DATEX II

New developments in DATEX II content

Lane Management Model

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Lane Carriageway management modeling

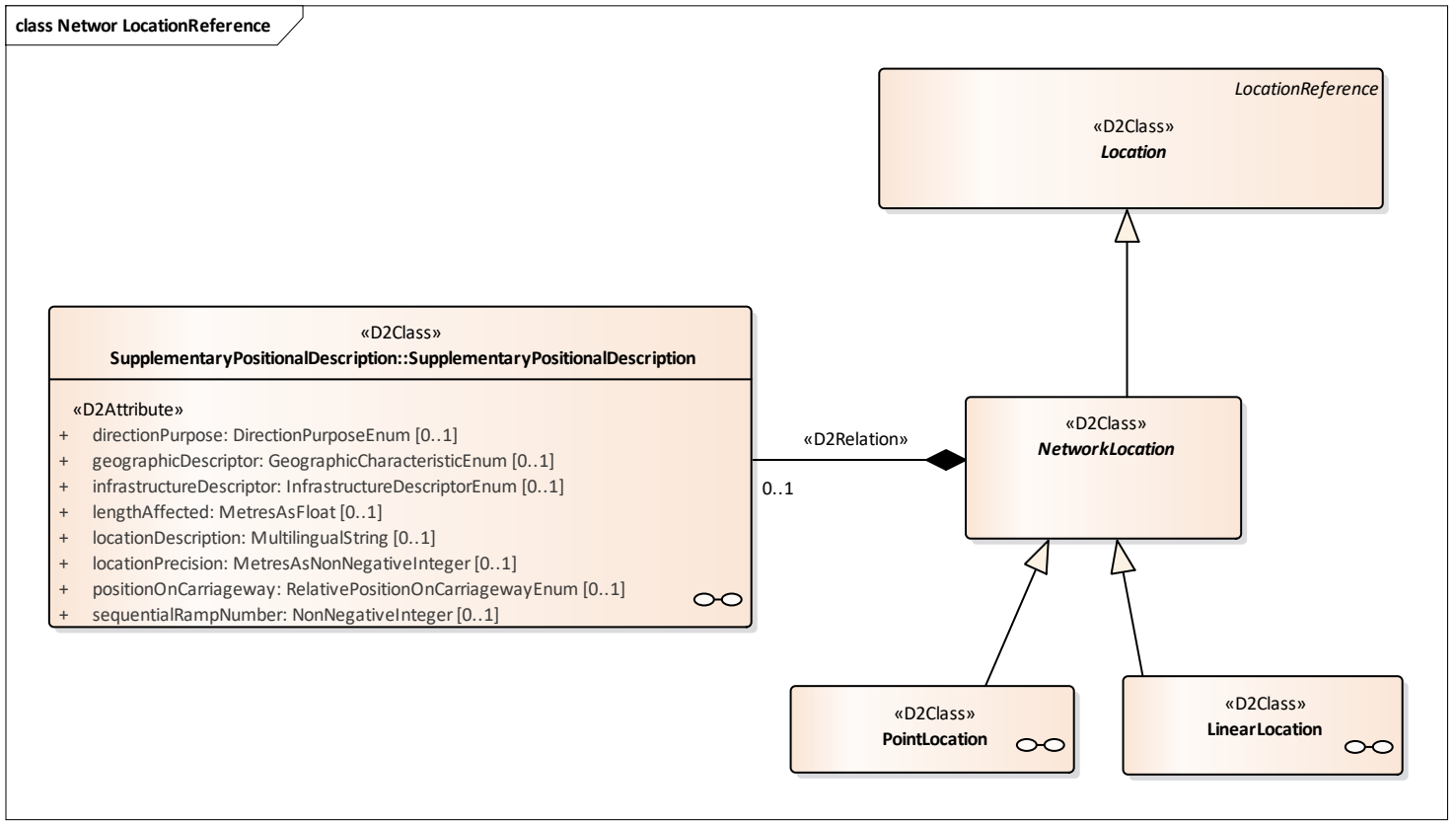
- Current DATEX II v3.x Location Referencing allows to manage LOGICAL information on lane whith some limits
- **Situation publication** support the description of lanes needing multiple record to specify several lane management configuration evolving along the carriageway.
- **Precise lane status** information is generated in specific road management use cases such as:
  - in Dynamic Lane Management DLM through Lane Control System LCS VMS
  - In Hardshoulder Management systems in combination or not with DLM
  - in Roadwork Management with specific fixed or even dynamic lanes settings

Lane Carriageway Management modeling

- Goals
  - Optimise information management with location details coding exact lane management information (logical lane description)
  - Reuse of current Location Referencing model in ISO 16157-2
  - Reuse of Traffic Regulation as being developed in TS 16157-11
- Applications
  - Optimised and accurate information description for DLM, HM and Roadworks Zones.
  - Support to deliver in vehicle information such as C ITS services.
  - Further **road/carriageway features description** associated to road along carriageway, supporting development in CCAM field, to be analysed and developed.

DATEX II

Lane Management in DATEX II v 3.x



Location is associated to any Situation Record / Measurement Sites, VMS, Devices

Point and Linear Location Referencing

Optional Supplementary Positional Description

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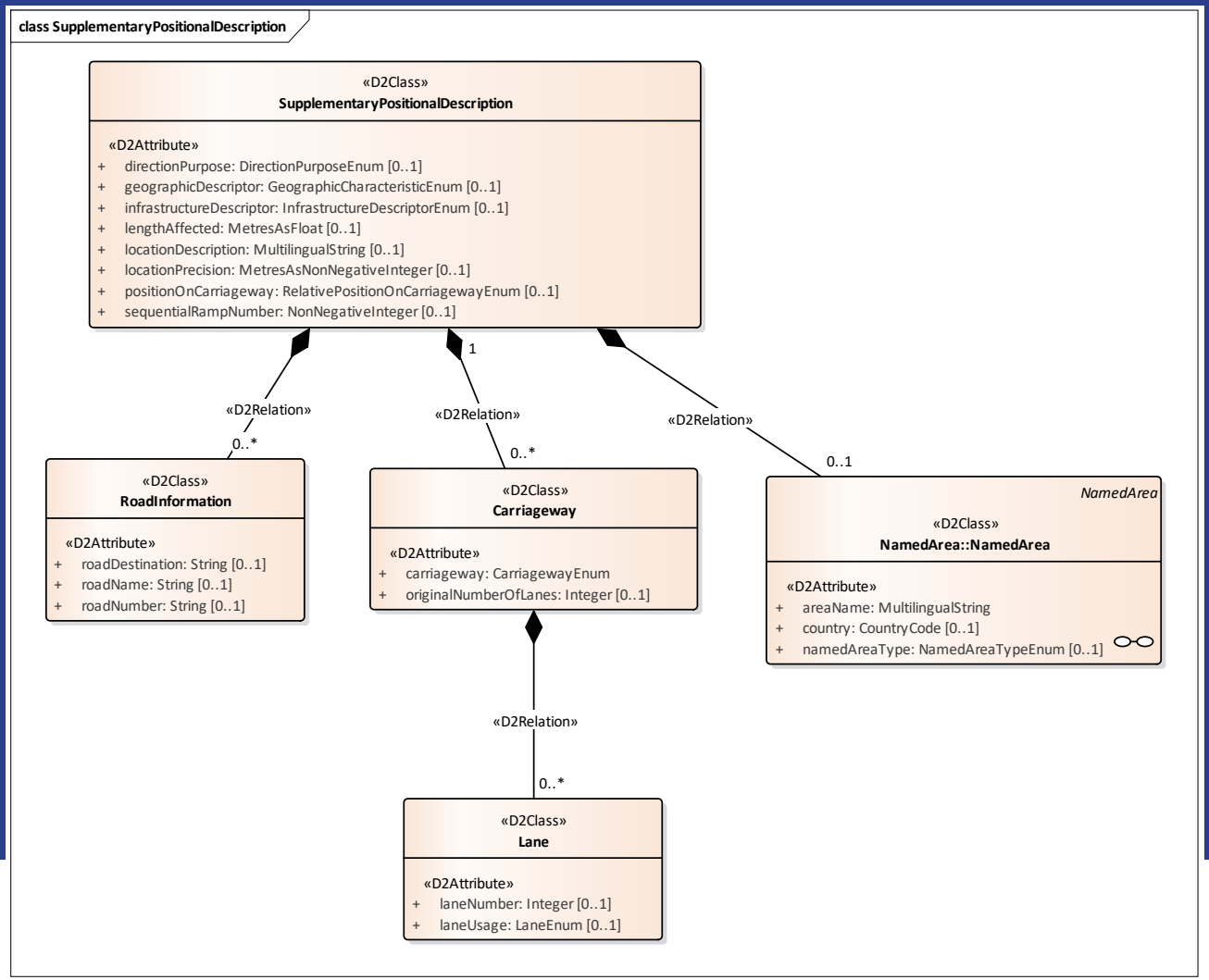
Lane Management in DATEX II : Supplementary Positional Description



- SPD allows to manage Carriageway and Lanes details for any carriageway:
  - It's a «logical» information
    - **Original Number of lanes**
    - **Lane number:** 0=hardshoulder + 1,2,n
    - **Lane usage:** specific lane usage if needed:

- **Being related to the location any lane numbering variation along the road in a single event needs to introduce several SituationRecords to manage sections with same carriageway and lane details**

- No detail about lane transition zones is possible

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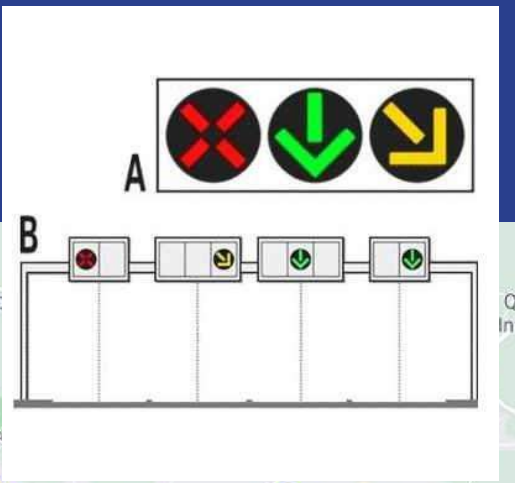
Lane Management use cases: DLM & HM

- **Dynamic Lane Management (DLM)**
  - Supported by Lane Control System VMS
  - Per lane restrictions applies are advised/granted by the VMS signals.
  - Under monitoring systems and enforcement when applicable
  - Tunnel Management Applications
- **Hardshoulder management (HM)**
  - It can be combined with DLM
  - Hardshoulder running is set by specific

Dynamic Lane Management

Bologna A14 Motorway

Dynamic Hardshoulder / Lane Mgmt



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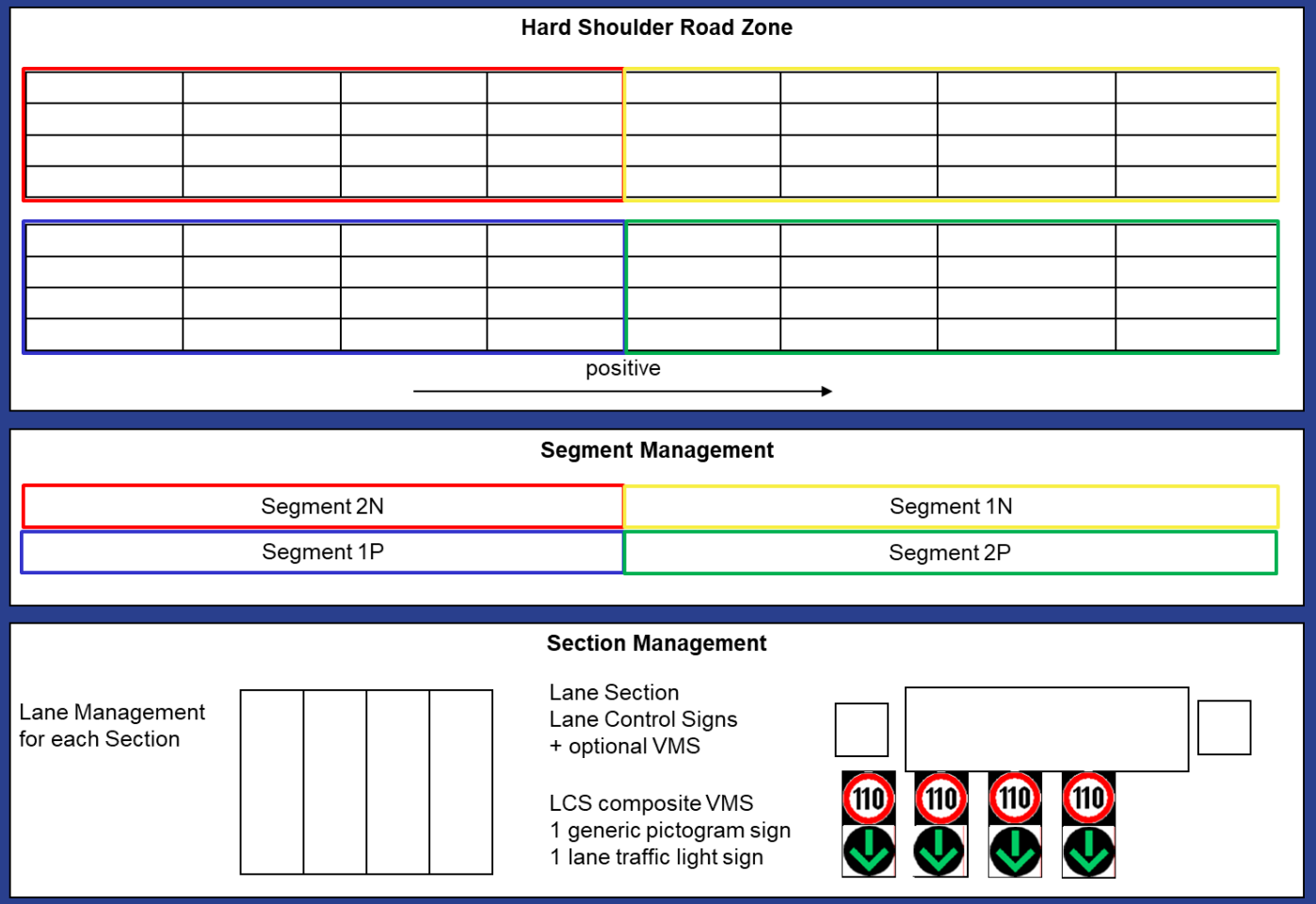
Lane Management Concepts



- **«Bologna» HM Zone**
- **Segments** bounded by
  - Bologna Casalecchio
  - Bologna Arcoveggio
  - Bologna S.Lazzaro
- Section and Lanes
  - Any 500m-800m based on road morphology
  - LCS and VMS alternated on the road

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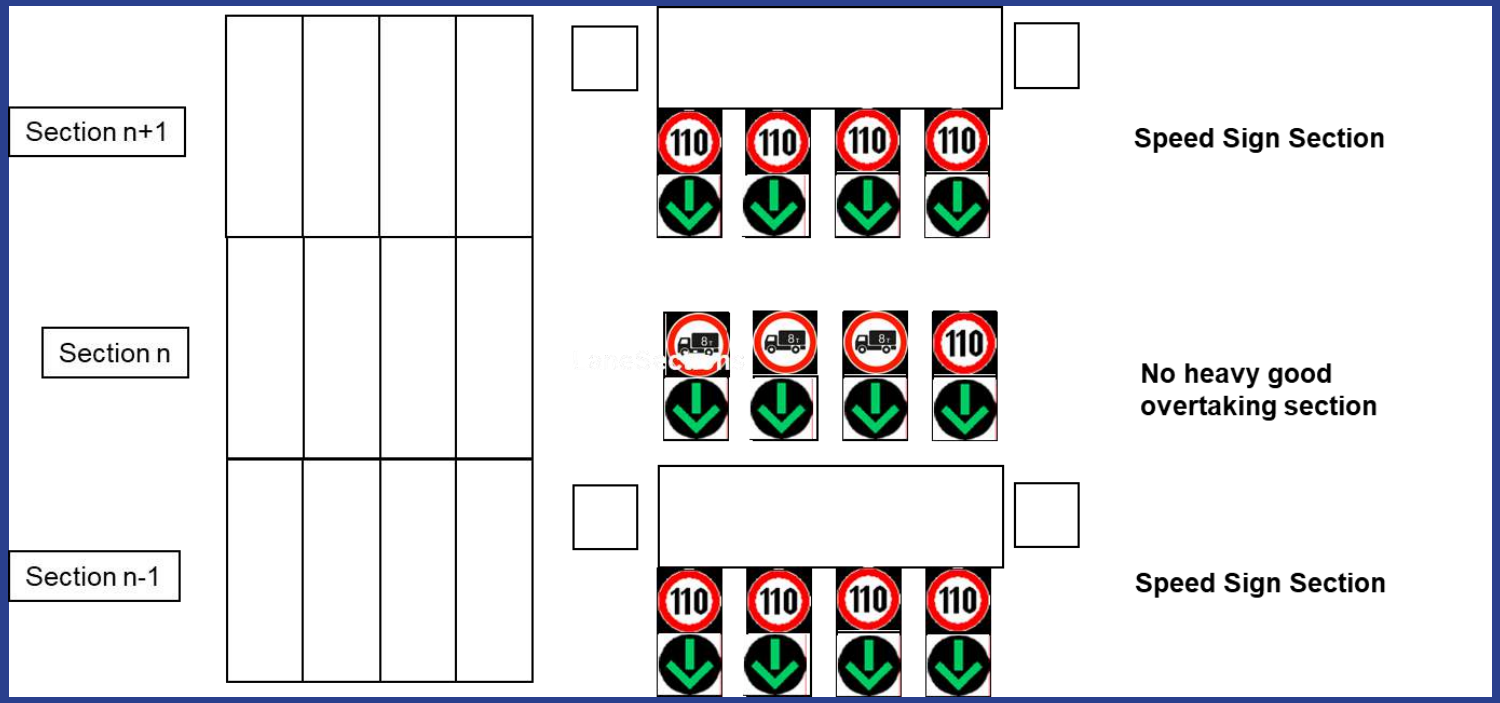
Dynamic Lane Management



- **Lane Sections management via Lane Control systems**
- **Per Lane Restrictions:**
  - Lane Speed Limit
  - Lane allowed vehicle: heavy good on 1° lane
- **VMS Information describing hardshoulder running / not running:**
  - 3 lanes avaliable
  - 4 lanes available

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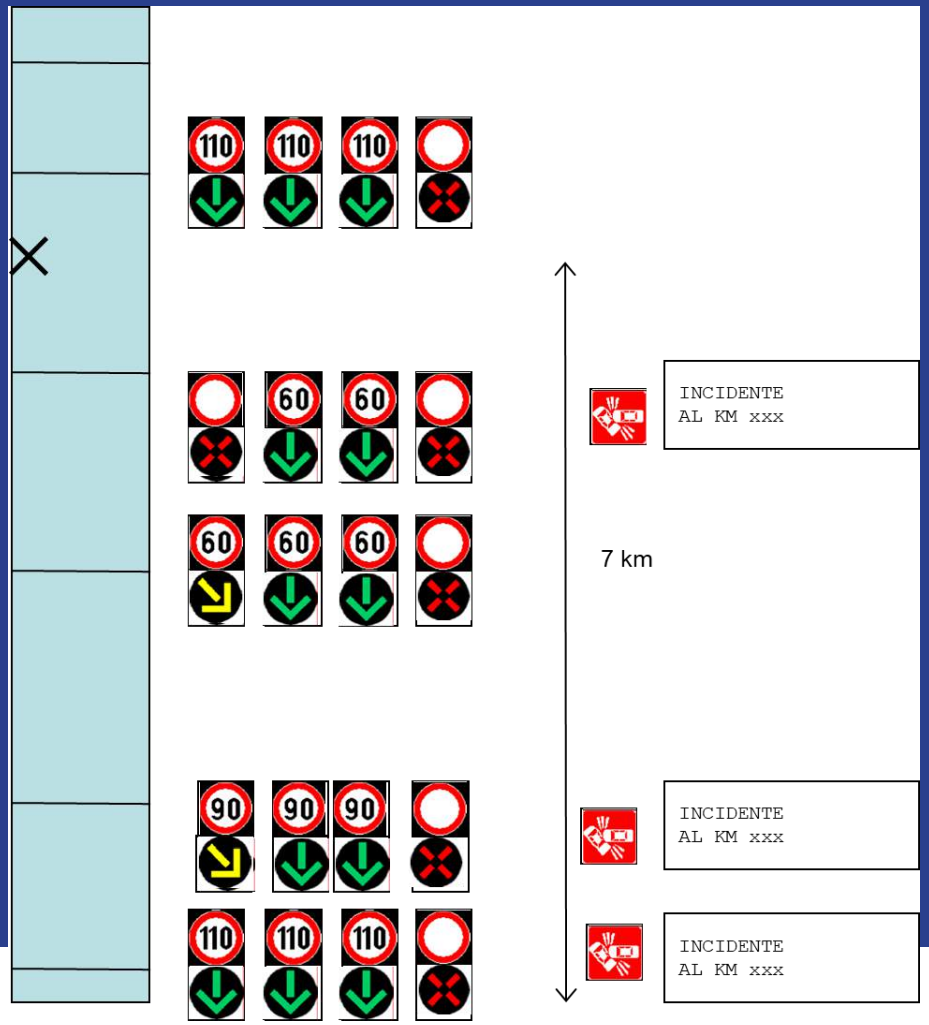
Accident: speed, lane status management



- Speed management
- Accident zone protection
  - Lanes deviated
  - Lanes closed
- LCS + VMS information

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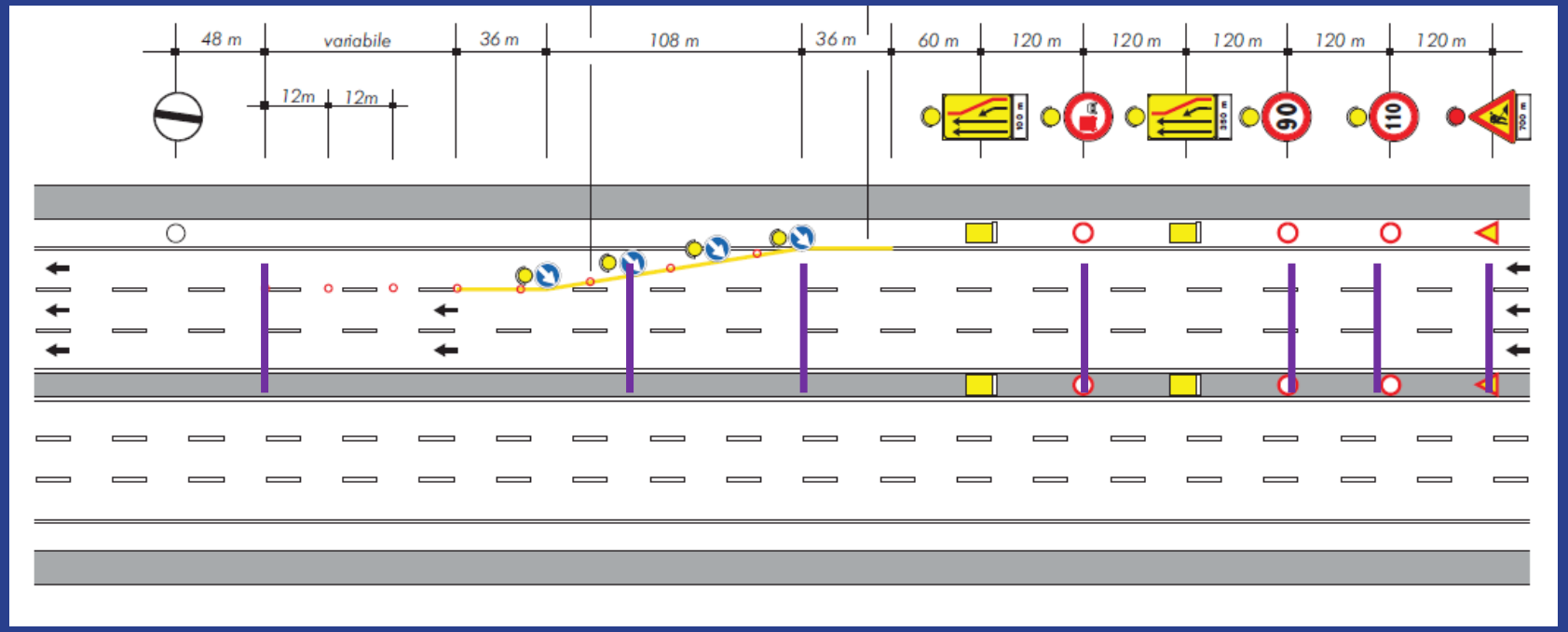
Lane Management use cases: roadworks

- **General roadwork management** along roads implies lane management

  Depending on road configuration and number of lanes, several options

  - closed
  - deviated
  - reduced width
  - alternated one way traffic
- Number of lanes lead to several option of lane configuration
  - Specific rules apply to grant level of services to different road types

Roadwork management



- **Roadwork Zone**
- **Sections** with homogenous management status
  - allowed speed / regulations
  - number of lanes
- **Lane** status
  - open
  - closed
  - deviated

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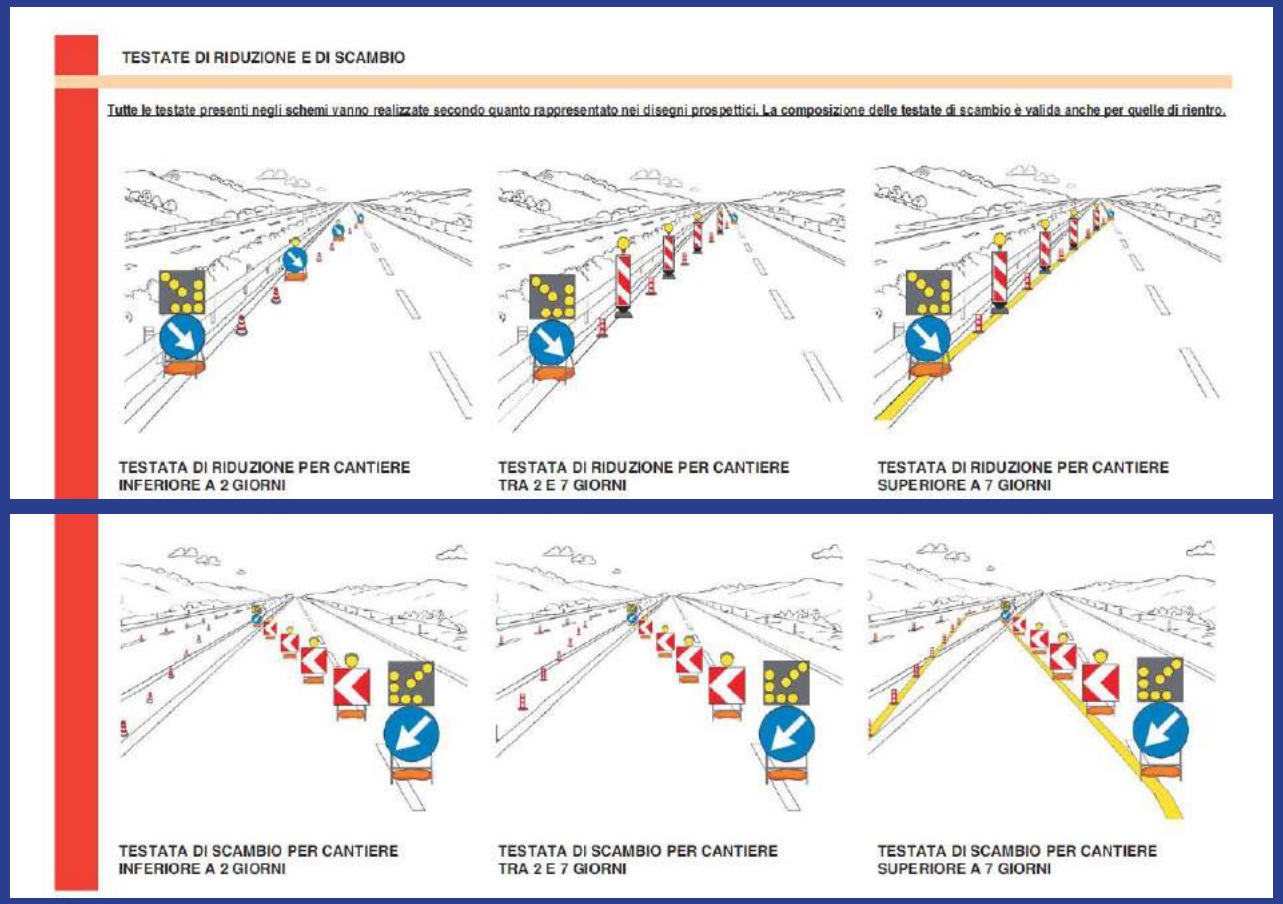
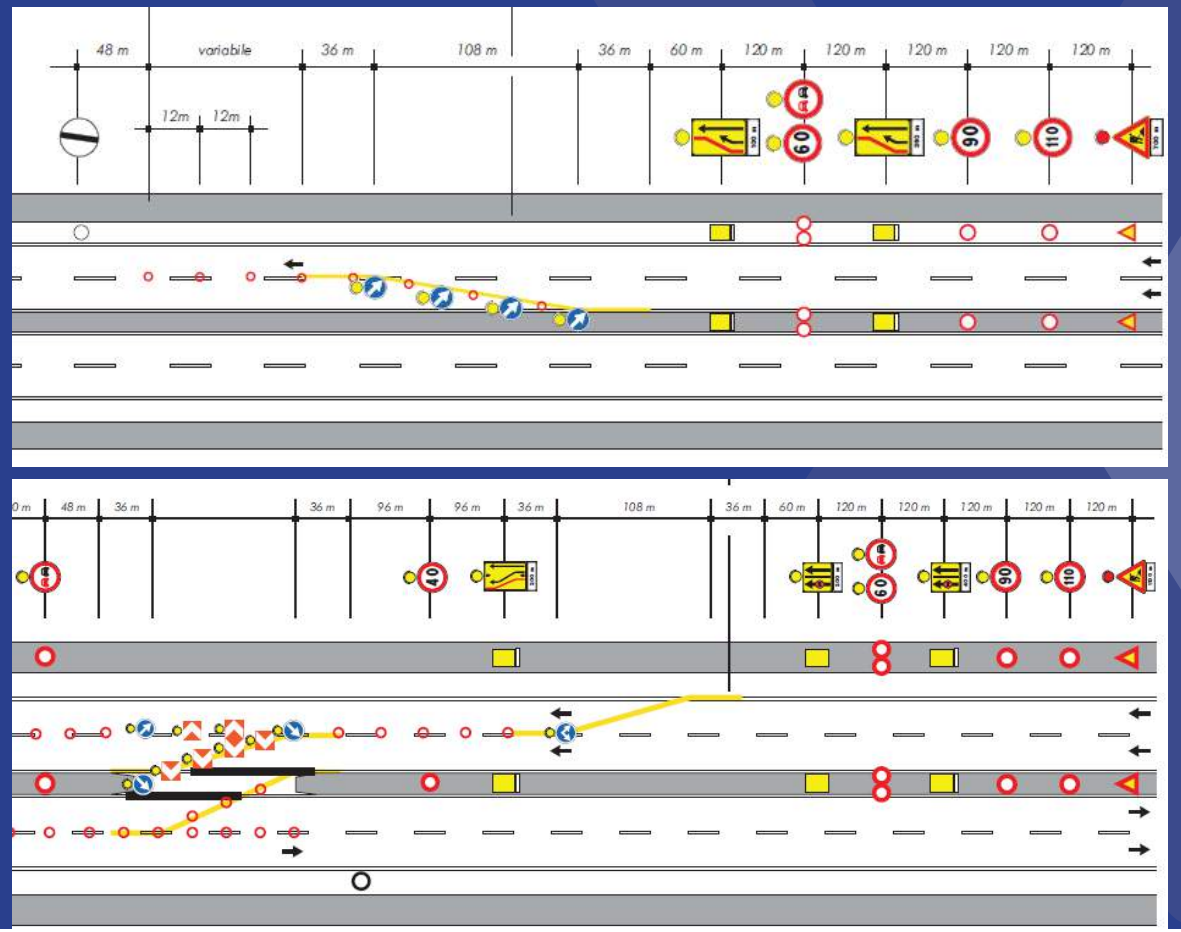
Roadwork layout and traffic regulations lane closures and deviations





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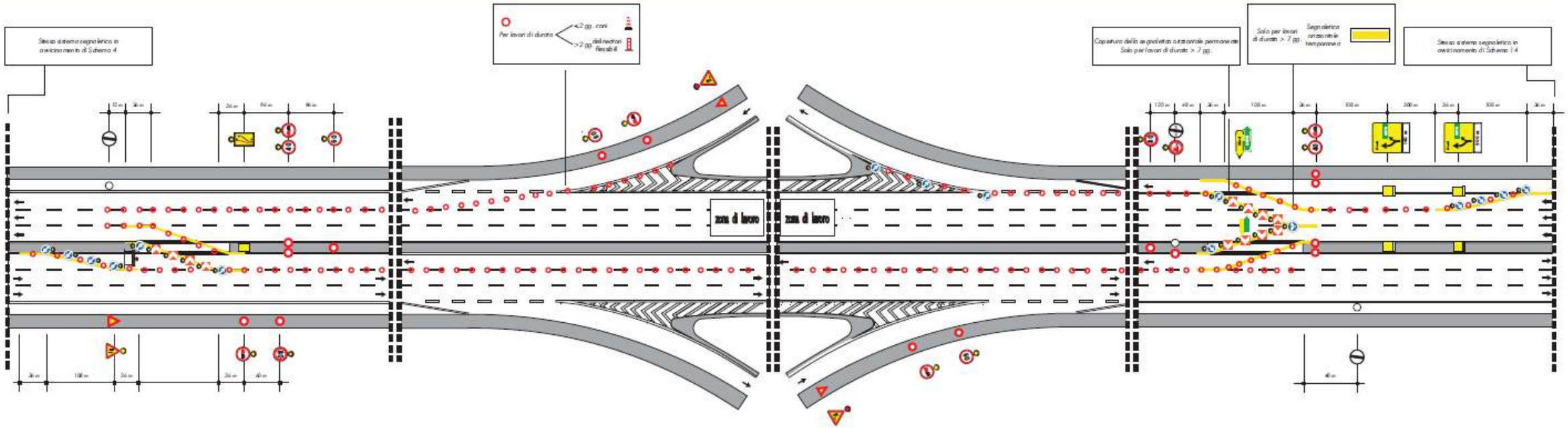
Closures and deviatons combination in complex interconnections

31 DEVIAZIONE PARZIALE IN ZONA DI SVINCOLO CON PRERESTRINGIMENTO

Schema



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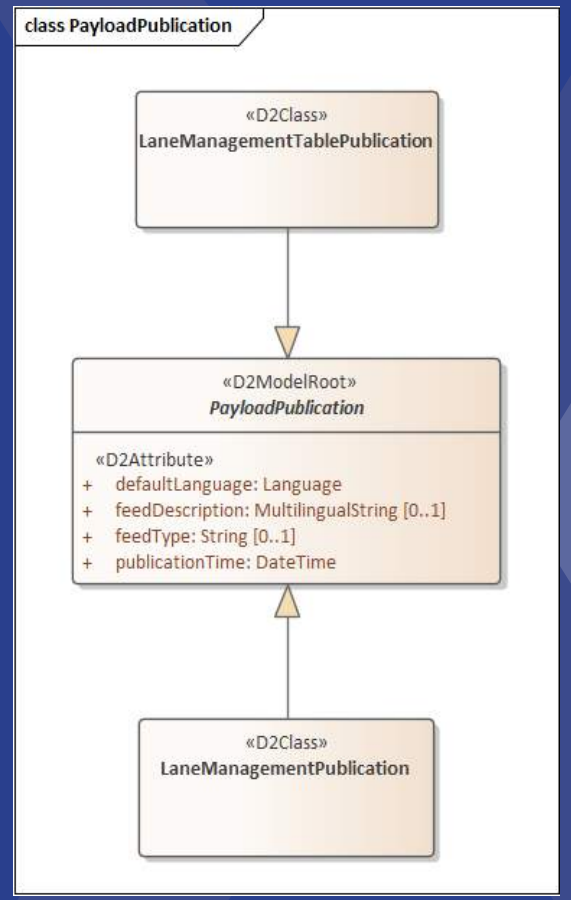
Lane Carriageway Model concept

- Both for roadworks and DLM/HM zones the Lane Management Model supports a **«natural» description of the road 'ALONG THE ROAD'** as it is seen developing on subsequent sections, e.g. by a vehicle moving along.
- Optimising the lane status information management based on the assumption of a structured location referencing per **segment / sections / lanes.**
  - **(Indexed Sections remind arrays in Traffic Flow TFP TPEG messages)**
- Describes the carriageway and lanes and their status setting as by road signs, VMS, LCS by:
  - **Lane Management Table Publication: Static definition possible for predefined zone for DLM / HM** with further publication for dynamic information
  - **Lane Management Publication : Dynamic definition and setting** for not predefined DLM/HM Zones



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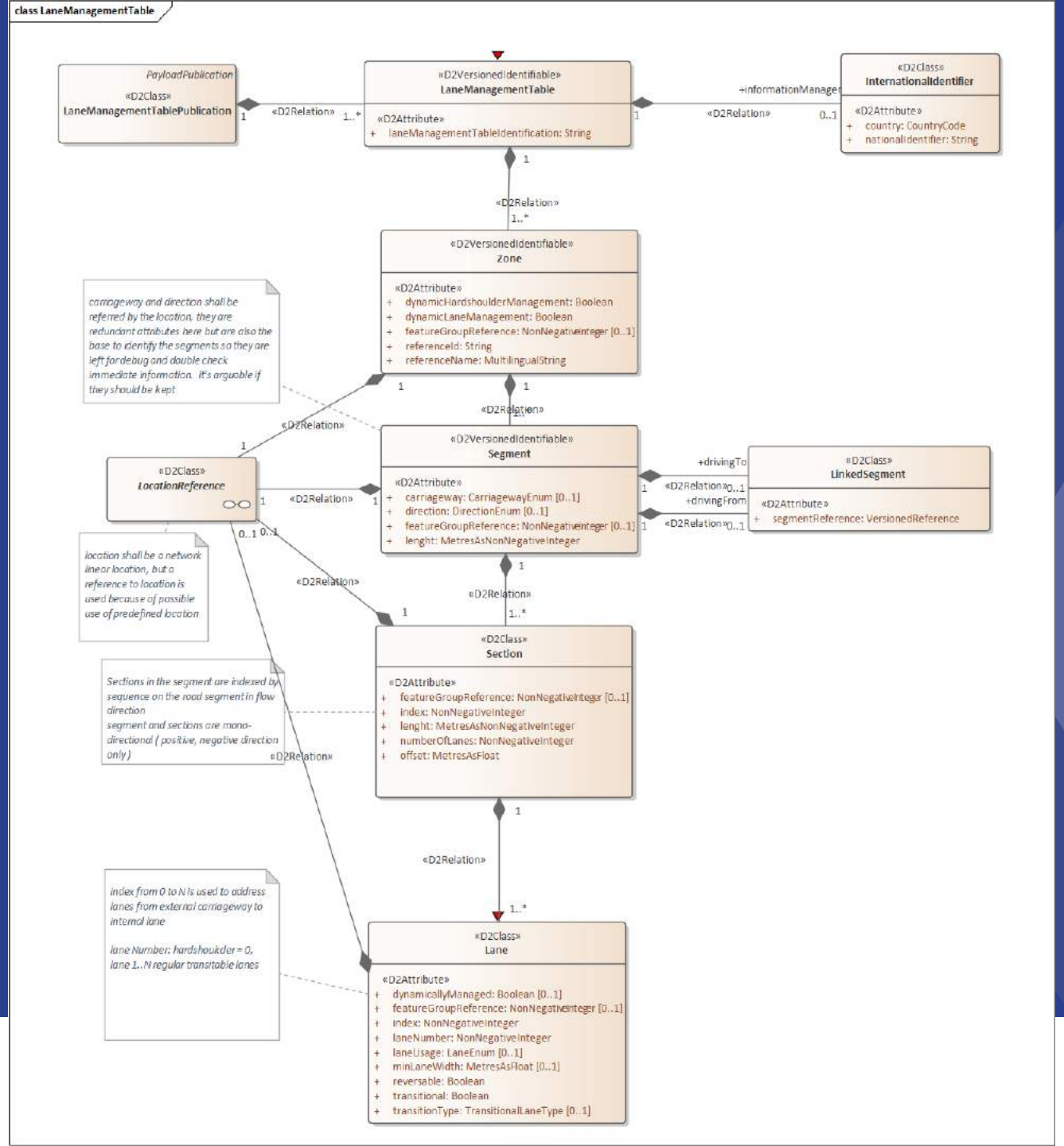
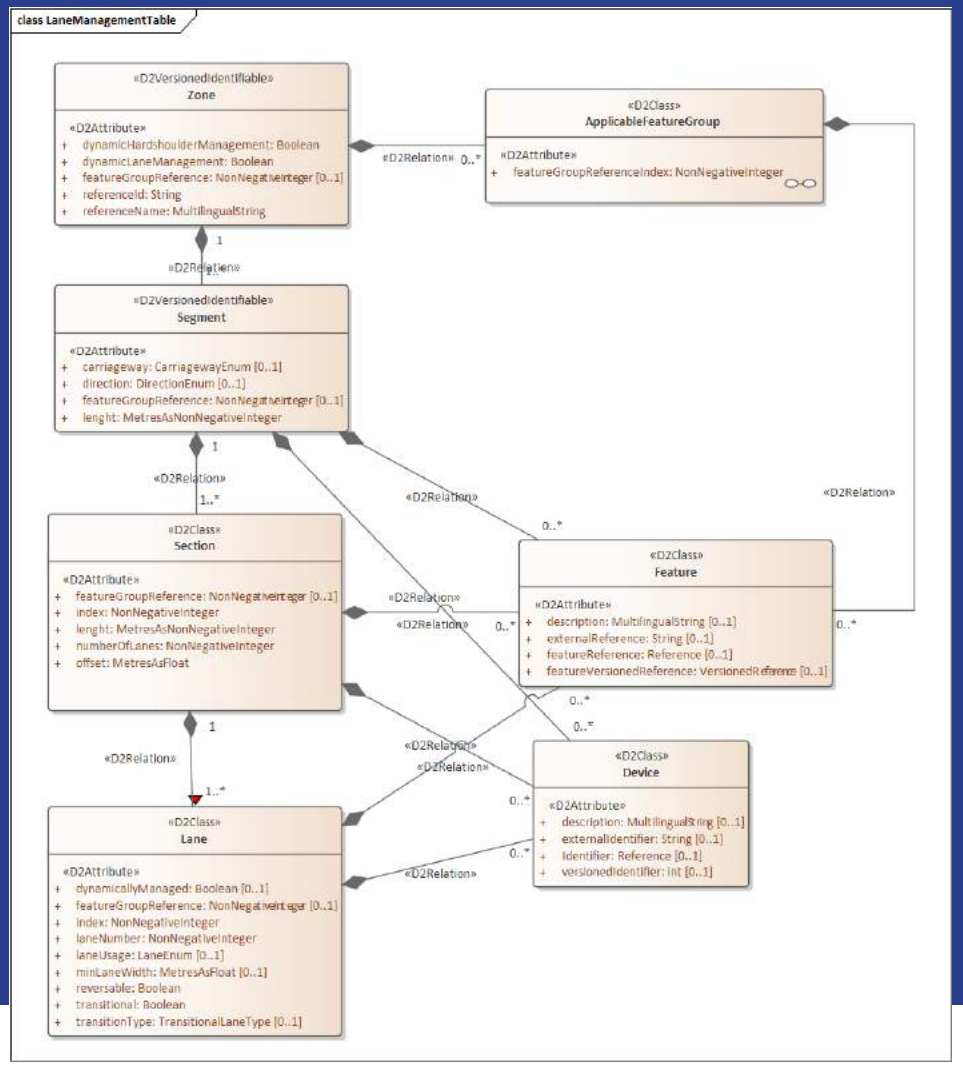
Lane Management Table 1/2

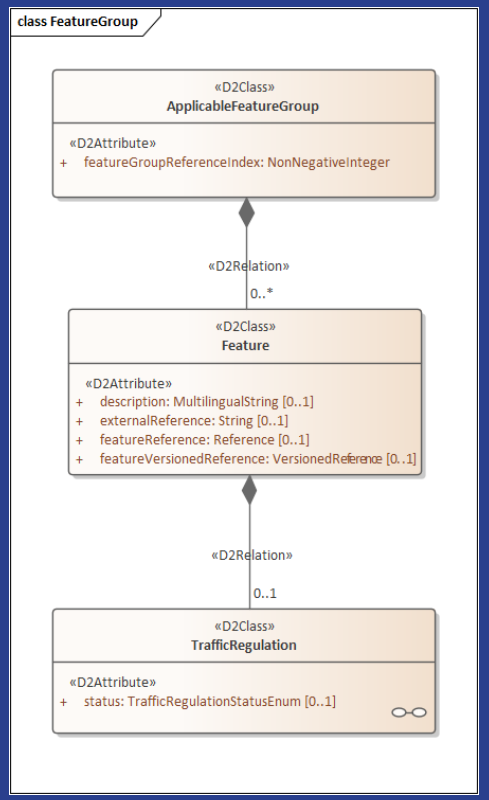
- Model enhanced location description by
  - Road, Carriageway and Lane
  - Lane Transition description
  - Split road inbound / outbound / interconnecting carriageways

- Morphology & Location
  - Zone & Segments
  - Sections & Lanes
    - Index referenced
    - Optional location, derived by Segment + offset
  - Linked Segments
  - Linked Lanes



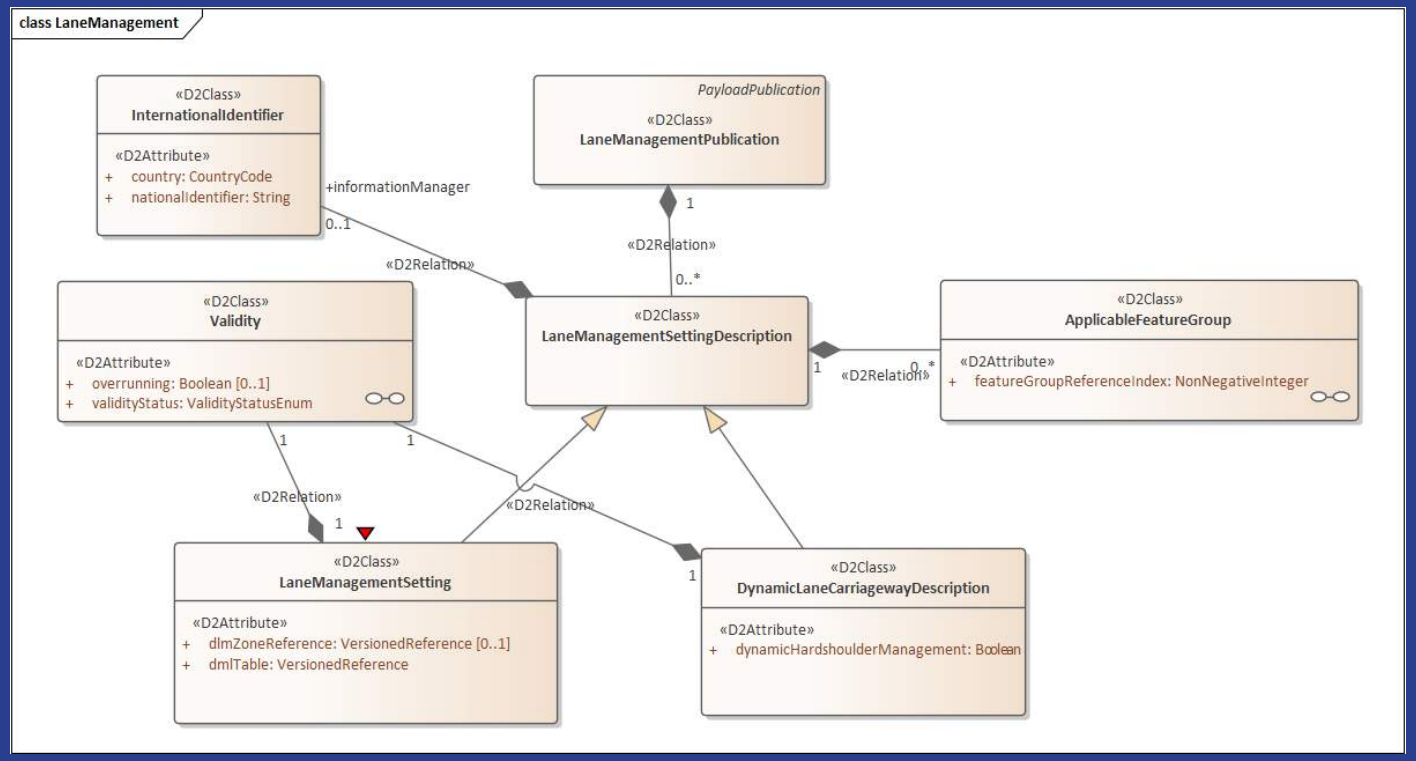
Lane management Table 2/2





- Per segment/section/lanes
  - Features
  - Devices
    - VMS, Sensors, LCS
- Features group
  - convenient to apply to several Segments, Sections, Lanes with similar features
- Static Features
  - Road characteristics in general, besides traffic regulation: road class level, support to ISAD level, ODD..

Lane Management Publication (dynamic)



- Validity
- Features group reusable
  - Static Table reference Setting
  - Dynamic Lane and Carriageway description for Roadworks
- LaneManagementSetting
  - DLM/HM Table reference
- DynamicLaneCarragewayDescriptio
  - on the fly configuration, e.g. roadworks

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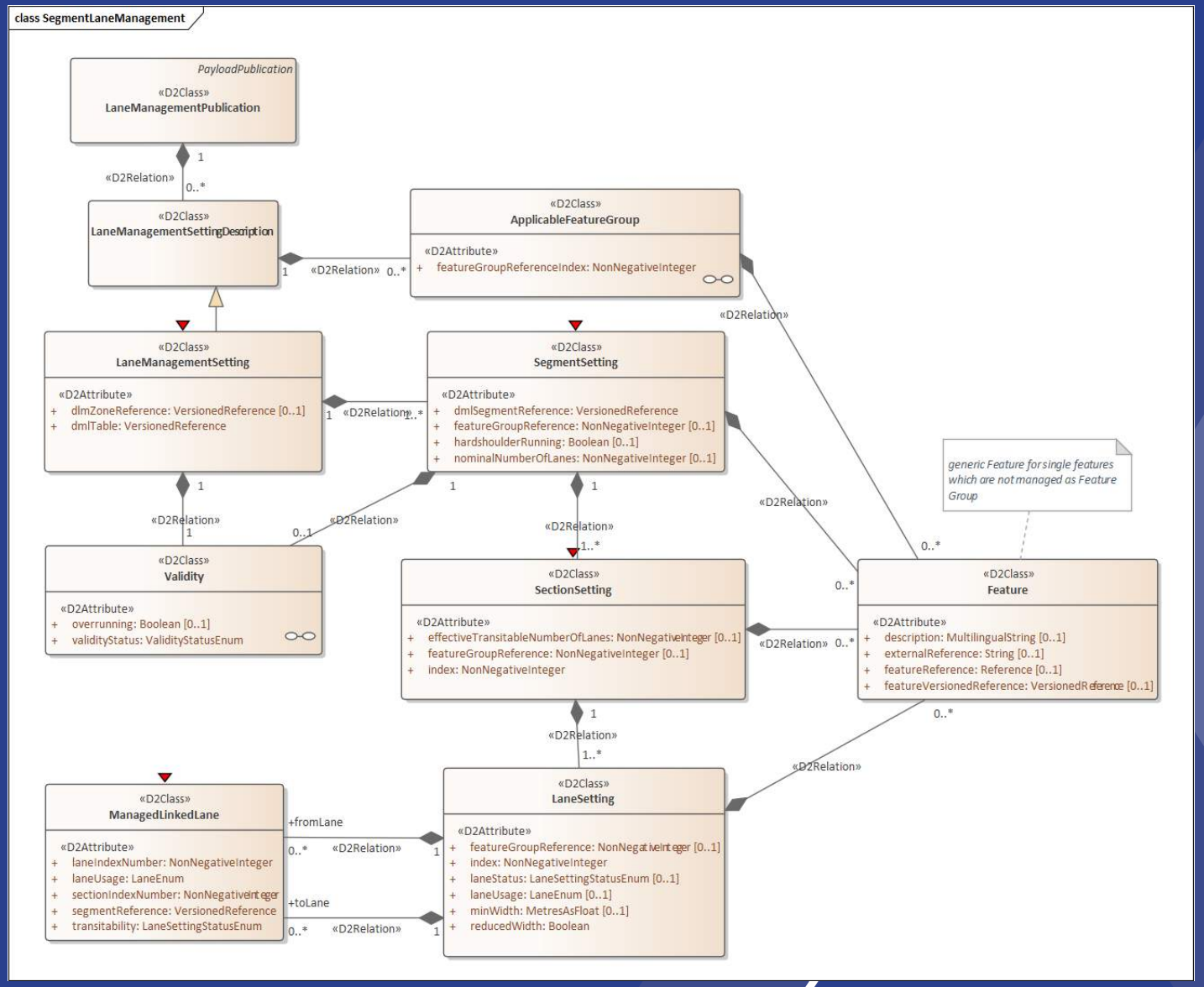
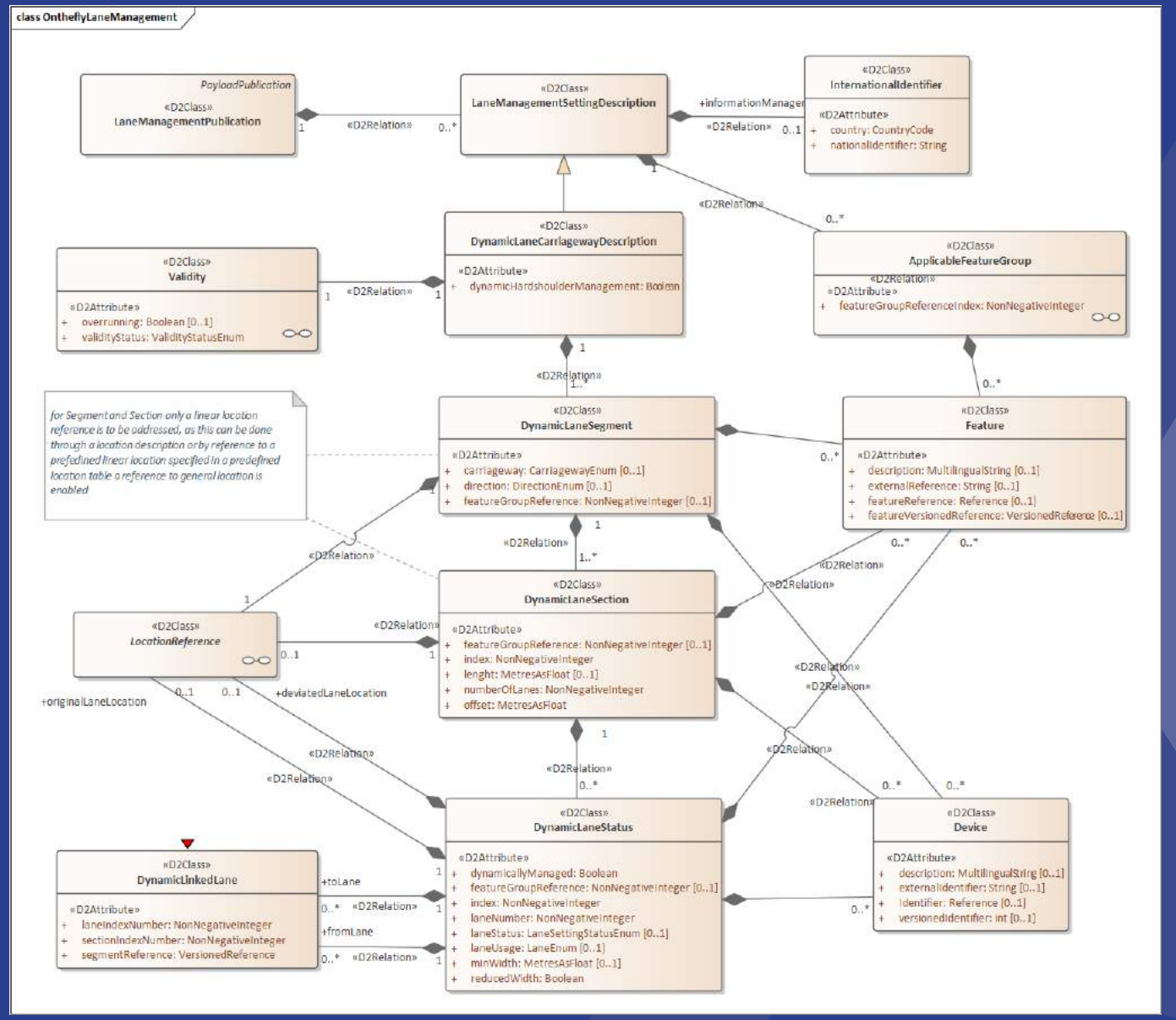
Lane Management Setting description

- Single applied Features
- Reusable Feature Group by reference
- Dynamic Status
  - Open
  - Closed
  - Left/Right Deviated
- Splitted / Merged Linked Lanes

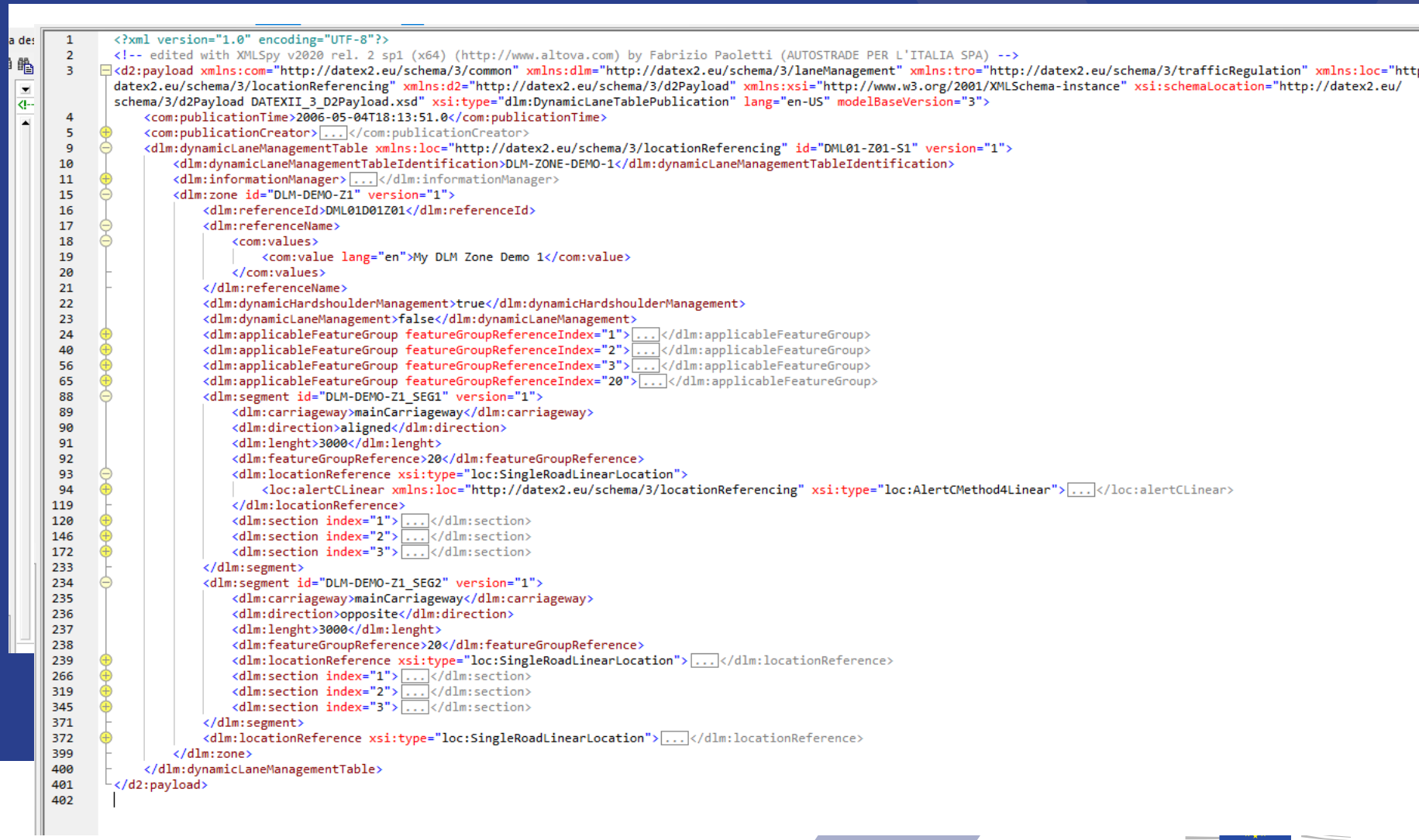


Dynamic Lane Carriageway Description

- **Location Referencing** to assess the morphology
- **Features**
- **Devices**
- **Dynamic information** as per DLM zone management



Sample DLM Zone



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                </com:values>
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            <dlm:applicableFeatureGroup featureGroupReferenceIndex="3">...</dlm:applicableFeatureGroup>
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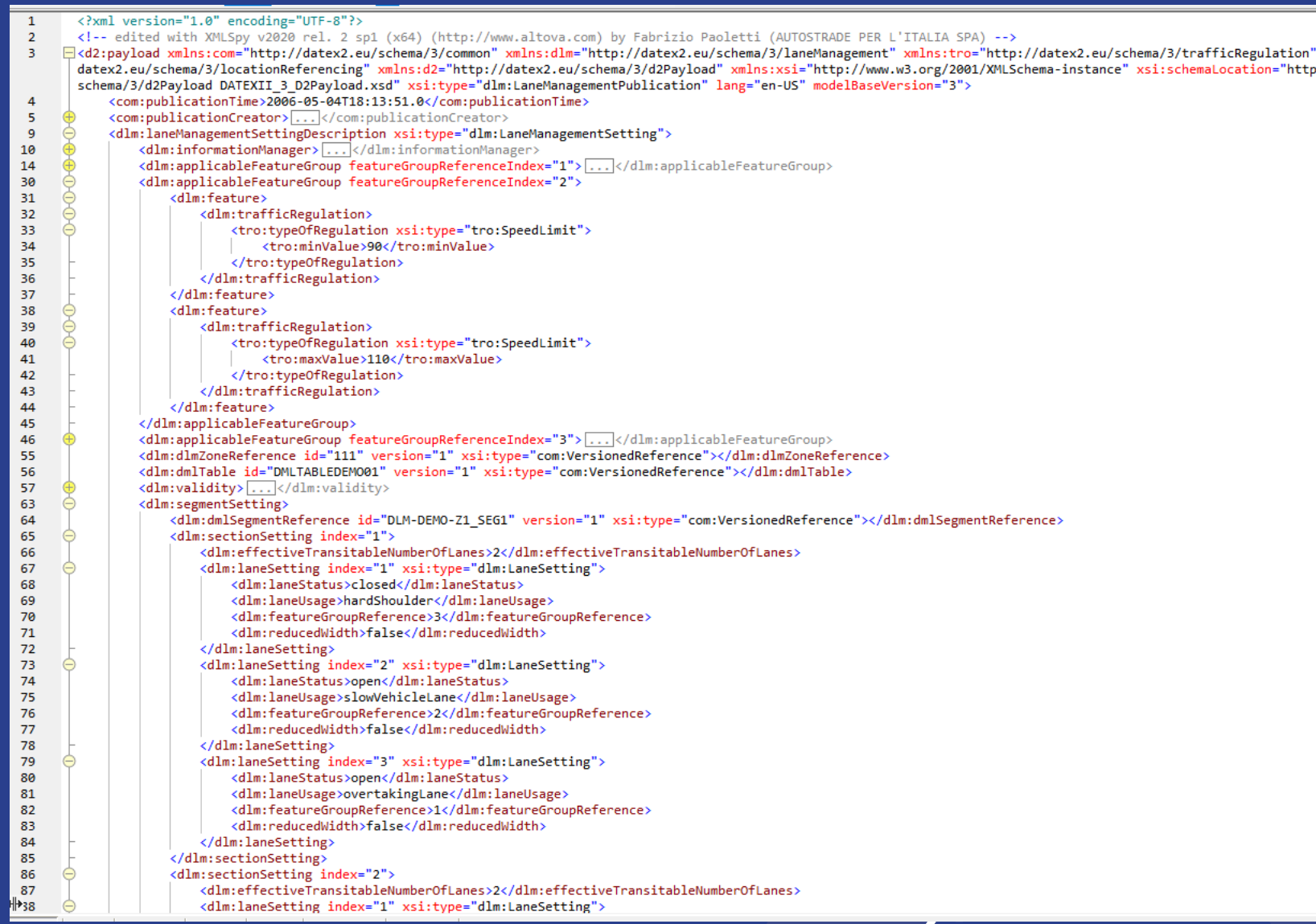
Sample DLM Zone dynamic setting



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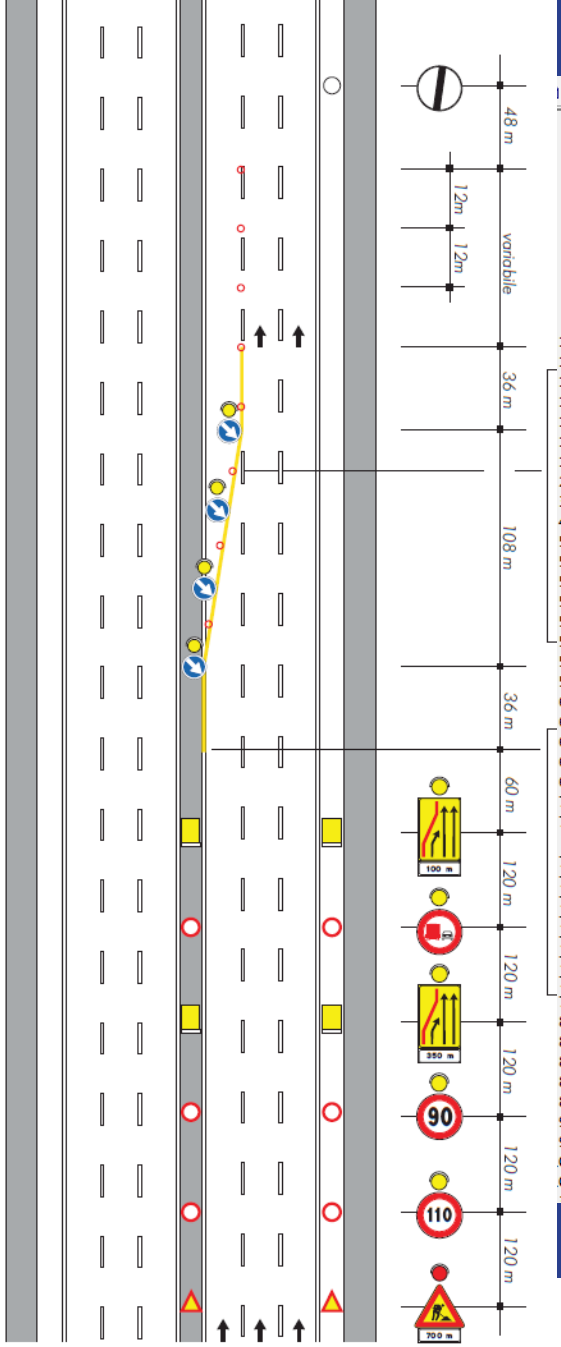
Roadworks Management

Overtaking lane closed

Speed reduction and deviated / closed lane

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2   <d2:payload xmlns:com="http://datex2.eu/schema/3/common" xmlns:dlm="http://datex2.eu/schema/3/laneManagement" xml
    datex2.eu/schema/3/locationReferencing" xmlns:d2="http://datex2.eu/schema/3/d2Payload" xmlns:xsi="http://www.w3.o
    schema/3/d2Payload DATEXII_3_D2Payload.xsd" xsi:type="dlm:LaneManagementPublication" lang="en-US" modelBaseVersio
3   <!--    sample of road works in a 3 lane motorway + hardshouder with lane 3 daviated and then closed and reduced
4   |       the location description refers to predefined location, otherwise location reference definition is to be
5   -->
6       <com:publicationTime>2006-05-04T18:13:51.0</com:publicationTime>
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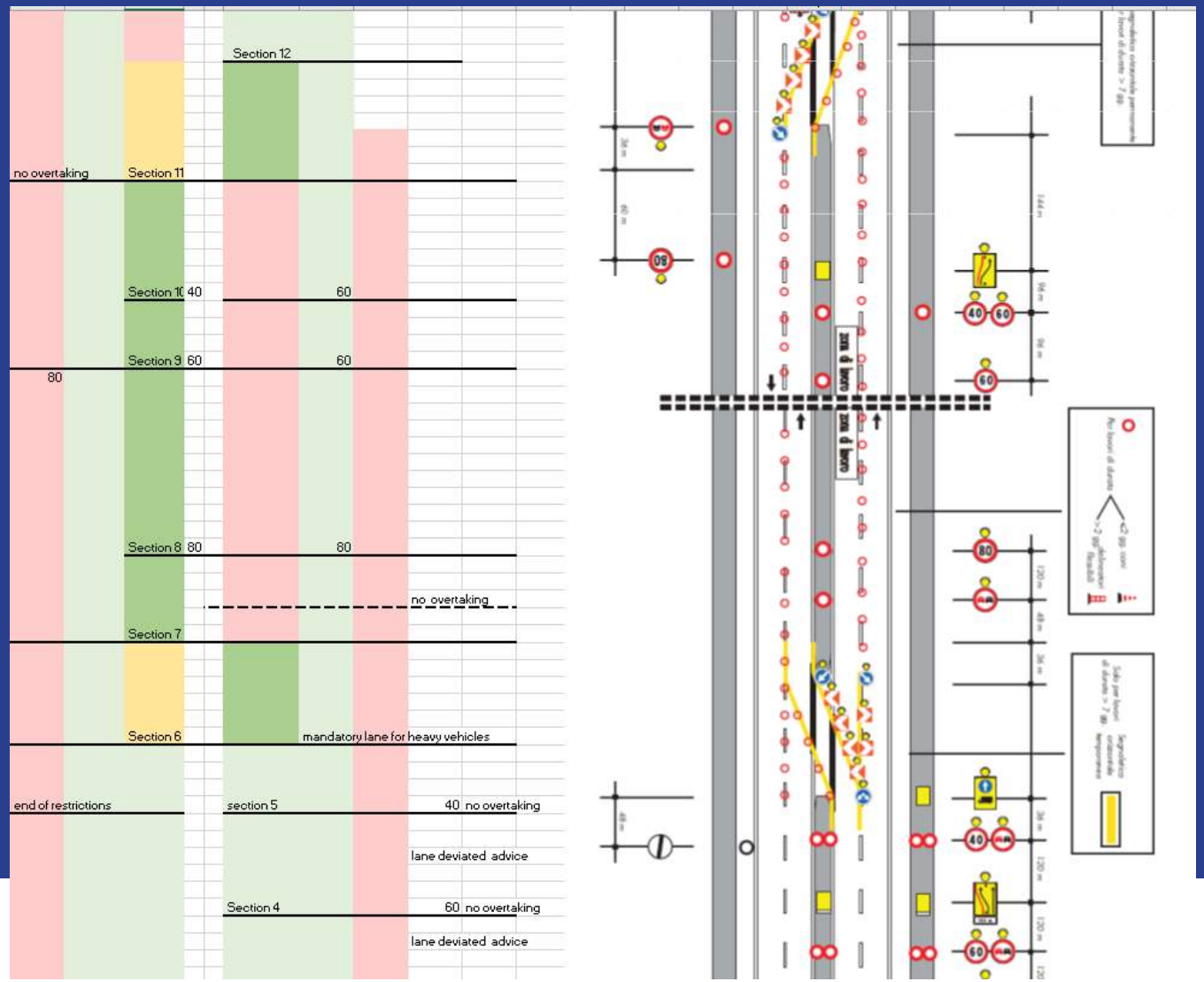
21st April 2021

Complex Y deviated lane



- Interactive XML visualisation

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Conclusions

- Roadworks management layout description has similar requirements and characteristics as for Dynamic Lane / Hardshoulder Management
- A compact unified modeling to manage Lane & Carriageway configuration has been designed to describe static configuration and dynamic lane managed setting.
  - Compact and optimised to derive C ITS DENM Roadwork and IVS messages
- Model to be published as proposed starting model and assessed against other possible usages
  - Describing road features / devices along the carriageway/ segment / sections
  - Could be used to support delivery of features such as ISAD / ODD levels in CAV / ADAS application

Thanks for listening

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DATEX II

6th Forum Webinar series

25th November 2020

European Commission