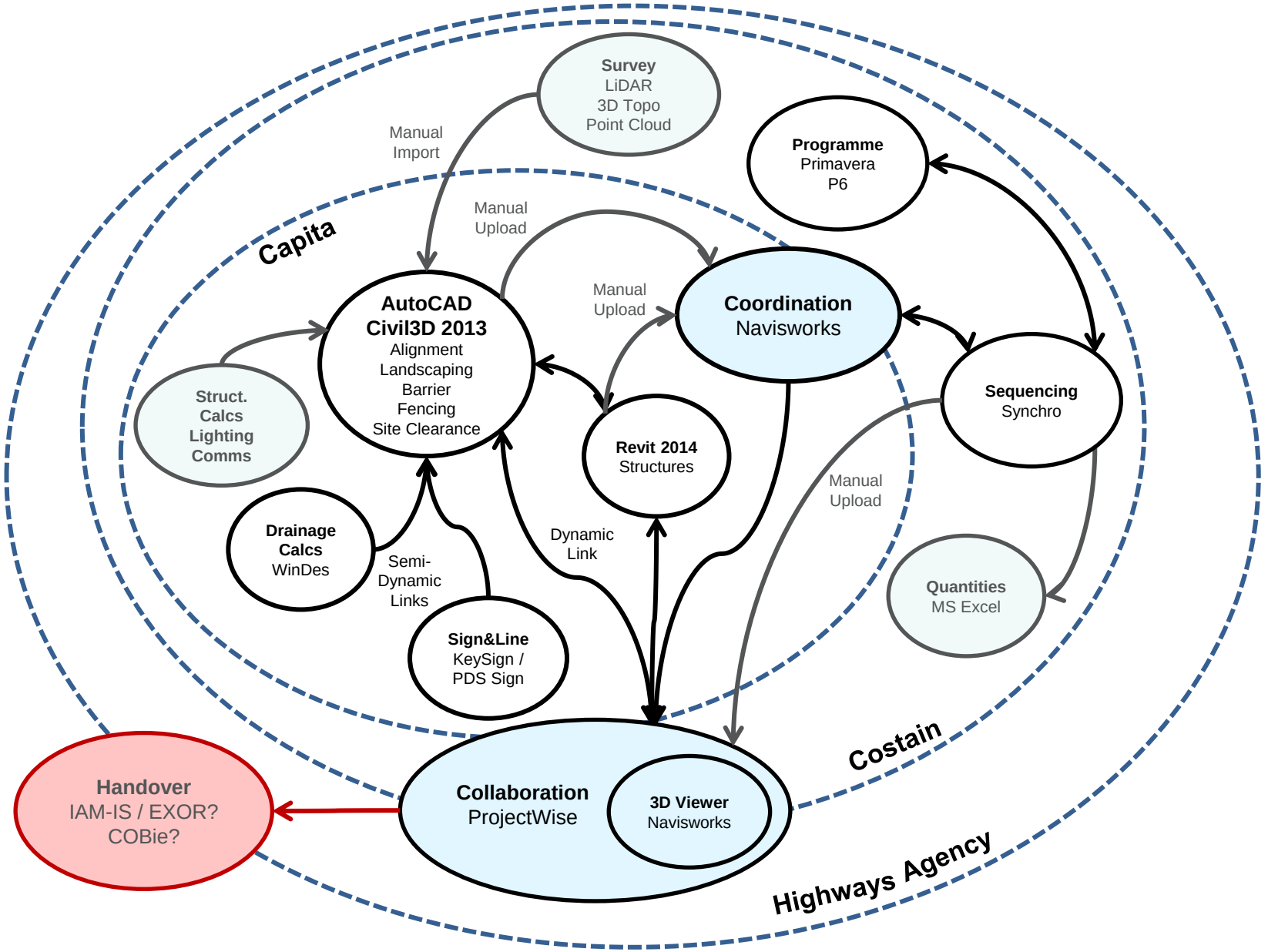
Configuration Option	Configuration Value	Configuration Meaning
Point or Continuous	Continuous	The Asset Type is a Line feature, i.e. an An Asset Item of this type has different Start and End points.
XSP Required	Yes	The Asset Type requires a cross sectional postion.
Locate by X Y	No	Assets of this Type will not be located using Geographical Co-ordinates (e.g. Grid References).
Contiguous	No	This Asset type is not mandatory along the entire length of a Network Element.
Replaceable	Yes	An Asset Item of this Type can be end-dated as a result of a Network Operation being carried out on the Network Element or Elements on which an Item of this Type is located. Note that a Network Element cannot be Closed (End-Dated) if any Asset Items that are either wholly or partially located on the Element are of an Asset Type which HAS NOT been flagged as Replaceable.
Exclusive	No	The Asset Type may exist more than once for a given Network Location. If the 'XSP Allowed' flag is also selected and the Asset Type can reside in Multiple XSP's

Configuration Option	Configuration Value	Configuration Meaning
		and within the same XSP, i.e. many Items of a non-exclusive Asset Type may exist at the same linear offset within the same XSP, but the values of the 'Exclusive Flexible Attributes' must differ for each item.
Multiple Locations	Yes	This Asset type may have multiple disparate locations. If this checkbox is selected the system will check for the existence of any location records already associated with an Asset Item when a new location record is added. The User will be prompted to either append or replace existing location records.
End Location Only	No	The Asset Items of this type will not remain 'open' i.e. It will be End Dated, if the Network Element to which it is associated is End Dated.
Top of Hierarchy	Yes	The Asset Item of this Type is used within an Asset Hierarchy and this Asset Type is at the Top Level of the Asset Hierarchy eg Parent Asset.

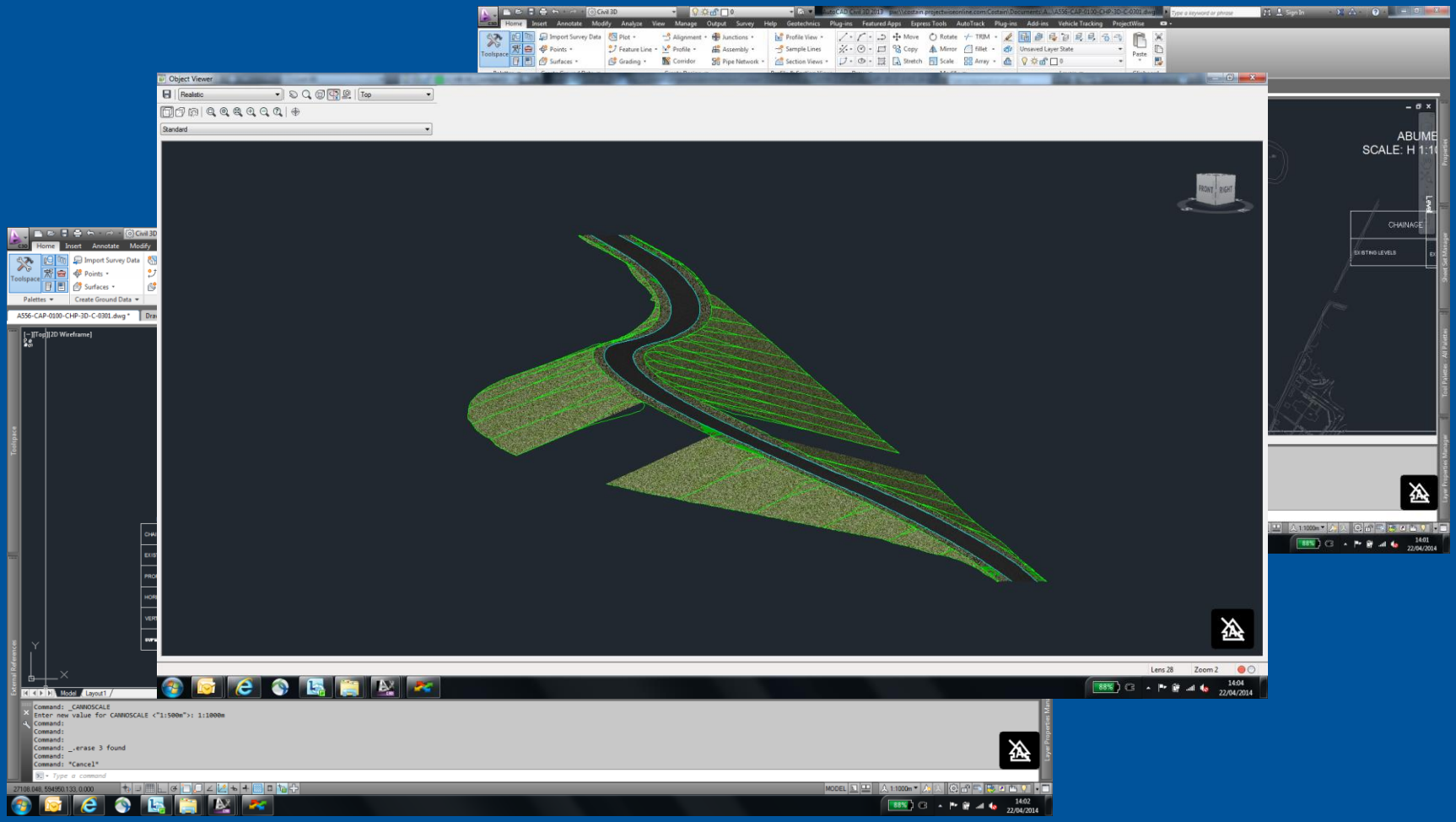
Asset Attributes

The asset attributes define the characteristics of an individual asset eg where it is, how large it is, when was it constructed or who owns it.

Field Name	Field Format	Mandatory Required Optional	Field Domain	Additional Information
Type	VARCHAR2	M	VRS_TYPE	
Asset ID	VARCHAR2	O		
Source ID	NUMBER	O		
Shape	VARCHAR2	M	VRS_SHAPE	
Beam/Concrete Profile	VARCHAR2	M	VRS_BEAM	
Manufacturer	VARCHAR2	O		
Design / Drawing Number	VARCHAR2	O		
Owner	VARCHAR2	M	ALL_OWNER	
Hazard (reason for VRS)	VARCHAR2	O	VRS_HAZARD	
Connected Parapet	NUMBER	O		
Current	VARCHAR2	M	CURRENT MAINTENANCE	


Survey
LiDAR
3D Topo
Point Cloud
Manual
Import
Programme
Primavera
P6
Manual
Upload
Capita
AutoCAD
Civil3D 2013
Alignment
Landscaping
Barrier
Fencing
Site Clearance
Manual
Upload
Coordination
Navisworks
Struct.
Calcs
Lighting
Comms
Revit 2014
Structures
Sequencing
Synchro
Manual
Upload
Drainage
Calcs
WinDes
Semi-
Dynamic
Links
Dynamic
Link
Quantities
MS Excel
Sign&Line
KeySign /
PDS Sign
Costain
Handover
IAM-IS / EXOR?
COBie?
Collaboration
ProjectWise
3D Viewer
Navisworks
Highways Agency

3D Design…. Not Just Revit
AutoCAD too… Vanilla / Map3D & Civil3D

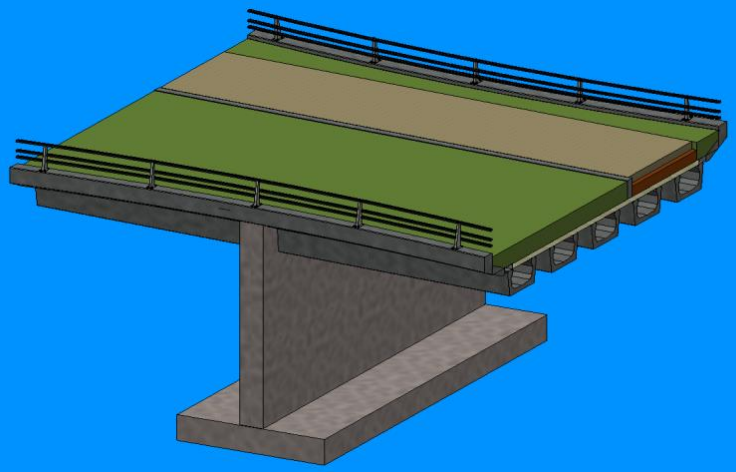


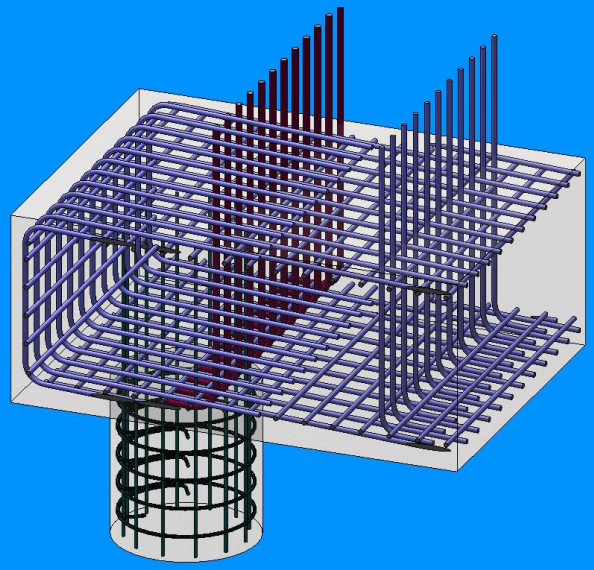
3D Design…. Not Just Revit

But a little bit of Revit too

A556 Structures

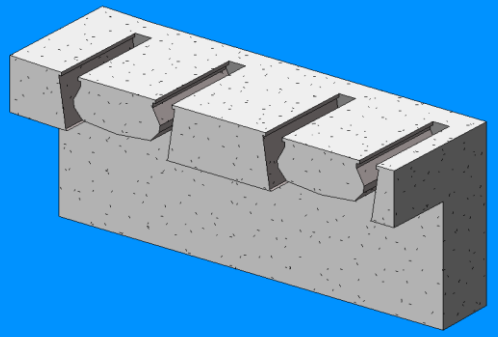
- 7 Bridges, 1 Underpass
- Bespoke Family Files
- Intelligent Rebar

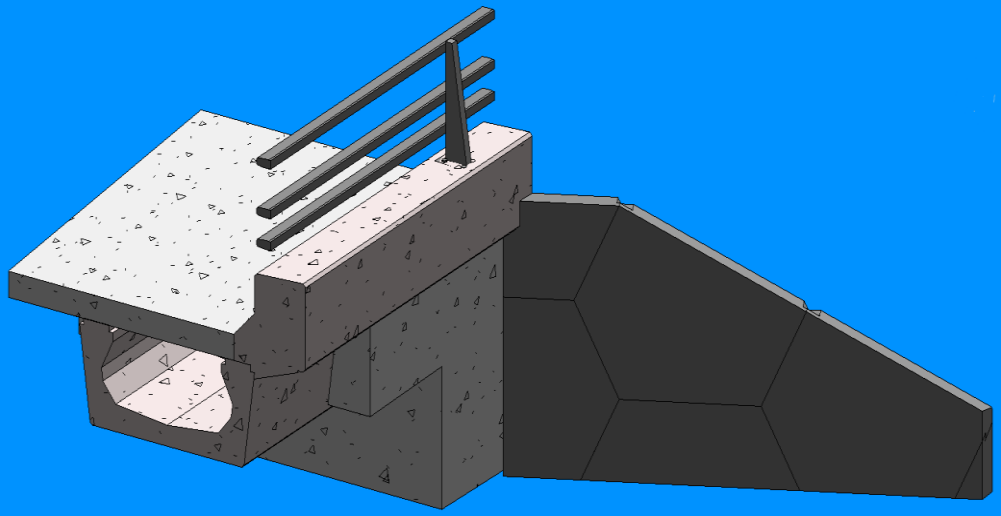


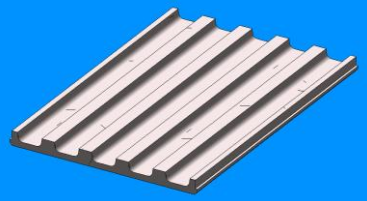


A556 Revit Family Files

- Precast Beams
- Precast Permanent Formwork
- Pier & Abutment Stem with Diaphragm
- String Course
- Parapet
- Wing Walls Panels

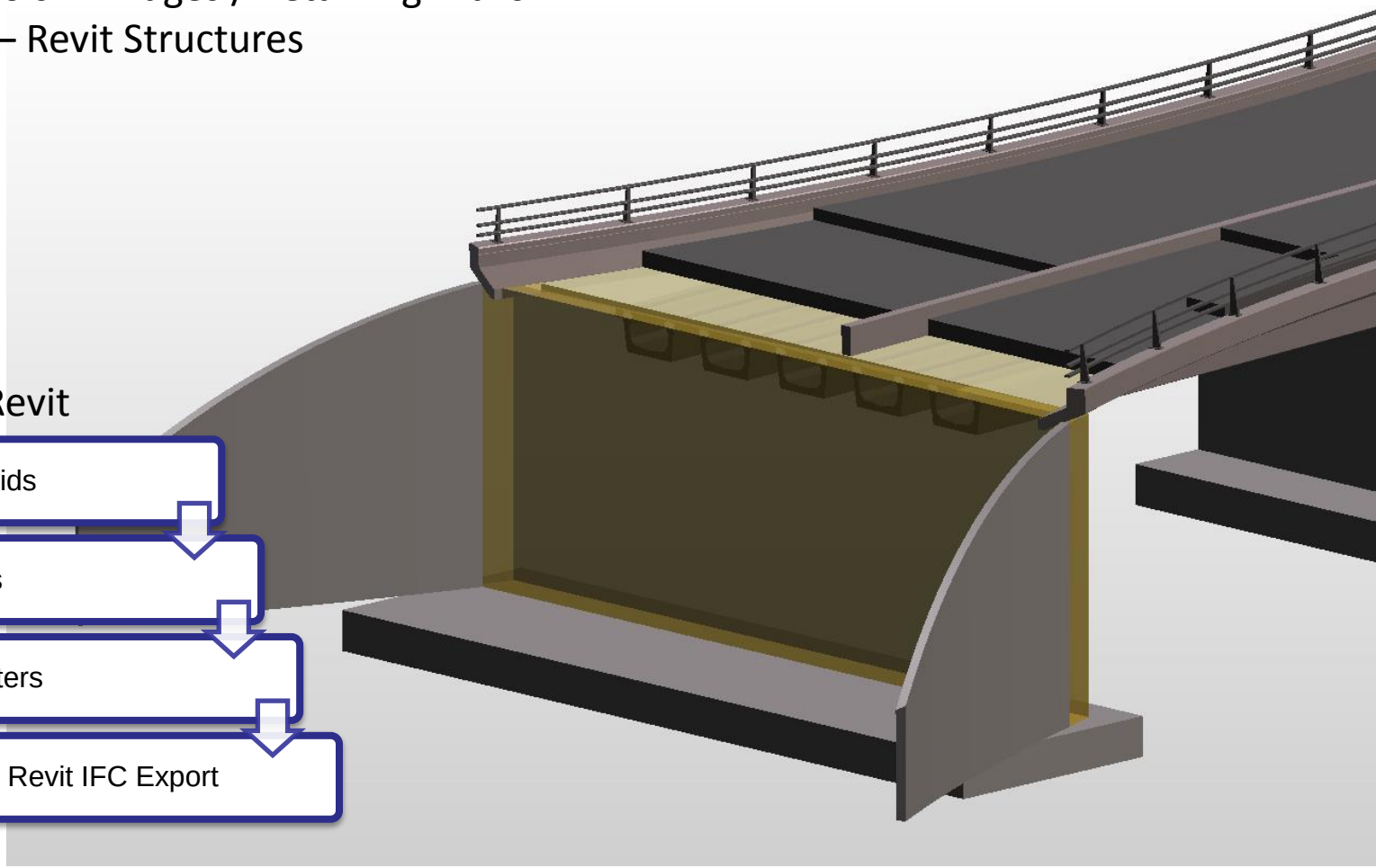






ASSET UNKNOWN'S…. COBIE FOR ALL?

- Main Design Tools – Bridges / Retaining Walls
  - Autodesk – Revit Structures



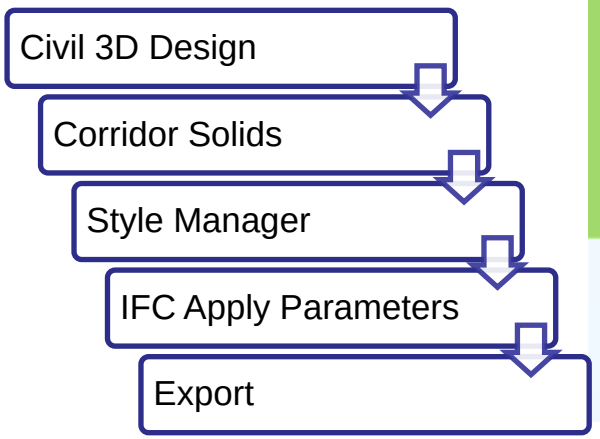
IFC Workflow for Revit

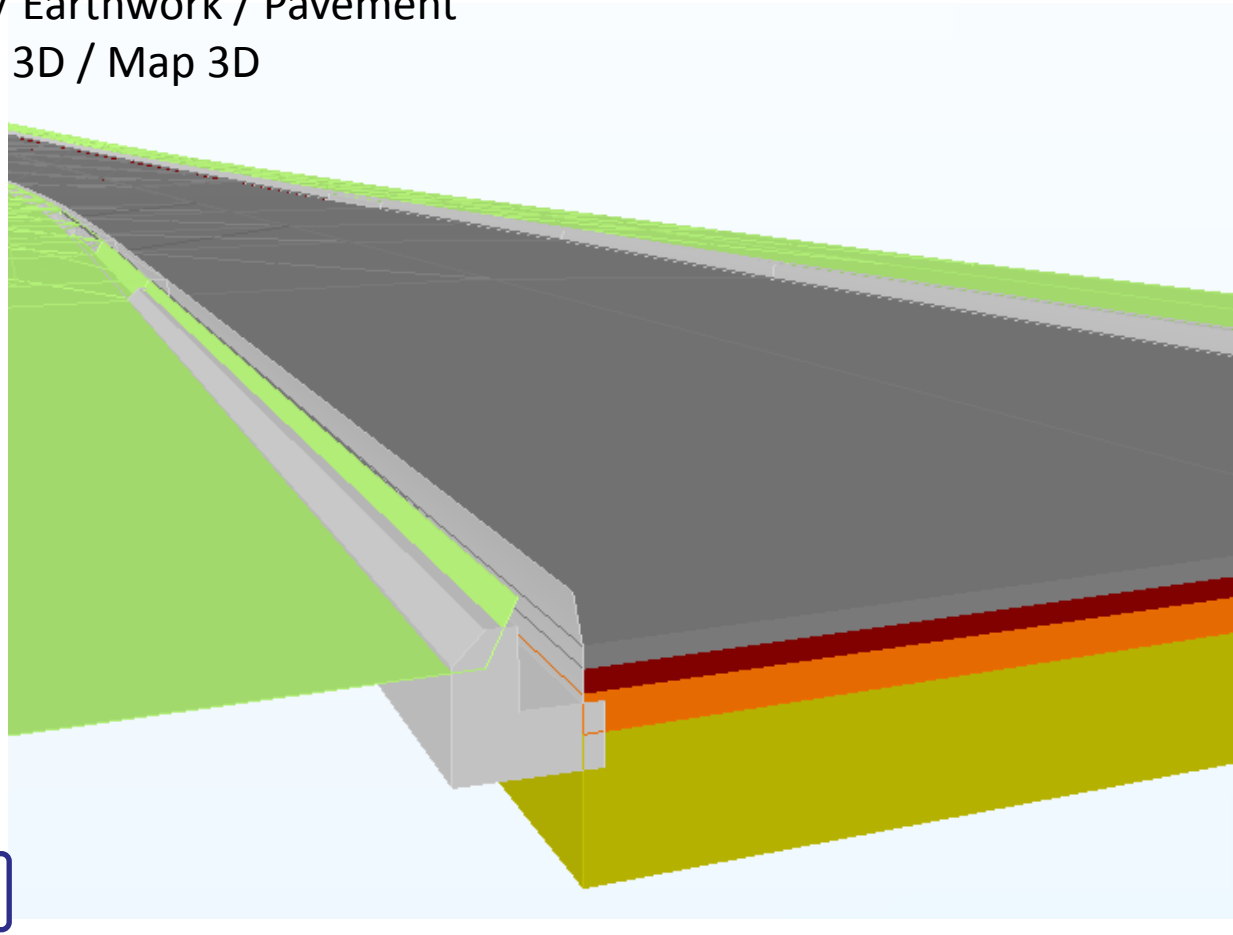
- Import Civil 3D Solids
- Create Families
- Inc. Parameters
- Autodesk Revit IFC Export

ASSET UNKNOWN'S…. COBIE FOR ALL?

- Main Design Tools - Highways / Earthwork / Pavement
  - Autodesk – AutoCAD Civil 3D / Map 3D
- Supplementary Tools / Plugins
  - Drainage – Windes
  - Signs & Lines – PDS
  - Lighting – KeyLights
  - Geotech – Holebase

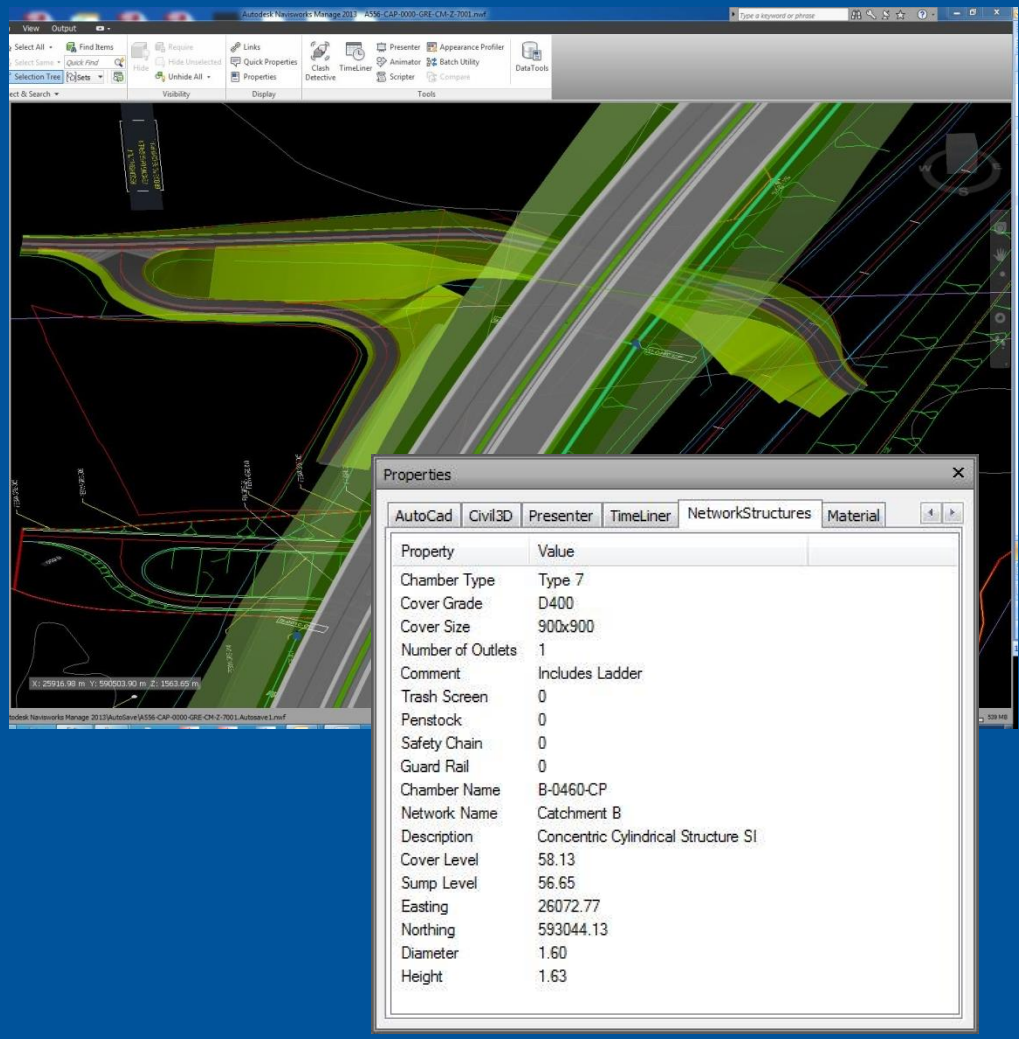
IFC Workflow all in AutoCAD



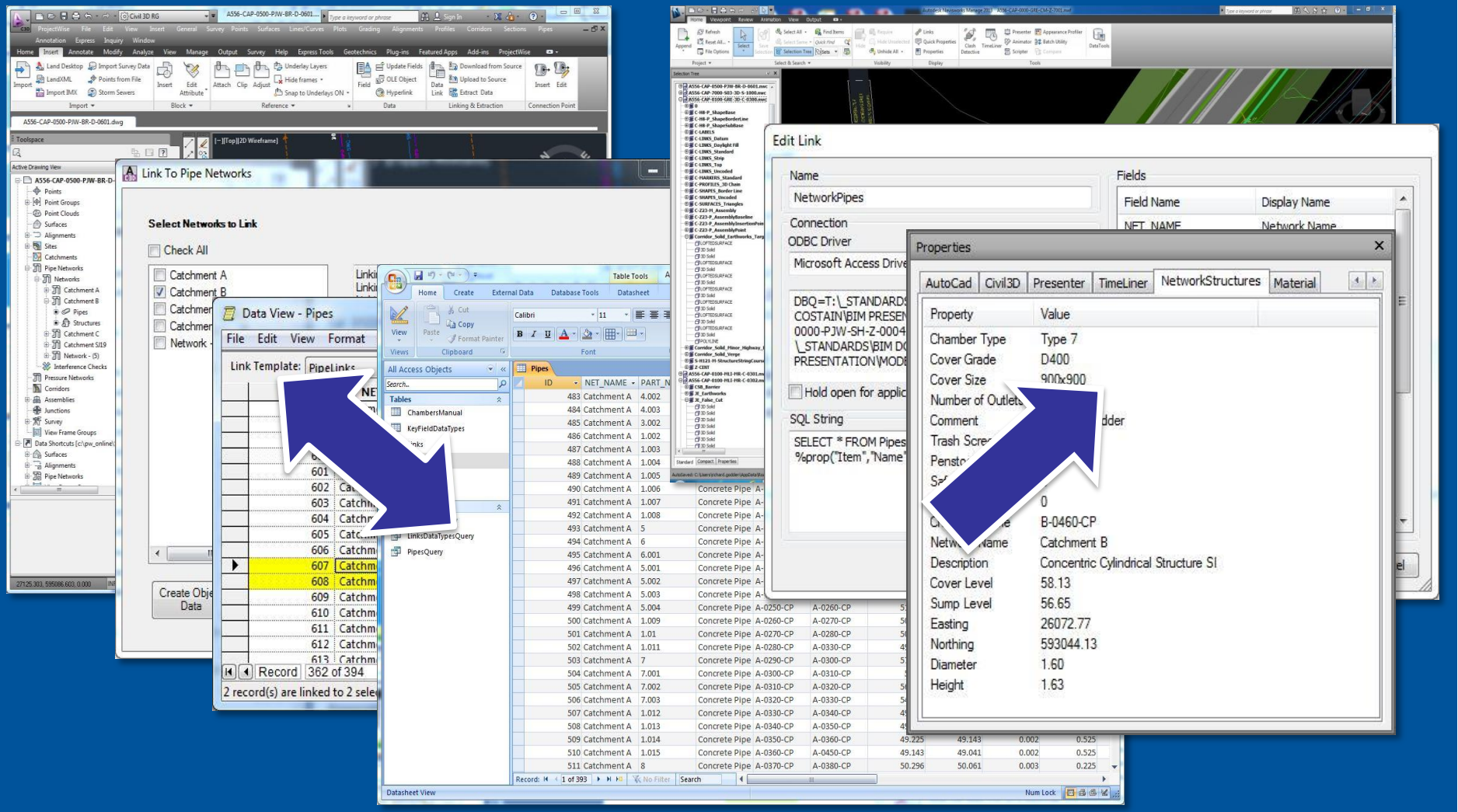


LINKED DATABASES

- Civil 3D Data Linking
  - Extract Data to Database
  - Add Custom Fields
  - Re-link all data to Objects in Navisworks Model
- Database can be Updated by Non-CAD Users
- Data can be bound into Model for Field BIM
- Data can be transposed and transferred



A556 Highways Data Linking



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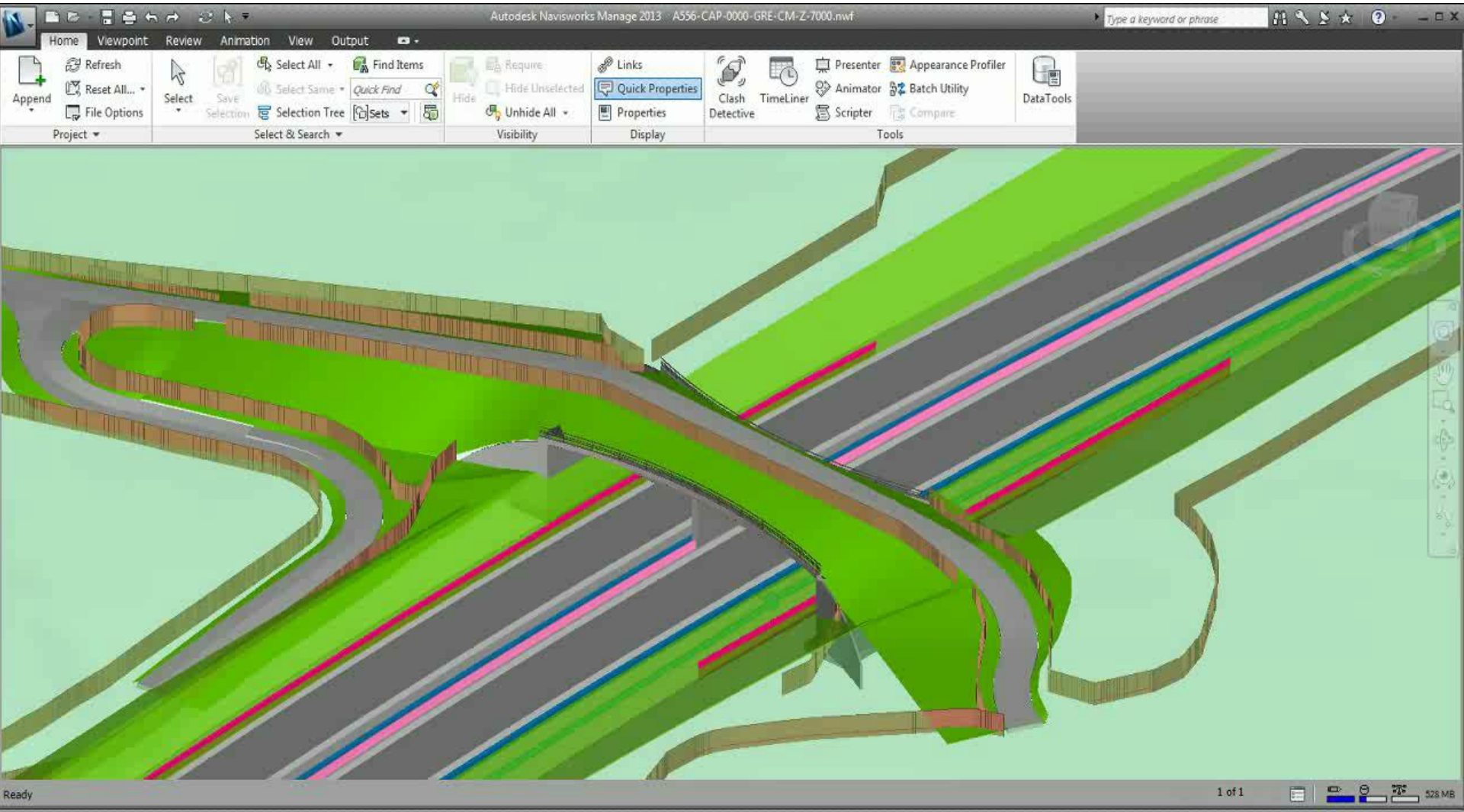
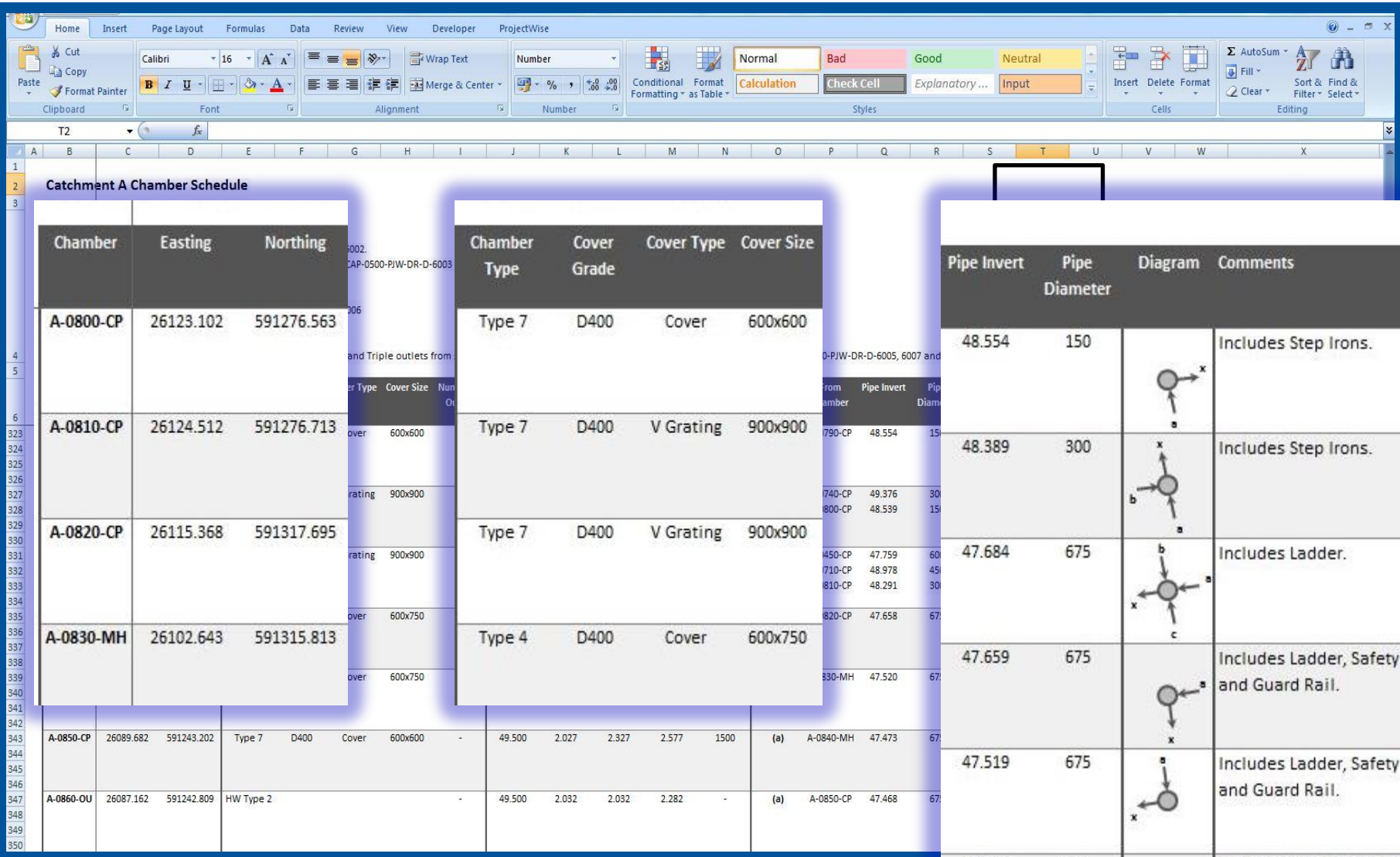


A556-CAP-0000-PJW-SH-Z-0001 : Database (Access 2002 - 2003 file format) - Microsoft Access

Points

POINT_NO	Easting	Northing	Elevation	BotanicalName	CommonName	Height	RootZone	Mix	Add New Field
885	26078.734	593152.466	63.526	Malus Sylvestris	Crab Apple	2.5m-3.0m	RB	0.35	
886	26081.389	593145.318	63.535	Sorbus Aucuparia	Rowan	2.5m-3.0m	RB	0.35	
884	26086.292	593154.917	63.939	Crataegus Monogyna	Hawthorn	2.5m-3.0m	RB	0.35	



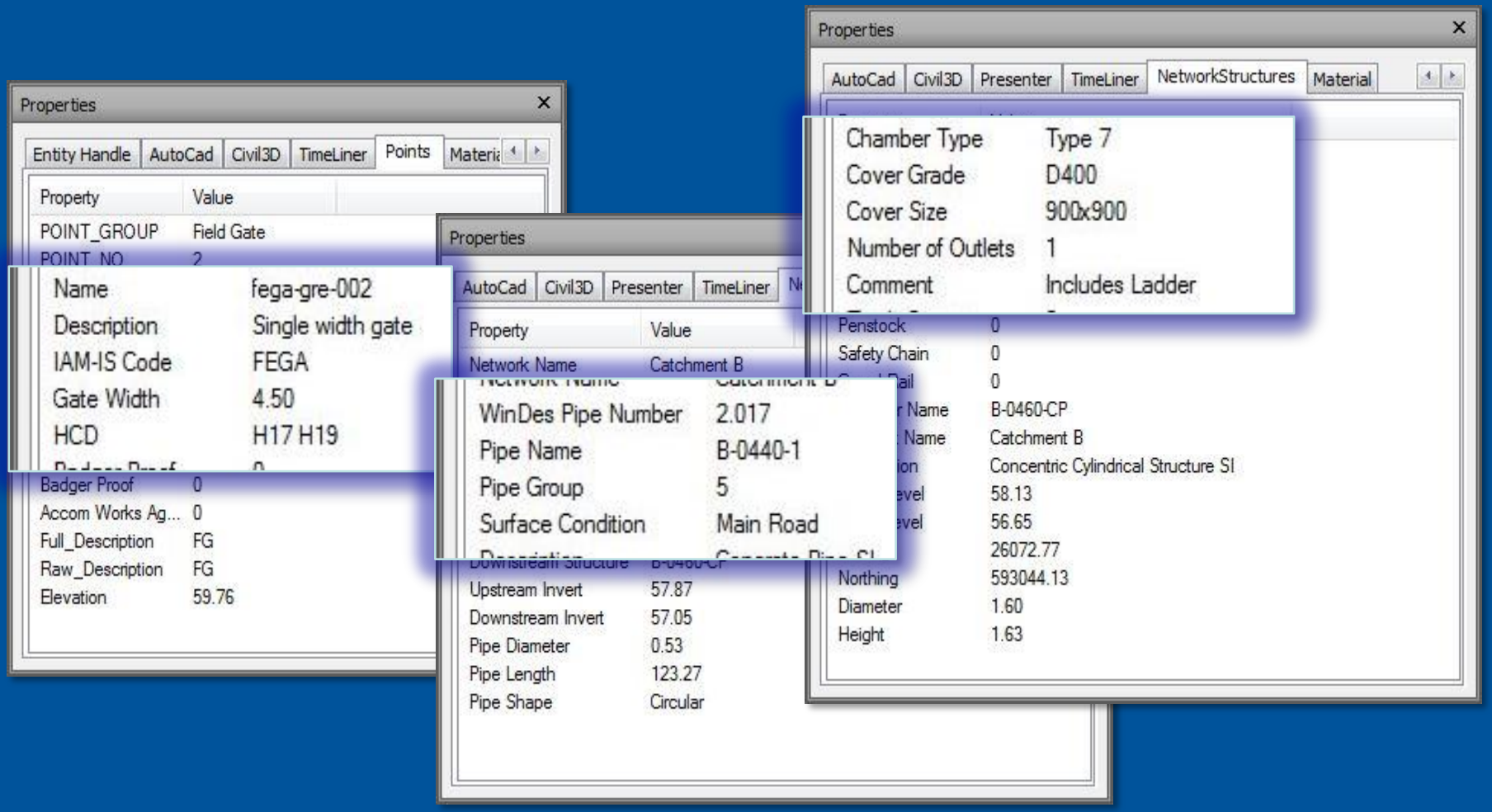
Catchment A Chamber Schedule

Chamber	Easting	Northing
A-0800-CP	26123.102	591276.563
A-0810-CP	26124.512	591276.713
A-0820-CP	26115.368	591317.695
A-0830-MH	26102.643	591315.813

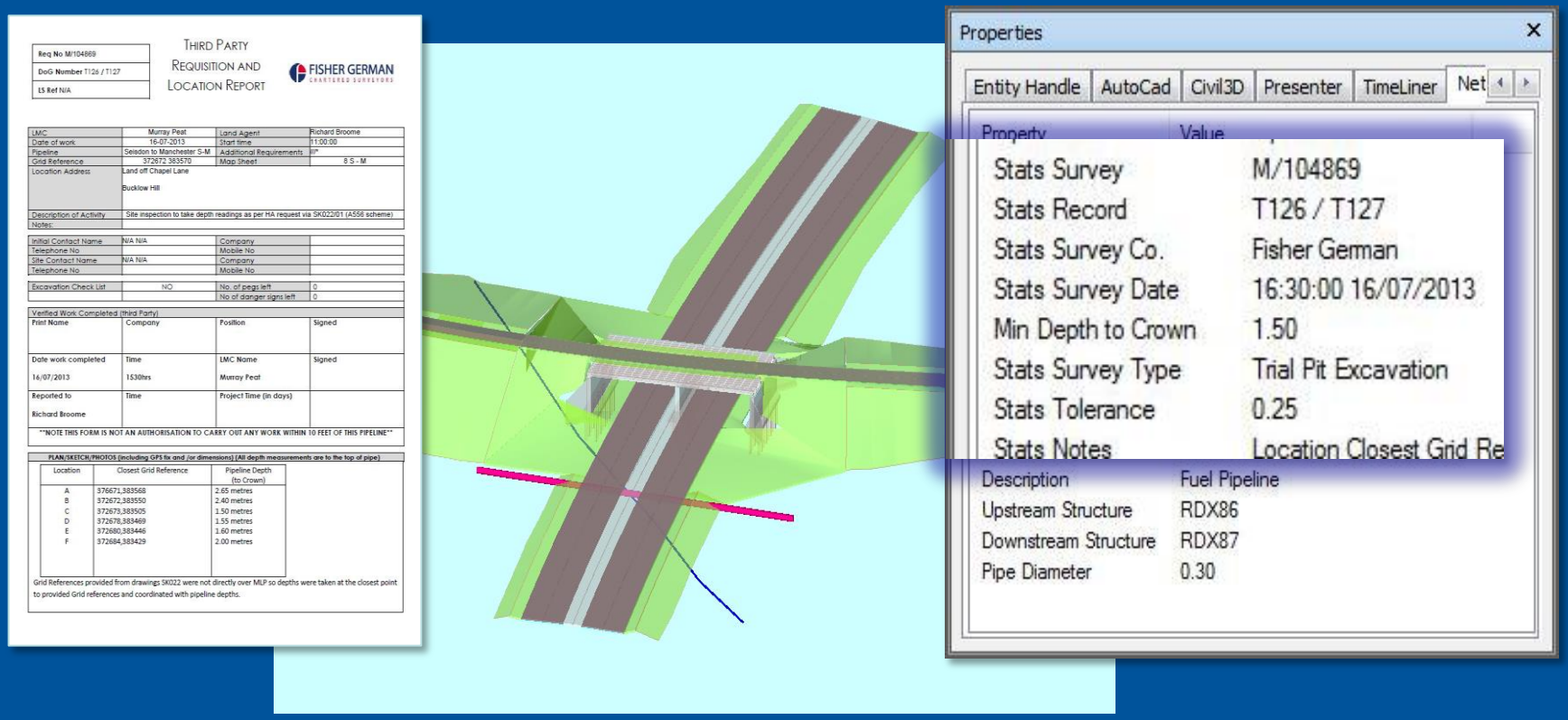
Chamber Type	Cover Grade	Cover Type	Cover Size
Type 7	D400	Cover	600x600
Type 7	D400	V Grating	900x900
Type 7	D400	V Grating	900x900
Type 4	D400	Cover	600x750

Pipe Invert	Pipe Diameter	Diagram	Comments
48.554	150		Includes Step Irons.
48.389	300		Includes Step Irons.
47.684	675		Includes Ladder.
47.659	675		Includes Ladder, Safety Cha and Guard Rail.
47.519	675		Includes Ladder, Safety Cha and Guard Rail.

DATA, DATA, DATA…. LINK TO DATABASE



DATA, DATA, DATA…. LINK TO DATABASE



Req No M/104869
DoG Number T126 / T127
LS Ref N/A

THIRD PARTY REQUISITION AND LOCATION REPORT

FISHER GERMAN CHARTERED SURVEYORS

LMC	Murray Peat	Land Agent	Richard Broome
Date of work	16-07-2013	Start time	11:00:00
Pipeline	Seledon to Manchester S-M	Additional Requirements	///
Grid Reference	372672 383570	Map Sheet	8 S - M
Location Address	Land off Chapel Lane Bucklow Hill		
Description of Activity	Site inspection to take depth readings as per HA request via SK022/01 (A556 scheme)		
Notes:			

Initial Contact Name	N/A N/A	Company	
Telephone No		Mobile No	
Site Contact Name	N/A N/A	Company	
Telephone No		Mobile No	

Excavation Check List	NO	No. of pegs left	0
		No of danger signs left	0

Verified Work Completed (third Party)

Print Name	Company	Position	Signed
Date work completed 16/07/2013	Time 1530hrs	LMC Name Murray Peat	Signed
Reported to Richard Broome	Time	Project Time (in days)	

NOTE THIS FORM IS NOT AN AUTHORISATION TO CARRY OUT ANY WORK WITHIN 10 FEET OF THIS PIPELINE

PLAN/SKETCH/PHOTOS (including GPS fix and /or dimensions) (All depth measurements are to the top of pipe)

Location	Closest Grid Reference	Pipeline Depth (to Crown)
A	376671,383568	2.65 metres
B	372672,383550	2.40 metres
C	372673,383505	1.50 metres
D	372678,383469	1.55 metres
E	372680,383446	1.60 metres
F	372684,383429	2.00 metres

Grid References provided from drawings SK022 were not directly over MLP so depths were taken at the closest point to provided Grid references and coordinated with pipeline depths.

Properties

Entity Handle | AutoCad | Civil3D | Presenter | TimeLiner | Net

Property	Value
Stats Survey	M/104869
Stats Record	T126 / T127
Stats Survey Co.	Fisher German
Stats Survey Date	16:30:00 16/07/2013
Min Depth to Crown	1.50
Stats Survey Type	Trial Pit Excavation
Stats Tolerance	0.25
Stats Notes	Location Closest Grid Re
Description	Fuel Pipeline
Upstream Structure	RDX86
Downstream Structure	RDX87
Pipe Diameter	0.30

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Mass Collaboration

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ATKINS

Mott MacDonald

Grontmij

On board

WALTERS GROUP

Earthworks

AGGREGATE INDUSTRIES

Pavement - Asphalt

Tendering Suppliers

BANAGHER CONCRETE

SHAY MURTAGH

Pre-cast Bridge Beams

Polypipe

Drainage – Pipes & Chambers

Any Questions?

Wish List…

- Software Certification
- Consultant Lloyds Accredited ISO 9001
- Industry cooperation on Uniclass
- IFC exporter in AutoCAD, not just Architecture
- IFC Schema Improved for Infra eg Alignment
- Greater participation… by the industry at large
- Software Arms Race