



**REPUBLIC OF LEBANON  
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION**

**ROADS ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA**

**TENDER DOCUMENTS**

**VOLUME 4  
TENDER DRAWINGS/MANUAL  
JANUARY 2024**

DRAWING No.  
GENERAL

DRAWING TITLE

GN-001	LOT 18-LIST OF DRAWINGS
GN-Z-002	LOT 18-CAZA OF ZAHLE-SCOPE OF WORKS LAYOUT PLAN

STANDARD DETAILS

PAVEMENT REPAIR DETAILS

DET-RM-01	PAVEMENT COMMON DEFECT TYPES-AND MAINTENANCE ACTION
DET-RM-02	ASPHALT SHALLOW PATCHING-GENERAL GUIDANCE
DET-RM-03	ASPHALT DEEP PATCHING-GENERAL GUIDANCE
DET-RM-04	PAVEMENT SURFACE PATCHING WORKS
DET-RM-05	PAVEMENT SHALLOW PATCHING WORKS
DET-RM-06	PAVEMENT DEEP PATCHING WORKS
DET-RM-07	PAVEMENT CRACK SEALING
DET-RM-08	SUNKEN TRENCH REPAIR
DET-RM-09	DAMAGED TRENCH REPAIR

CONCRETE & INCIDENTAL REPAIR DETAILS

DET-RM-10	ADJUSTING MANHOLE COVER & CLEANING PIPES
DET-RM-11	STONE MASONRY WALL REPAIR
DET-RM-12	CONCRETE SHALLOW PATCHING WITH STRUCTURAL MORTAR
DET-RM-13	CURB & GUTTER DETAILS
DET-RM-14	SAFETY BARRIERS DETAILS-CONCRETE SINGLE FACE NEW JERSEY
DET-RM-15	SAFETY BARRIERS DETAILS-CONCRETE DOUBLE FACE NEW JERSEY
DET-RM-16	SAFETY BARRIERS DETAILS-TYPE 1(SB1) & TERMINAL UNIT DETAILS
DET-RM-17	SAFETY BARRIERS DETAILS-TYPE 2(SB2) & TERMINAL UNIT DETAILS
DET-RM-18	SAFETY BARRIERS DETAILS-SAFETY BARRIERS DETAILS-STEEL GUARDRAIL (SHEET 1 OF 4)
DET-RM-19	SAFETY BARRIERS DETAILS-SAFETY BARRIERS DETAILS-STEEL GUARDRAIL (SHEET 2 OF 4)
DET-RM-20	SAFETY BARRIERS DETAILS-SAFETY BARRIERS DETAILS-STEEL GUARDRAIL (SHEET 3 OF 4)
DET-RM-21	SAFETY BARRIERS DETAILS-SAFETY BARRIERS DETAILS-STEEL GUARDRAIL (SHEET 4 OF 4)

TRAFFIC SAFETY & CONTROL DEVICES DETAILS

DET-SA-01	SIGNING & MARKING TYPICAL DETAILS-TEMPORARY SIGNS (SHEET 1 OF 2)
DET-SA-02	SIGNING & MARKING TYPICAL DETAILS-TEMPORARY SIGNS (SHEET 2 OF 2)
DET-SA-03	SIGNING & MARKING TYPICAL DETAILS-REGULAR MARKING
DET-SA-04	SIGNING & MARKING TYPICAL DETAILS-SPECIAL MARKING & REFLECTIVE DETAILS
DET-SA-05	SIGNING & MARKING TYPICAL DETAILS-SIGNS MOUNTING DETAILS
DET-SA-06	SIGNING & MARKING TYPICAL DETAILS-PEDESTRIAN CROSSING & SPEED HUMPS
DET-SA-07	SIGNING & MARKING TYPICAL DETAILS-SPEED LIMIT & DIRECTIONAL ROAD ARROW
DET-SA-08	TRAFFIC MANAGEMENT PLANS ON HIGHWAY TYPICAL LANE CLOSURE RIGHT SIDE (SHEET 1 OF 3)
DET-SA-09	TRAFFIC MANAGEMENT PLANS ON HIGHWAY TYPICAL LANE CLOSURE SHOULDER (SHEET 2 OF 3)
DET-SA-10	TRAFFIC MANAGEMENT PLANS ON HIGHWAY TYPICAL LANE CLOSURE LEFT SIDE (SHEET 3 OF 3)

QC	Ref: L2106D / 3824	
	Revision: 01	Date: January 2024
	<input type="checkbox"/> Draft	<input checked="" type="checkbox"/> Final
	Signature:	

KEY PLAN

NOTES

LEGEND

TENDER DRAWINGS/MANUAL

No.	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

LIST OF DRAWINGS

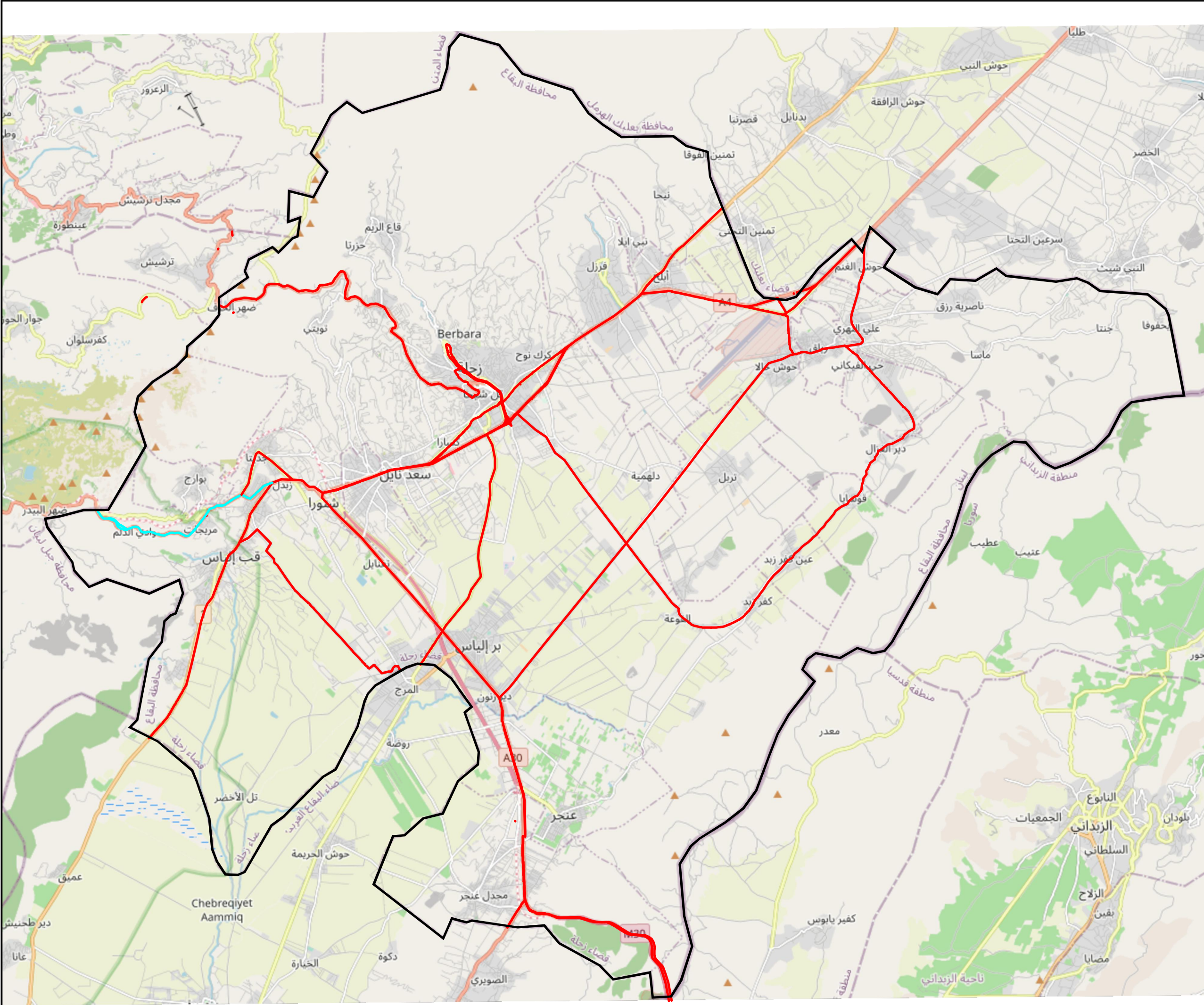
DATE January-2024

SCALE Not To Scale

Tender Drawings/Manual

DRAWING No.	REV
GN-001	00





KEY PLAN

NOTES

LEGEND

PRIMARY ROADS IN CAZA ZAHLE

HIGHWAY SECTION UNDER SCOPE OF WORKS

ZAHLE CAZA LIMIT

CADASTRAL LIMIT

TENDER DRAWINGS/MANUAL					
No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

PRIMARY ROADS LAYOUT PLAN  
ZAHLE CAZA

DATE January-2024

SCALE Not To Scale

Tender Drawings/Manual

DRAWING No. GN-Z-002

REV





# Pavement Common Defect Types & Maintenance Action



### Alligator Fatigue Cracks:

Is one of the most common types of failure that occurs in asphalt.  
**Fix:** In cases where the fatigue is considered medium & remains relatively stable, a shallow asphalt patching of the fatigued area can be applied. (BOQ item C1a)  
In the cases where the fatigue is more severe, the area should be saw cut-excavated or milled. The base layer should be repaired and the asphalt should be replaced. (BOQ item C1b)  
Use a straight edge to restore patch to existing roadway section.



### Rutting:

Ruts are channelized depressions in the wheel-tracks due to insufficient load bearing capability of the asphalt and base. It is caused by insufficient pavement thickness; lack of compaction of the asphalt during construction, stone base or soil; weak asphalt mixes; or moisture infiltration.  
**FIX:** If rutting is minor or has stabilized the depressions can be filled and overlaid. (BOQ item C1a)  
If severe, the rutted area should be totally removed and replace with suitable material. (BOQ item C1c)



### Bleeding:

Also called flushing, looks like a thin film of shiny reflective liquid or oil on the asphalt surface.  
**FIX:** If the bleeding is still minor do nothing but when the bleeding is more considerable ,mill off the top layer of asphalt and apply a new course of hot mix asphalt that contains a lower asphalt cement content. (BOQ item C1a)



### Raveling:

is the deterioration of pavement by the loss of asphalt and rocks.  
**FIX:** when the raveling is low (pavement just look old) do nothing, when it is high (The surface is very rough and has deep pits) If the raveling is present in only localized areas remove the raveled pavement and patch. For large areas of raveling (indicative of general asphalt failure) remove the damaged pavement and overlay. (BOQ items C1a or C1b)



### Edge Cracks:

Travel along the edge of a pavement surface within  $\frac{1}{4}$  or  $\frac{1}{2}$  meter.  
**FIX:** Crack treatment when medium (BOQ item C.3)  
or go for a deep patching with good fill if severe (BOQ item C.2).  
Notes: Check for adequate ditching to ensure there is no standing water. Vegetation must be cleared away from edge. (BOQ item B.1)



### Joint Reflection Cracks:

occur directly over the underlying cracks or joints.  
**Fix:** For less severe cracks (width less than 15 mm) crack sealing (BOQ item C2) will prevent the further entry of moisture into the sub-grade. If the cracks are more severe the removal of the cracked pavement layer followed by an overlay may be required. (BOQ item C1b)



### Slippage Cracks:

Are crescent-shaped cracks in the surface layer(s) of asphalt where the new material has slipped over the underlying course.  
**Fix:** If medium remove surface layer from around crack until good bond between layers is found and repave. (BOQ item C1a)  
If found severe proceed with a full asphalt recovery. (BOQ item C1b)



### Sunken Utility Trenches:

As shown in figure.  
**Fix:** Leveling (BOQ item C3a) or full depth patching (BOQ item C3b).  
**Note:** If a full depth patching is done, the backfill materials from the hole should be used if found good to re-fill the hole only under the base course level to avoid a future differential soil settlement and shall be well compacted in layers of 30cm.



### Block Cracks:

Look like large interconnected rectangles & is not load-associated.  
**Fix:** Less severe cracks measuring 15mm or less can be sealed to prevent moisture from entering into the sub grade. (BOQ item C2)  
More severe cracks should be fixed by removing the cracked pavement layer and replacing it with an overlay. (BOQ item C1b)



### Patches:

Are portions of the pavement that has been removed and replaced.  
**Fix:** for less sever cases a surface or shallow patches are enough (BOQ items C1a and C1b)  
for sever cases a in deep repair is needed (BOQ item C1c)



### Depressions:

Are localized surface areas with slightly lower elevations than the surrounding pavement. Depressions are very noticeable after a rain.  
**Fix:** Depending on its severity, the asphalt may have to be removed and replaced (severe)(BOQ item C1c). Less severe depressions can be fixed by applying a surface patch. (BOQ item C1a)  
**Note:** Check for any nearby and/or under beneath structure failures.



### Shoving/Corrugation:

Is the formation of ripples and bumps across a pavement. it occurs at locations having severe horizontal stresses caused where heavy traffic loads typically stop or start, such as intersections, and is typically caused by: excess asphalt; too much fine aggregate; rounded aggregate; too soft an asphalt; or a weak granular base.  
**FIX:** Partial repair (BOQ items C1a & C1b) or full depth patch (BOQ item C1c). The most common repair is to perform full-depth repair (C1b) ,this exposes the base, allowing for any base weaknesses to be detected/repared (C1c).



### Pot Holes:

Are what most people think of when they think of pavement failures  
**Fix:** for small pot holes (less than 30cm x 30cm) remove all distressed area to a depth of firm material and replace with the proper asphalt mix and compact (BOQ item C1b),  
medium severe pot holes be shallow patched in rectangular patches (BOQ item C1b)  
Severe pot holes should be saw cut around the entire failing area, excavated and base repaired, then proper placement of the asphalt. Reconstruction is only needed if base problems are the root source of the potholes. Extensive potholes may lead to area repairs or reclamation. (BOQ item C1c)



## NOTES

- For repairing details refer to general guidance & details drawings number DET-RM-02 to 09.

Defect	Intensity	Density		
		Less than 10%	11% to 50%	More than 50%
Alligator Fatigue Cracking	Low	Do nothing	Shallow patching	Shallow patching
	Medium	Deep patching	Deep patching	Deep patching
	High	Deep patching	Deep patching	Deep patching
Block Cracking	Low	Do nothing	Do nothing	Do nothing
	Medium	Crack sealing	Crack sealing	Shallow patching
	High	Shallow patching	Shallow patching	Shallow patching
Bad or Deteriorated Patch	Low	Do nothing	Do nothing	Do nothing
	Medium	Shallow patching	Shallow patching	Shallow patching
	High	Deep patching	Deep patching	Deep patching
Pot Holes	Low	Shallow patching	Shallow patching	Shallow patching
	Medium	Shallow patching	Shallow patching	Shallow patching
	High	Deep patching	Deep patching	Deep patching
Depression	Low	Do nothing	Do nothing	Do nothing
	Medium	Shallow patching	Shallow patching	Shallow patching
	High	Deep patching	Deep patching	Deep patching
Shoving/Corrugation	Low	Do nothing	Shallow patching	Shallow patching
	Medium	Deep patching	Deep patching	Deep patching
	High	Deep patching	Deep patching	Deep patching
Rutting	Low	Do nothing	Do nothing	Do nothing
	Medium	Shallow patching	Shallow patching	Shallow patching
	High	Deep patching	Deep patching	Deep patching
Asphalt Bleeding	Low	Do nothing	Do nothing	Do nothing
	Medium	Do nothing	Shallow patching	Shallow patching
	High	Shallow patching	Shallow patching	Shallow patching
Raveling	Low	Do nothing	Do nothing	Do nothing
	Medium	Shallow patching	Shallow patching	Shallow patching
	High	Shallow patching	Shallow patching	Shallow patching
Edge Cracks	Low	Do nothing	Do nothing	Do nothing
	Medium	Crack sealing	Shallow patching	Shallow patching
	High	Deep patching	Deep patching	Deep patching
Reflection Cracks	Low	Do nothing	Do nothing	Do nothing
	Medium	Crack sealing	Crack sealing	Crack sealing
	High	Shallow patching	Shallow patching	Shallow patching
Slippage Cracks	Low	Do nothing	Do nothing	Do nothing
	Medium	Shallow patching	Shallow patching	Shallow patching
	High	Deep patching	Deep patching	Deep patching

## TENDER DRAWINGS/MANUAL

## REPUBLIC OF LEBANON

## COUNCIL FOR DEVELOPMENT AND CONSTRUCTION

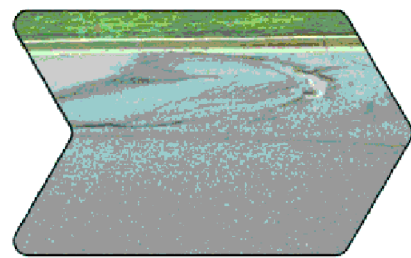
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS

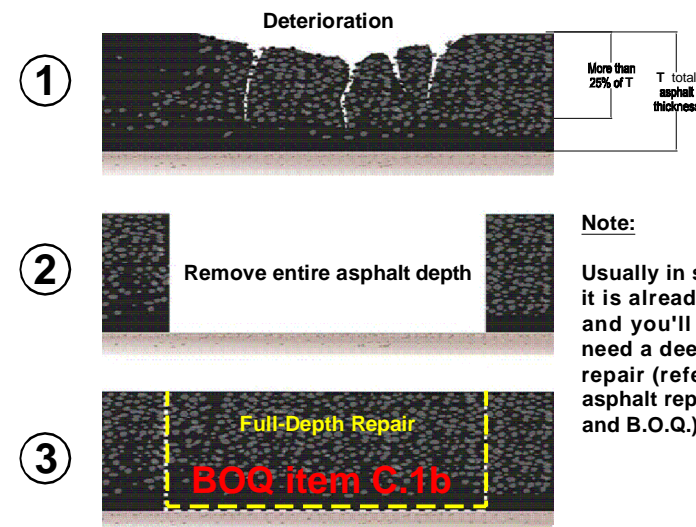
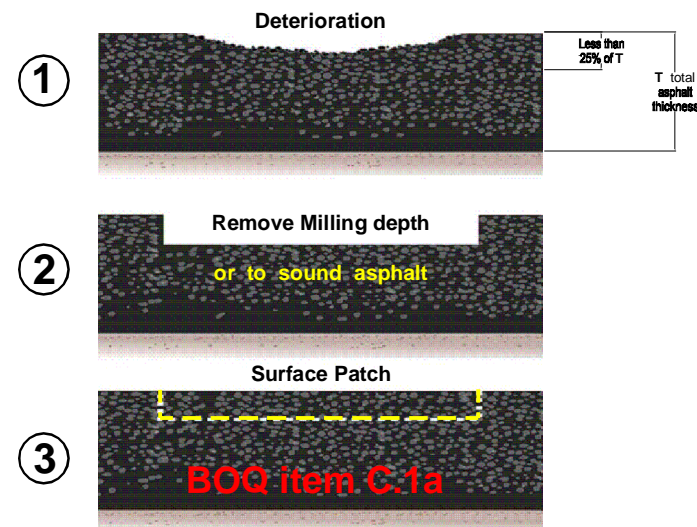
PAVEMENT COMMON DEFECT TYPES  
AND MAINTENANCE ACTION

DATE January-2024  
SCALE As Shown  
Tender Drawings/Manual  
DRAWING No. DET-RM-01  
REV 00



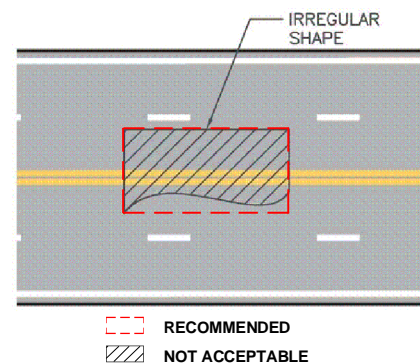
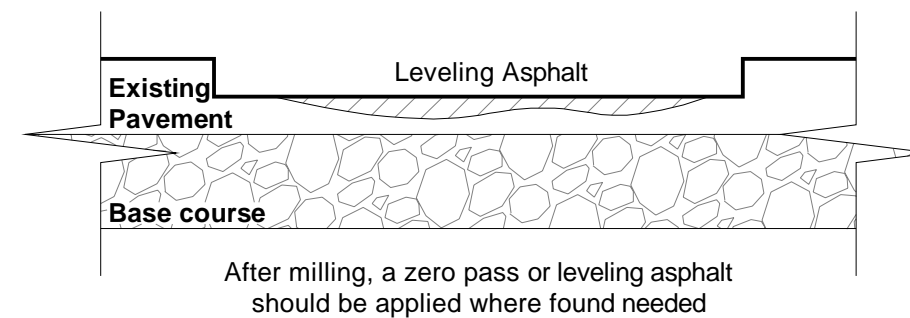


## Asphalt Surface/Shallow Patching (BOQ items C1a & C1b): Raveling, Bleeding, Slippage Cracks, Sunken Trenches Corrugations (if base material not responsible), Reflection Cracks, Medium Rutting, Medium Depressions

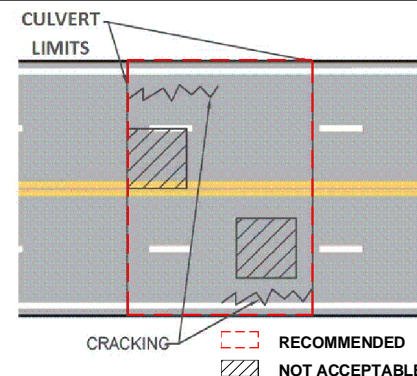


### Note:

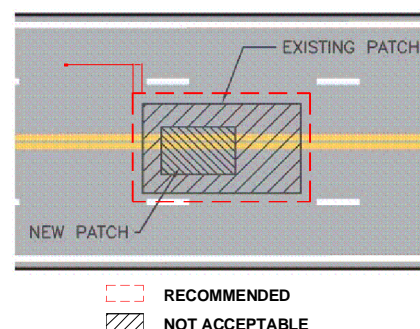
Usually in such case it is already too late and you'll probably need a deep asphalt repair (refer to deep asphalt repair details and B.O.Q.)



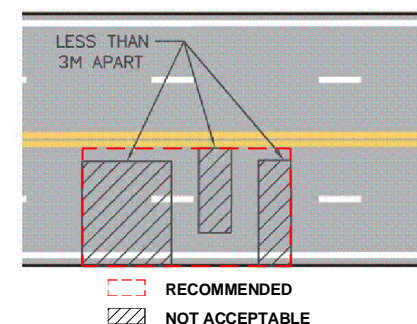
Existing pavements should be removed to clean, straight lines parallel and perpendicular to the flow of traffic. Do not construct patches with angled sides and irregular shapes. Asphalt and concrete pavements should be removed by saw cutting or grinding. Avoid breaking away the edges of the existing pavement or damaging the remaining pavement with heavy construction equipment.



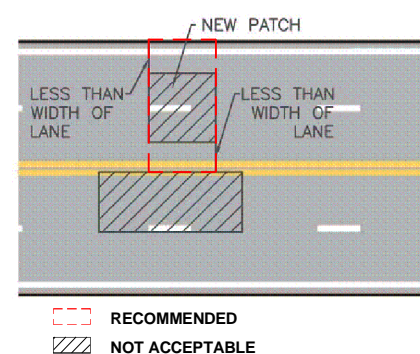
In the case of shallow culverts reflection cracks can not be fixed by shallow patching, however a shallow patching covering the whole culvert may be the only possible repair way and is therefore considered as temporary and is to be repeated again when needed



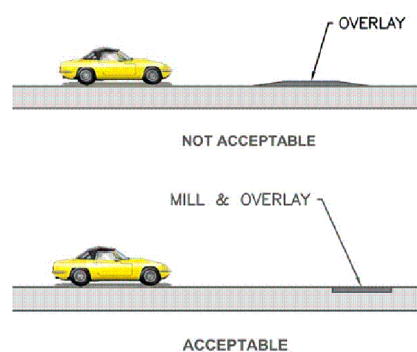
Avoid patches within existing patches. If this cannot be avoided, make the boundaries of the patches coincide.



In the case of a series of patches, repair the pavement over the patches by grinding and overlay when the spacing between the patches is less than 3 meters.



Do not leave strips of pavement less than one-half lane in width from the edge of the new patch to the edge of an existing patch or the lip of the gutter.



Completed street repairs should have rideability at least as good as, if not better than, the pavement prior to the repairs. An overlay to be avoided in located areas.

### NOTES

- If there are many areas requiring skin patching and / or leveling in one section, consider rebuilding the road section. Applying an overlay patch will not fix the problem.
- Mill and fill patches should be used to permanently repair pavement failures where the cause is determined to be in the asphalt and not the base.
- A mill and fill patch is the same as the rehabilitation option, simply done on a smaller scale.
- Large sections of mill and fill become a rehabilitation option and should not be pursued.
- Surface tolerances for street repairs should meet the standard for new construction.
- Factors influencing the performance of these repairs include:

- 1) The climate, pavement material, soil conditions, traffic and repair techniques.
- 2) Poor construction techniques can damage the area adjacent to repair and further degrade the patch and surrounding pavement.
- 3) Poor performance of these repairs tends to be a result of inadequate compaction of the materials, insufficient thickness of materials, poor quality of materials.
- 4) To take advantage of the layering effects of a flexible pavement, the compacted base course and surface asphalt should be extended at least 0.5 m from the edge of a trench.

### TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

### REPUBLIC OF LEBANON

### COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

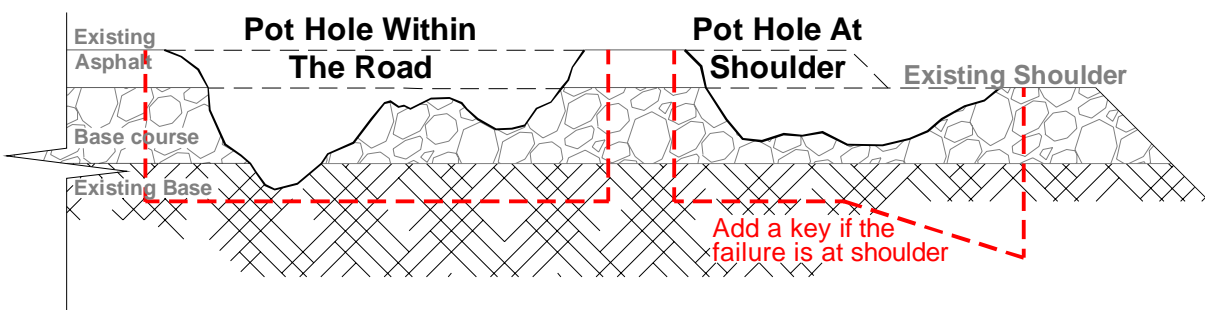
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS	DATE January-2024
PAVEMENT REPAIR DETAILS	SCALE As Shown
ASPHALT SHALLOW PATCHING GENERAL GUIDANCE	Tender Drawings/Manual
DRAWING No. DET-RM-02	REV 00





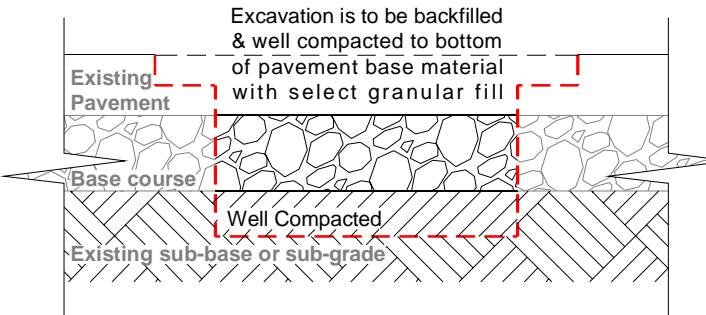
**Asphalt Deep Patching (BOQ item C1c): Alligator Cracks (medium+), Pot Holes, Failed Trenches Corrugations (if base material responsible), All Layers Slippage, High Rutting, High Depressions**



Clean and trim to rectangular lines and vertical faces

**Remark:**

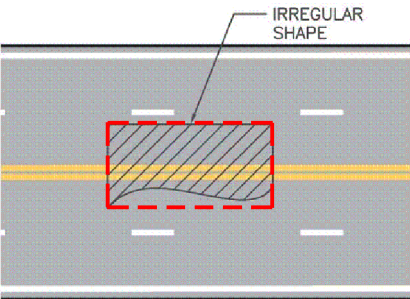
When you're filling potholes & repairing major cracks it is probably too late for maintenance. It's not uncommon to have multiple failures overlapping, especially alligator cracking & surface deformations.



Area to be repaired is to be excavated to depth that is sufficient to remove existing failed base materials & any underlying unsuitable materials. As for pavement sub-base repair, any depth of repair area must to be included in the "Asphalt deep patching" global price.

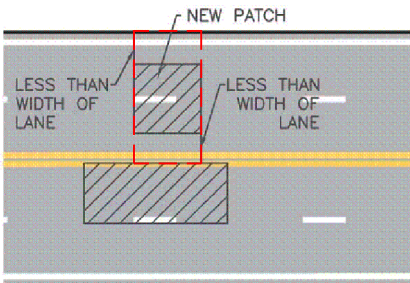
**Note:**

In case a small potholes (30x30cm for example) caused by surface damage to asphalt and where the base course is still intact with no corrugation or damages to the surrounding asphalt, repair works must be limited to full hole refill with asphalt followed by a good compaction.



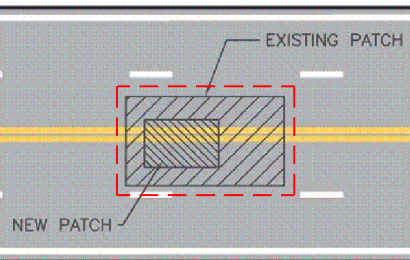
RECOMMENDED  
NOT ACCEPTABLE

Outer limits of existing pavement area to be repaired or replaced are to be saw cut along neat lines, and to full depth of pavement with diamond blade saw, edge is to be clean, dry and shaped so that square shoulder is provided in direction of traffic. Existing pavement section is to be excavated to neat lines, removed and properly disposed of. Care is to be taken to prevent any undermining of adjacent pavement section or damage from occurring to finished top course of adjacent pavement. Pavement section is to be constructed on sound thoroughly compacted sub-base. Repair and thoroughly compact pavement sub-base as necessary. For small areas, either hand operated vibrating tamper or power jumping jack may be used for compaction purposes.



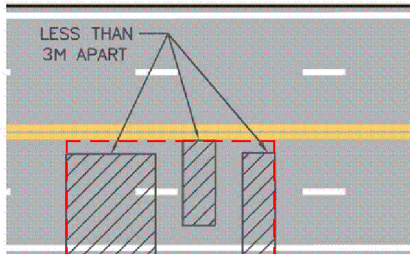
RECOMMENDED  
NOT ACCEPTABLE

Do not leave strips of pavement less than one-half lane in width from the edge of the new patch to the edge of an existing patch or the lip of the gutter. complete the patch with mill-repaves as shown in red.



RECOMMENDED  
NOT ACCEPTABLE

In case of repairing damaged or inadequate previous patches, avoid patches within existing patches. consider repairing the entire patch with extra minimum of 0.5m from each side.



RECOMMENDED  
NOT ACCEPTABLE

In the case of a series of patches, repair the pavement over the patches by grinding and overlay when the spacing between the patches is less than 3 meters.

**NOTES**

- Works consists of repair in deep of small sections of existing pavement base, or replacement of existing pavement section over utility trenches, as required & as directed by the engineer.
- Base/sub-base materials are to be reused only in utilities trenches backfilling (not in the base course layer) where the deterioration cause was found in compaction only.
- If there are many areas requiring deep asphalt repair in one section, consider rebuilding the road section. Applying several consecutive deep patching is not advisable.
- Deep asphalt patching should be used to permanently repair pavement failures where the cause is determined to be in the base materials.
- Large sections of deep patching become a rehabilitation option and should not be pursued.
- Surface tolerances for street repairs should meet the standard for new construction.
- Factors influencing the performance of these repairs include: The climate, pavement material, soil conditions, traffic and repair techniques.
- Poor construction techniques can damage the area adjacent to repair and further degrade the patch and surrounding pavement.

**TENDER DRAWINGS/MANUAL**

No	DATE	REVISION	DESCRIPTION	CHECKED	P. MANAGER

**REPUBLIC OF LEBANON**

**COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION**

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS

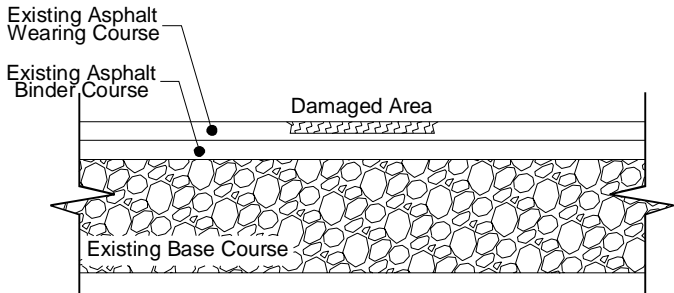
ASPHALT DEEP PATCHING  
GENERAL GUIDANCE

DATE January-2024  
SCALE As Shown  
Tender Drawings/Manual  
DRAWING No. DET-RM-03  
REV 00

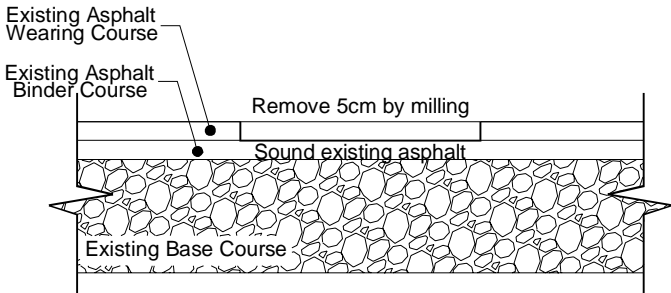
PAVEMENT REPAIR WORKS:

B.O.Q. Item C1a: Surface Patching Works  
including milling, tack coat, asphalt wearing course (one layer 5cm)

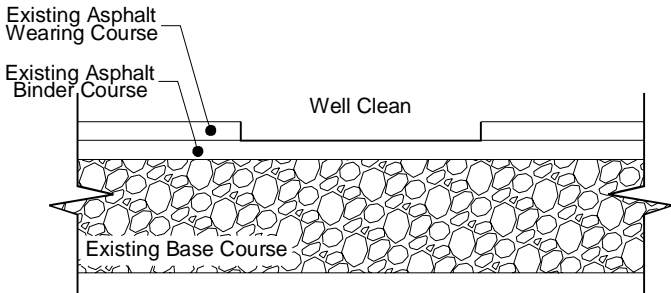
Step -1  
Locate the damaged area



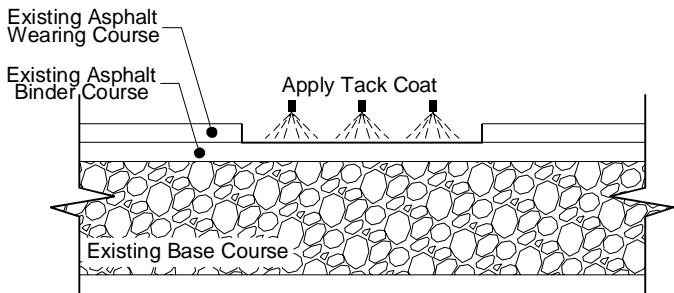
Step -2  
Mill 5cm in slightly larger rectangular shapes parallel to the traffic direction



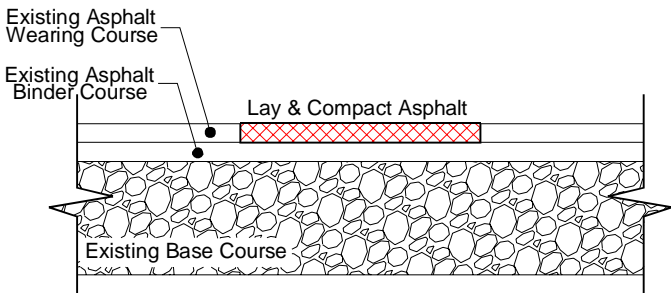
Step -3  
Well clean and check the milled area  
if found damaged remove the full asphalt  
and proceed with shallow patching works



Step -4  
Apply tack coat to surface and edges



Step -5  
Lay and compact wearing course asphalt



NOTES

- Refer to general guidance details Drawings number DET-RM-01 to 03.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS

DATE January-2024  
SCALE As Shown

PAVEMENT SURFACE PATCHING WORKS

Tender Drawings/Manual  
DRAWING No. DET-RM-04  
REV 00



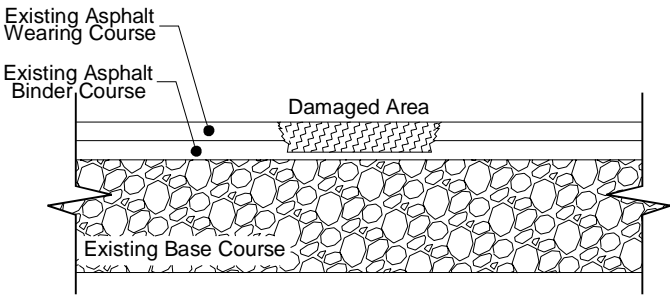
PAVEMENT REPAIR WORKS:

B.O.Q. Item C1b: Shallow Patching Works

including milling, prime coat, asphalt binder course (one layer 5cm),tack coat and asphalt wearing course (one layer 5cm)

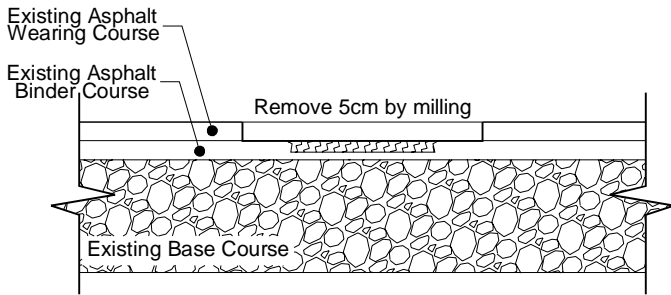
Step -1

Locate the damaged area



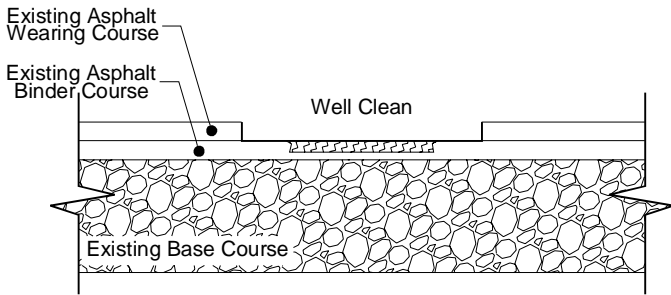
Step -2

Mill 5cm in slightly larger rectangular shapes parallel to the traffic direction



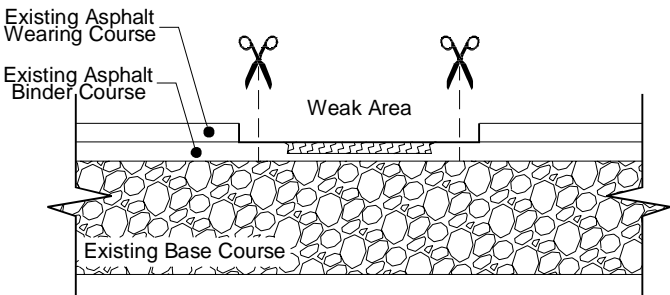
Step -3

Well clean and check the milled area if found sound, proceed wit surface patching B.O.Q item C1a



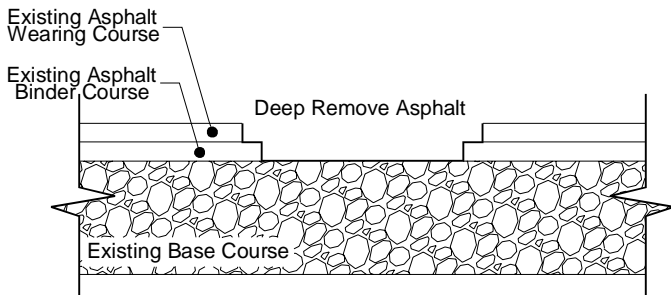
Step -4

Locate the remaining weak areas and saw cut to full asphalt depth



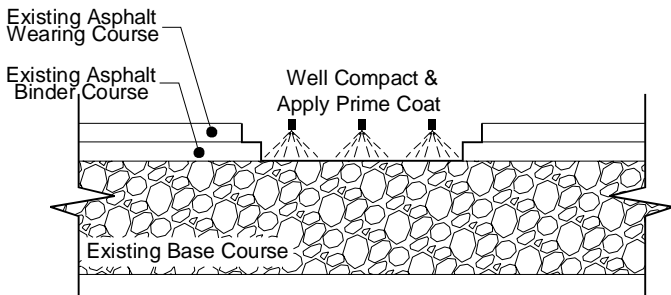
Step -5

Remove full asphalt within the cut limit without damaging existing base course



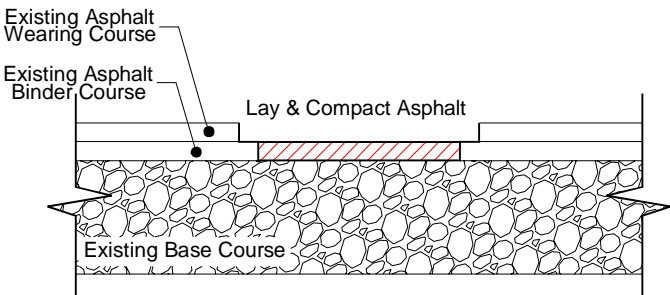
Step -6

Well compact the existing base course and apply prime coat to area and edges



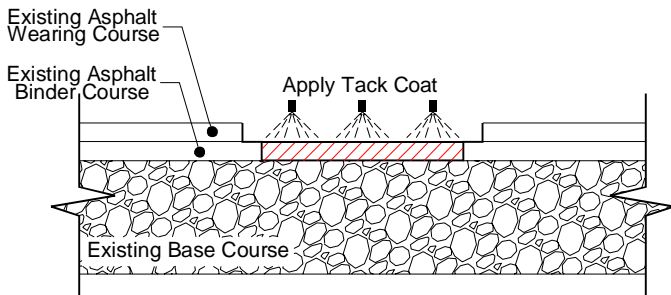
Step -7

Lay and compact binder course asphalt



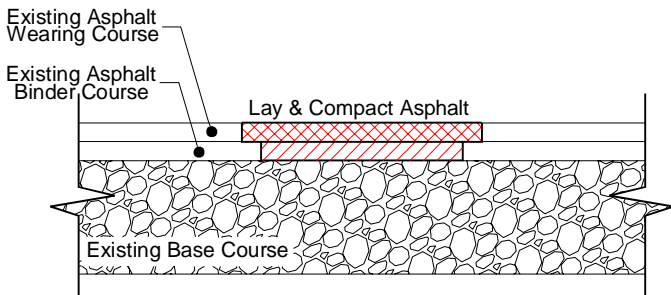
Step -8

Apply tack coat to surface and edges



Step -9

Lay and compact wearing course asphalt



NOTES

- Refer to general guidance details Drawings number DET-RM-01 to 03.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS

DATE January-2024  
SCALE As Shown

PAVEMENT SHALLOW PATCHING WORKS

Tender Drawings/Manual  
DRAWING No. DET-RM-05  
REV 00



PAVEMENT REPAIR WORKS:

B.O.Q. Item C1c: Deep Patching Works

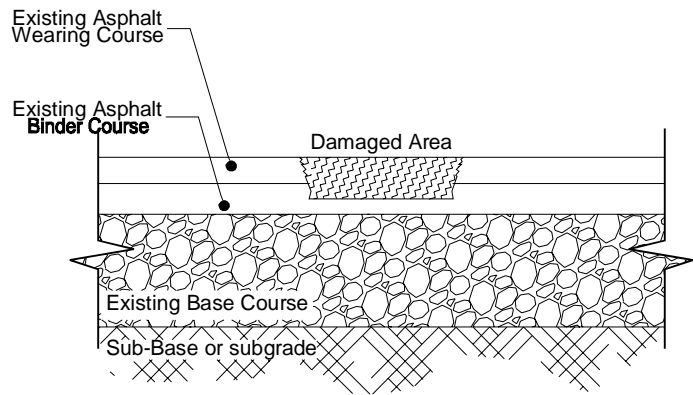
including excavation, base course (30cm), prime coat, asphalt binder course (one layer 5cm), tack coat and asphalt wearing course (one layer 5cm)

NOTES

- Refer to general guidance details Drawings number DET-RM-01 to 03.

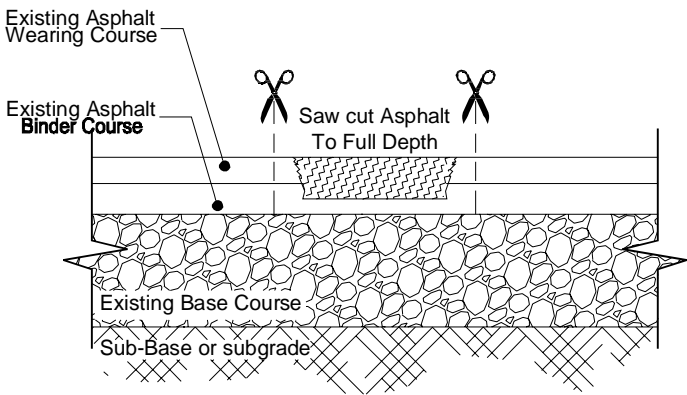
Step -1

Locate the damaged area



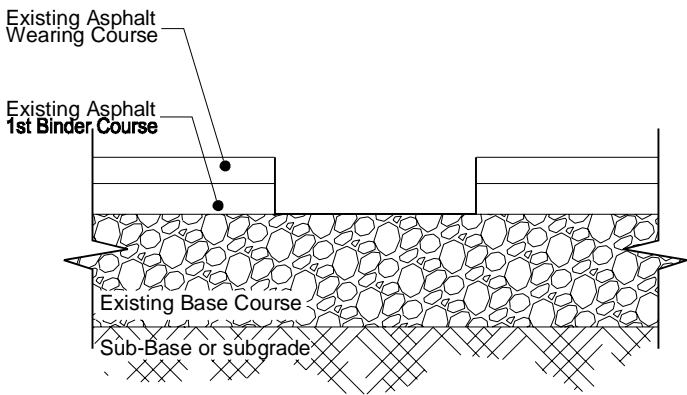
Step -2

Saw cut to full asphalt depth in slightly larger rectangular shapes parallel to road



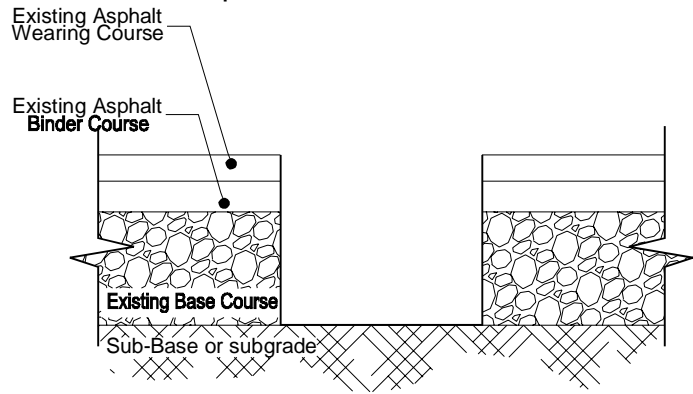
Step -3

Scrap-off all asphalt layers with care to not damage adjacent good asphalt



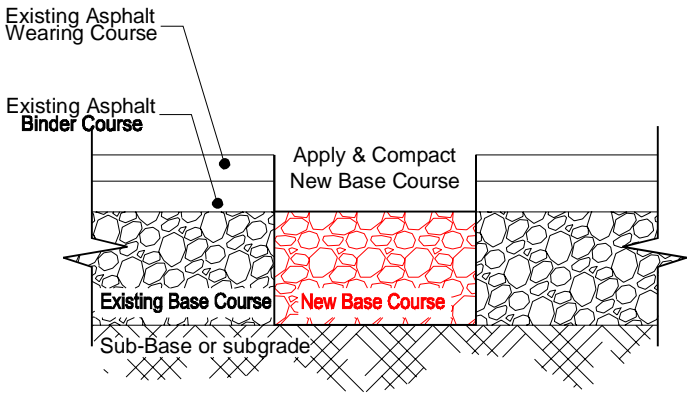
Step -4

Proceed with base course removal with care to not undermine adjacent asphalt and compact sub-surface



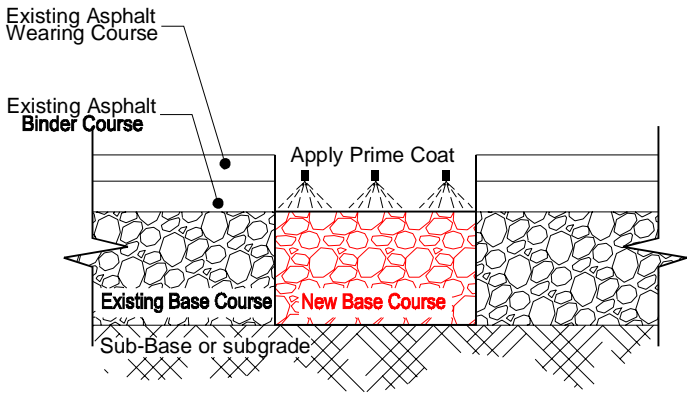
Step -5

Apply and well compact base course using new approved material



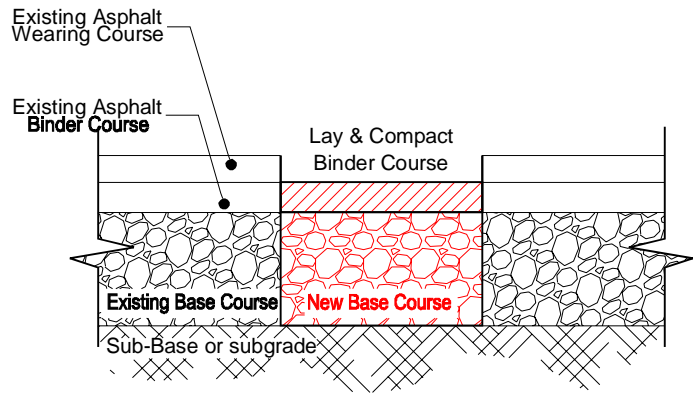
Step -6

Apply prime coat to area and edges



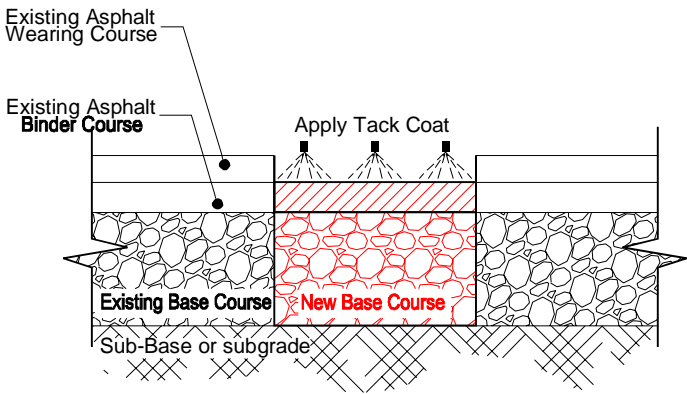
Step -7

Lay and compact binder course asphalt



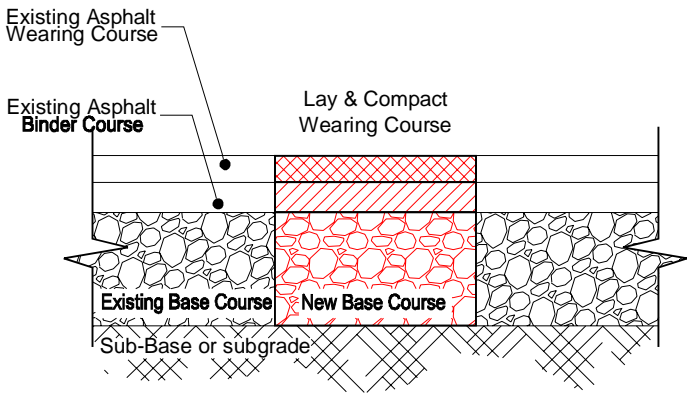
Step -8

Apply tack coat to area and edges



Step -9

Lay and compact wearing course asphalt



TENDER DRAWINGS/MANUAL					
No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

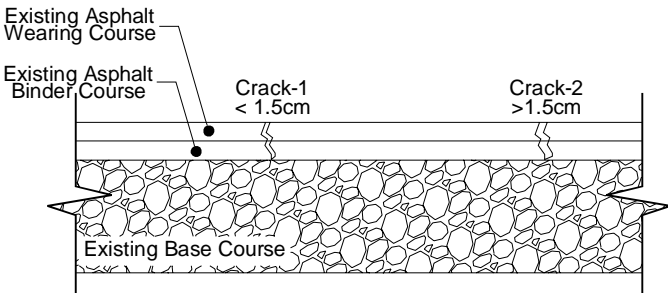
STANDARD DETAILS PAVEMENT REPAIR DETAILS  PAVEMENT DEEP PATCHING WORKS	DATE	January-2024
	SCALE	As Shown
	Tender Drawings/Manual	
	DRAWING No.	DET-RM-06
		REV 00



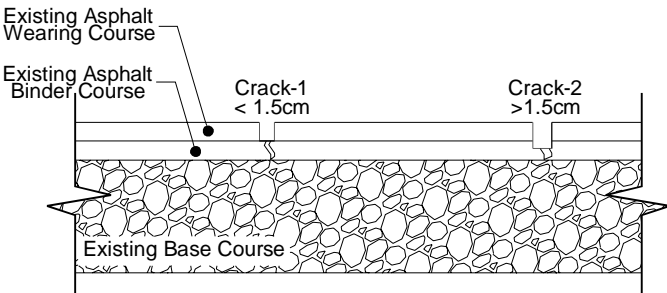
PAVEMENT REPAIR WORKS:

B.O.Q. Item C2: Crack Sealing  
including crack routing, cleaning and sealant pouring

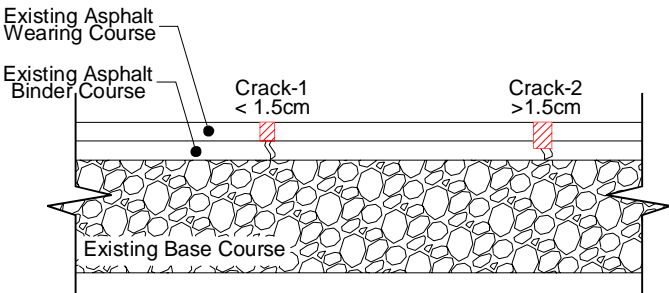
Step -1  
Locate cracks and check their widths



Step -2  
Routing cracks prior to sealing creates a reservoir the improves adhesion of cracksealing material.  
Cracks less than 1.5 cm wide should be routed to a depth of 1.5 cm while cracks wider than 1.5 cm should be routed 2cm deep



Step -3  
Thoroughly clean routed cracks of any debris, loose material or dust.  
Refer to note to apply sealent.



NOTES

- Refer to general guidance details Drawings number DET-RM-01 to 03.
- Depending on crack width, the works shall include filling the cracks to the road surface level with
  - diluted emulsified bitumen
  - or
  - with sand and saturated by diluted emulsified bitumen

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS  
  
PAVEMENT CRACK SEALING

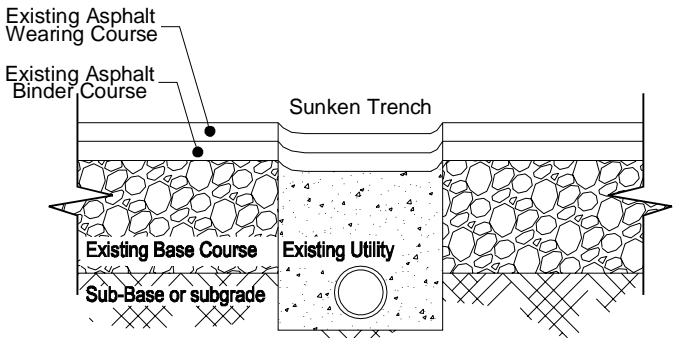
DATE	January-2024
SCALE	As Shown
Tender Drawings/Manual	
DRAWING No.	DET-RM-07
REV	00



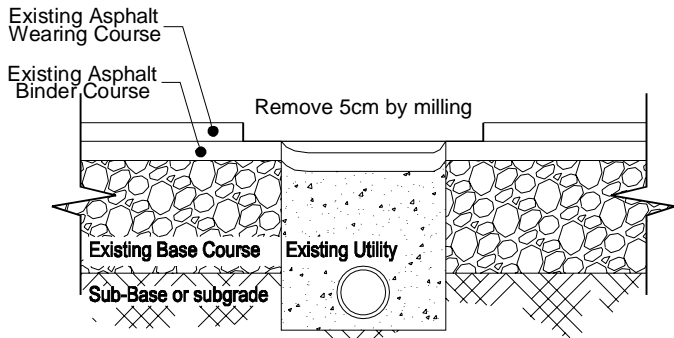
PAVEMENT REPAIR WORKS:

B.O.Q. Item C3a: Milling & overlay for sunken stable trench including milling 5cm deep, 20cm wider on each side, tack coat apply and asphalt wearing course (one layer of 5cm)

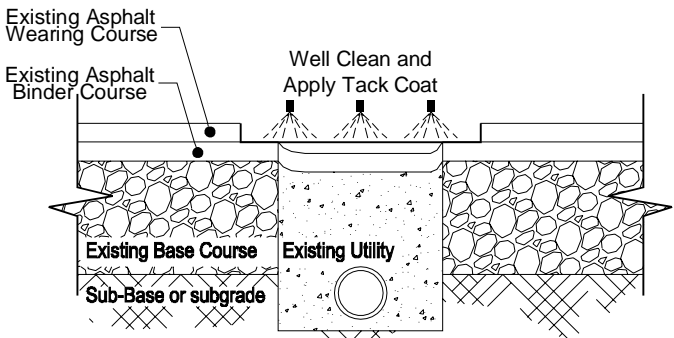
Step -1  
Locate the damaged area



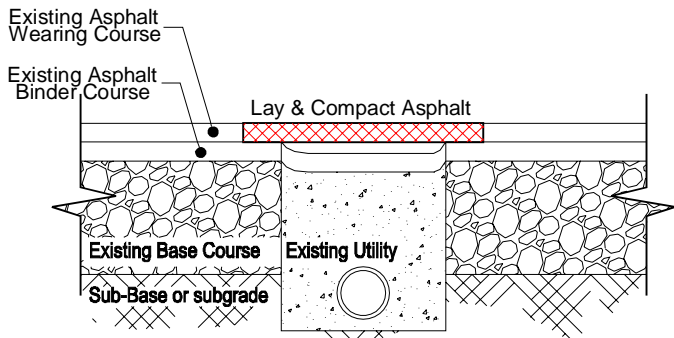
Step -2  
Mill 5cm slightly larger (20cm on each side) along the trench



Step -3  
Well clean and apply tack coat to surface and edges.



Step -4  
Lay and compact wearing course asphalt.



NOTES

- Refer to general guidance details Drawings number DET-RM-01 to 03.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS

SUNKEN TRENCH REPAIR

DATE January-2024

SCALE As Shown

Tender Drawings/Manual

DRAWING No. DET-RM-08

REV 00



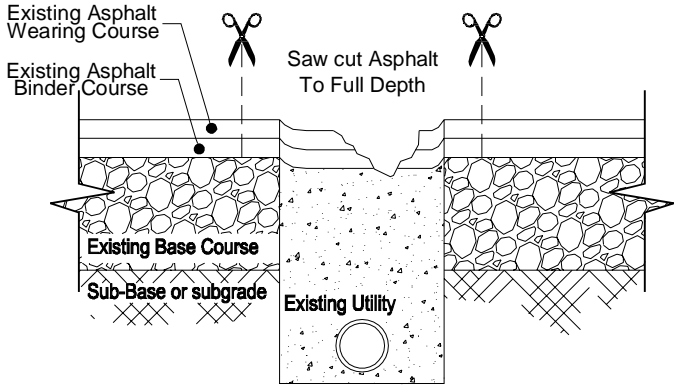
PAVEMENT REPAIR WORKS:

B.O.Q. Item C3b: Removal and reinstatement of damaged trench

including cut & removal of asphalt, removal of bad backfill material, reinstatement of back fill, base course,asphalt binder and wearing courses

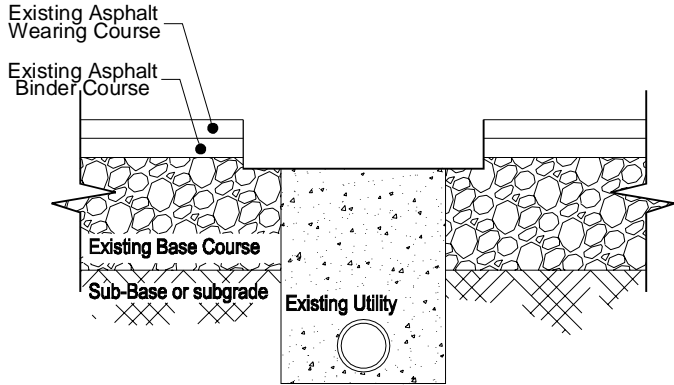
Step -1

Saw cut asphalt to full depth slightly larger (20cm on each side) along the trench



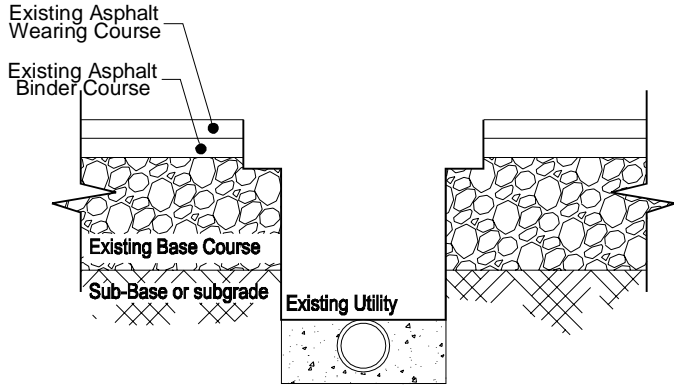
Step -2

Scrap-off all asphalt layers with care to not damage adjacent good asphalt



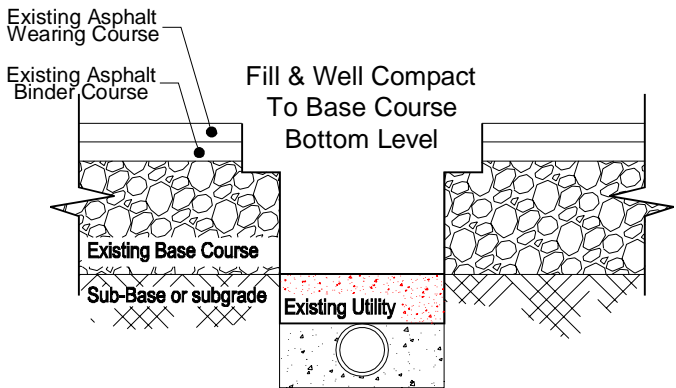
Step -3

Proceed with removal of trench bad fill material with care to not undermine adjacent asphalt



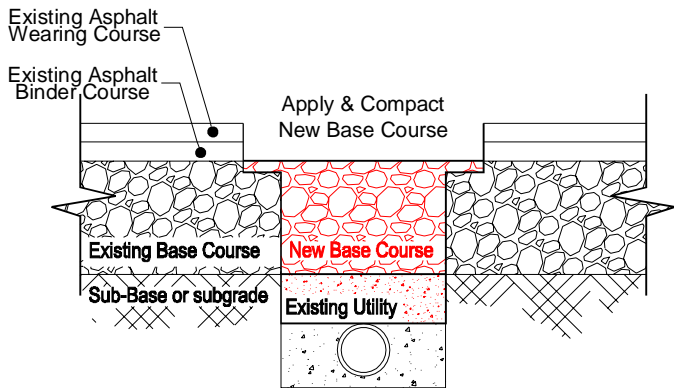
Step -4

Back fill and well compact trench with suitable fill material to base course level



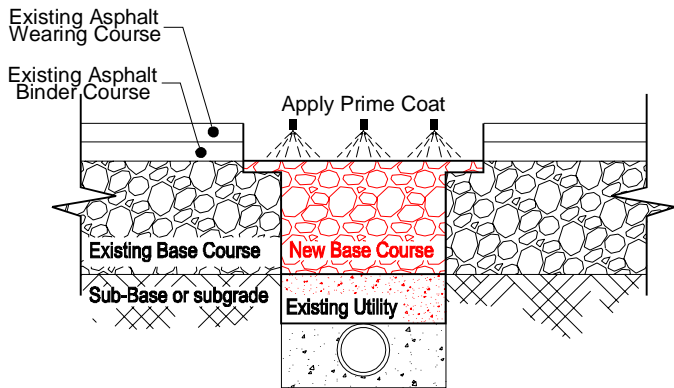
Step -5

Apply and well compact base course using new approved material



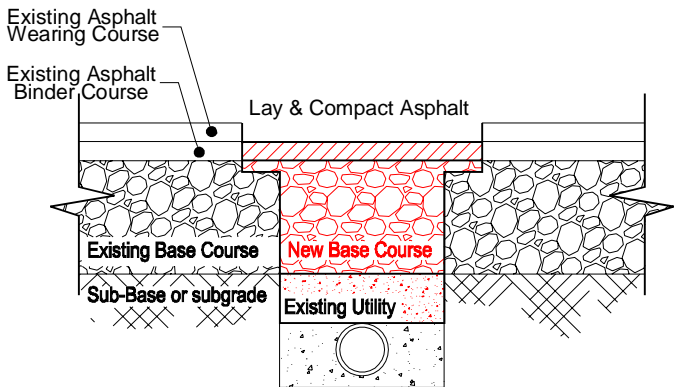
Step -6

Apply prime coat to trench and edges



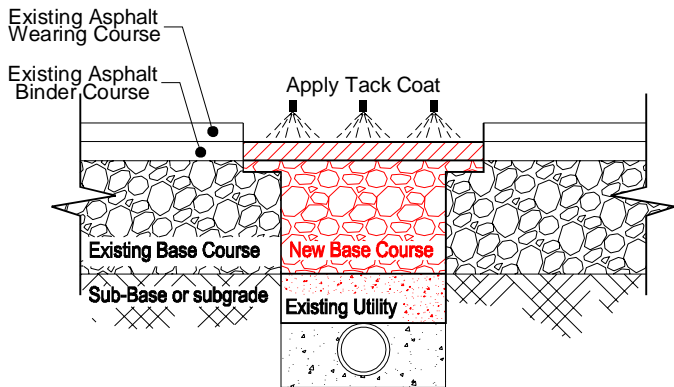
Step -7

Lay and compact binder course asphalt



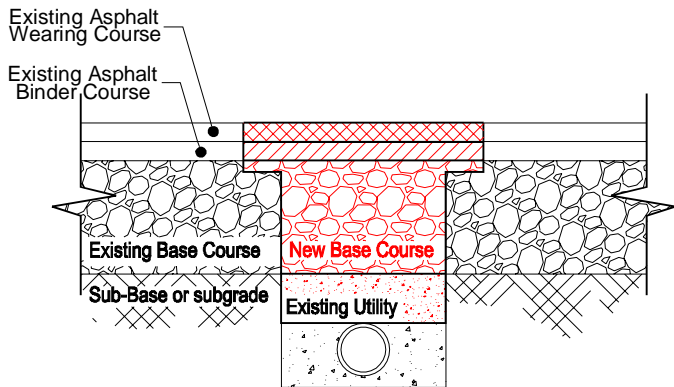
Step -8

Apply tack coat to trench and edges



Step -9

Lay and compact wearing course asphalt



NOTES

- Refer to general guidance details Drawings number DET-RM-01 to 03.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS  
  
DAMAGED TRENCH REPAIR

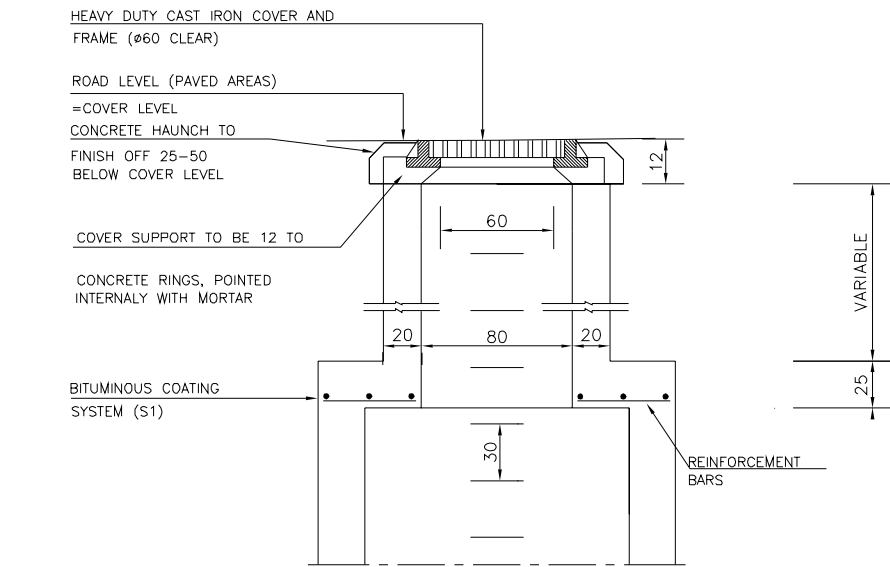
DATE January-2024  
SCALE As Shown  
Tender Drawings/Manual  
DRAWING No. DET-RM-09  
REV 00



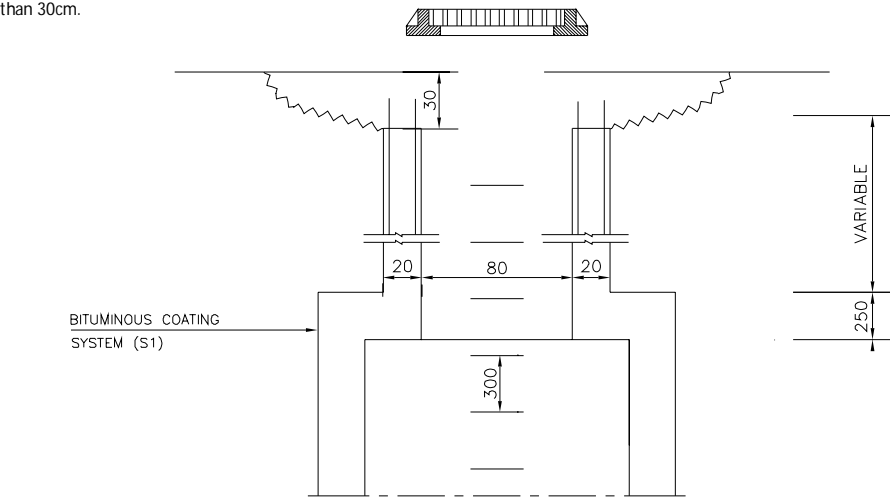
CONCRETE REPAIR WORKS:

B.O.Q Item B2: Adjusting Manhole cover works:  
including excavation, breaking deteriorated concrete, pouring concrete ring beam, fixing cover, structural mortar & finishing.

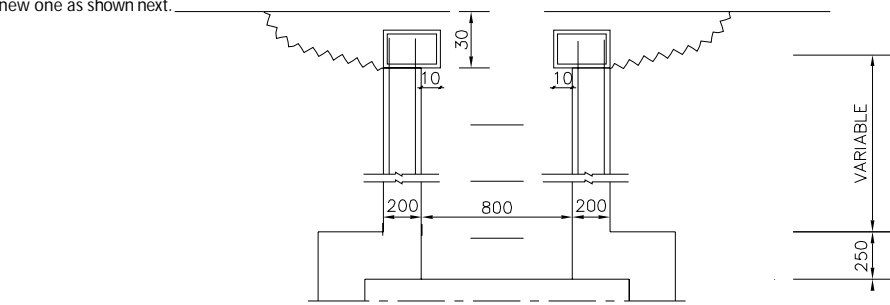
1-Typical Original Manhole Cover to be repaired.



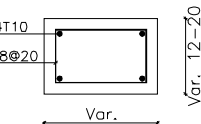
2-Remove the Cover, Excavate to expose the solid concrete manhole, but not less than 30cm.



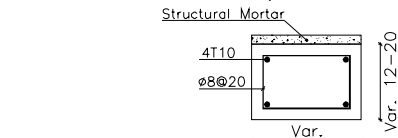
3-If the top ring is exposed completely then Remove the top ring and pour a new one as shown next.



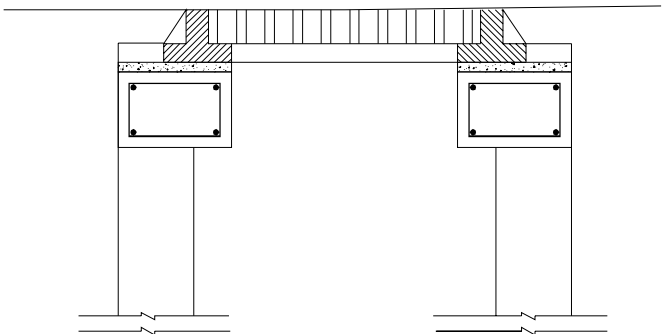
4-A typical top ring beam. The height shall be between 12 and 20cm as convenient to fix the manhole cover in its precise level and position.



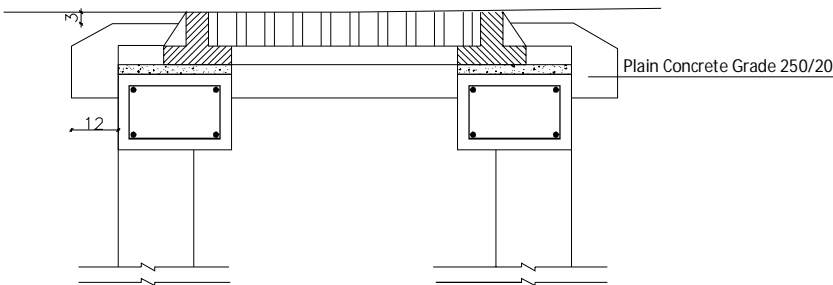
5-Fixing of Cover. After pouring the top ring beam use proprietary make mortar as specified in section 5.21 to adjust the cover level and fix flush with the asphalt level. This mortar shall not be thicker than 2.5cm. If thicker then the contractor shall consider a thicker top beam.



6-Fixing of Cover. After pouring the top ring beam and fixing the cover frame in place pour plain concrete grade 250/20 as shown in the following figure.

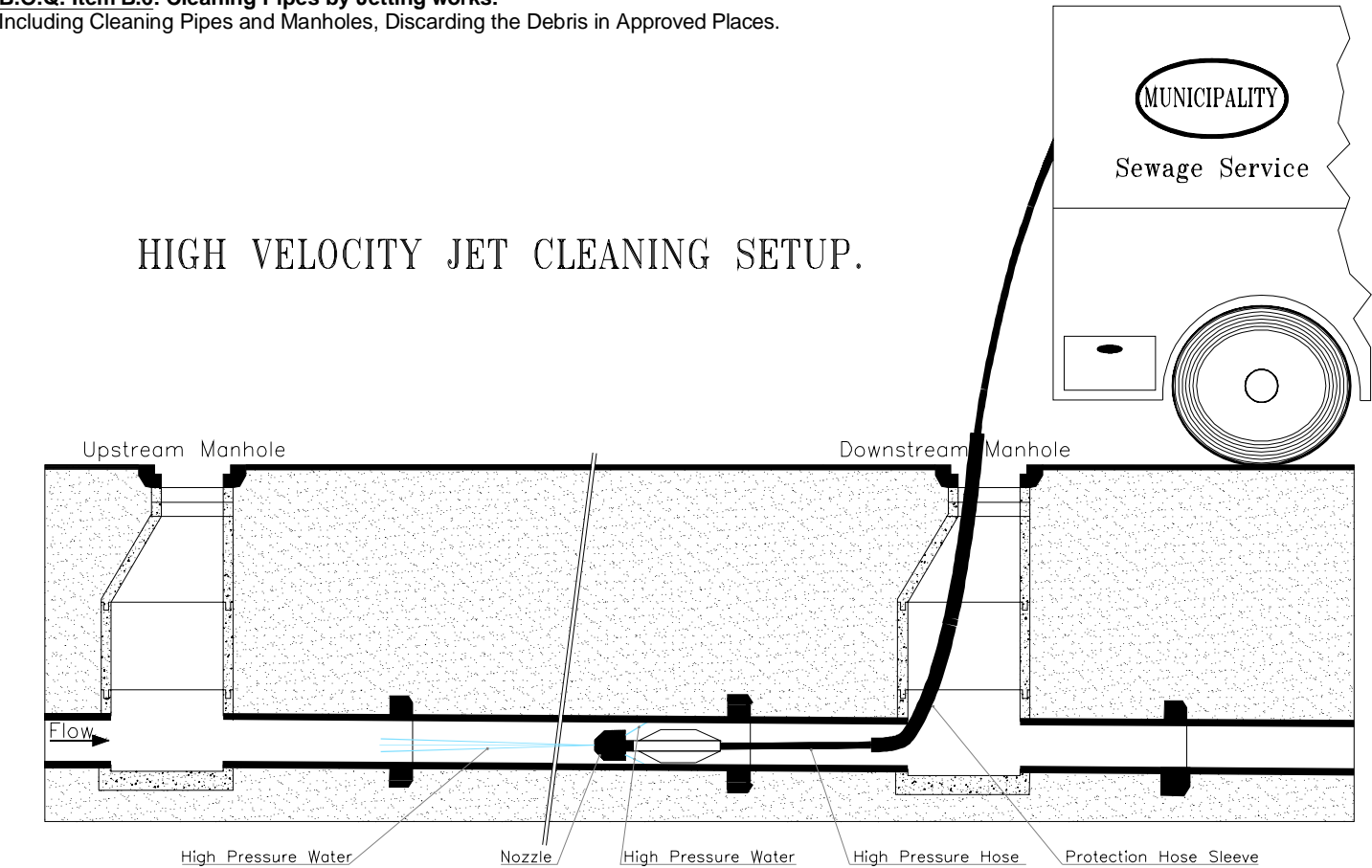


7-Concreting around the Cover. shall be as shown with 3cm lower than the cover level and chamfered at 30 to 45 degrees to receive the asphalt layers.



CLEANING SEWER PIPES:

B.O.Q. Item B.6: Cleaning Pipes by Jetting works:  
Including Cleaning Pipes and Manholes, Discarding the Debris in Approved Places.



NOTES

- Do not scale from the drawing.
- All dimensions are in centimeters.
- All dimensions and levels to be verified on site by the contractor or his sub-contractor & approved by the engineer.
- The drawing should be read in conjunction with other relevant drawings and all relevant sections of specifications.

TENDER DRAWINGS/MANUAL

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS		DATE January-2024	
CONCRETE & INCIDENTAL REPAIR DETAILS		SCALE As Shown	
ADJUSTING MANHOLE COVER & CLEANING PIPES		Tender Drawings/Manual	
DRAWING No. DET-RM-10		REV 00	



INCIDENTAL REPAIR WORKS:

B.O.Q. Item B7: Repairing Stone Masonry Walls:

including bracing, wedging, breaking and removing defective stones, grouting if needed, pointing if needed and any other necessary work.



- 1- THE CONTRACTOR SHALL DO ALL NECESSARY INSPECTION AND COORDINATION ON SITE IN ORDER TO LOCATE THE DEFECTS IN STONE MASONRY WALLS.
- 2- THE CONTRACTOR SHALL REMOVE DEFECTIVE STONES AND REPLACE THEM BY NEW SIMILAR TYPE NEW STONES.
- 3-THE CONTRACTOR SHALL WEDGE THE OLD STONES TO REMOVE THE DEFECTIVE ONES AFTER SECURING THE STABILITY OF THE WALL USING BRACES OR ANY OTHER APPROVED METHOD.



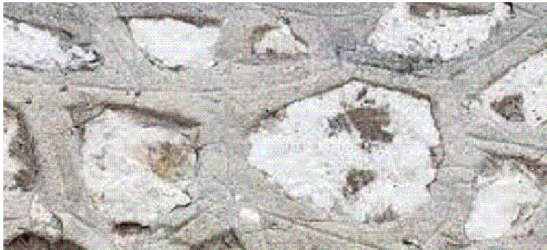
- 4- THE CONTRACTOR SHALL REMOVE ALL DEFECTIVE STONES TO AN ENOUGH DEPTH TO REMOVE ALL THE DEFECTS THAT MAY LEAD TO OTHER DEFECTS. THIS SHALL BE COORDINATED WITH THE ENGINEER WHO SHALL DETERMINE THE DEPTH NEEDED.
- 5- THE CONTRACTOR SHALL INSERT NEW STONE BLOCKS AND MAKE THE SURFACE AS FLUSH WITH THE OLD SURFACE AS POSSIBLE TO INSURE GOOD FINISHING.



- 7- THE CONTRACTOR SHALL POINT THE JOINTS TO A STATE SIMILAR TO THE PREVIOUSLY EXISTING STATE IF THE OLD WALL WAS POINTED OR ACCORDING TO THE DIRECTIVES OF THE ENGINEER.



- 6- THE CONTRACTOR SHALL GROUT THE NEW STONE BLOCKS AND INJECT THE MORTAR TO A DEPTH ENOUGH TO STABILIZE THE WALL.



THE PHOTOS ON THE LEFT SHOW SEVERAL TYPES OF POSSIBLE POINTING PATTERNS THAT COULD BE USED OR SIMILAR ONES AS CLOSE AS POSSIBLE TO THE EXISTING PATTERN AS THE OLD WALL WAS POINTED OR ACCORDING TO THE DIRECTIVES OF THE ENGINEER.



NOTES

- The drawing should be read in conjunction with other relevant drawings and all relevant sections of specifications.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS CONCRETE & INCIDENTAL REPAIR DETAILS	DATE	January-2024
	SCALE	As Shown
STONE MASONRY WALL REPAIR	Tender Drawings/Manual	
	DRAWING No.	DET-RM-11
	REV	00



CONCRETE SHALLOW PATCHING WORKS:

Overhead, Horizontal and/or Vertical Concrete Patching Works:  
including breaking, bonding agent, structural mortar & finishing.

1-Delineate the damaged area using percussion methods and mark it.

2- Mark the area to be cut around the damaged area by paint. All lines shall be parallel and/or perpendicular to the reinforcing bars

3- Cut around the delineated area using Electrical hand saw. The depth of cut shall not be less than 2.5 cm but care shall be taken not to damage reinforcing bars.

4- Remove all the concrete in the designated area to a depth not less than 2cm.

5- Clean reinforcing bars using a hand wire brush or mechanical wire brush.

6- Add reinforcement bars as required. Proper splicing shall be respected.

7- Wash using high pressure water jet.

8- Coat the reinforcing bars with Zinc-Rich antirust.

9- Apply the bonding agent on all the exposed surfaces including bars.

10- Fill the designated area with propriatory make struc- mortar

11- Finish the surface

12-Coat the surface with a protection coat.

1-Delineate the damaged area using percussion methods and mark it.

2- Mark the area to be cut around the damaged area by paint. All lines shall be parallel and/or perpendicular to the reinforcing bars

3- Cut around the delineated area using Electrical hand saw. The depth of cut shall not be less than 2.5 cm but care shall be taken not to damage reinforcing bars.

4- Remove all the concrete in the designated area to a depth not less than 2cm.

5- Clean reinforcing bars using a hand wire brush or mechanical wire brush.

6- Add reinforcement bars as required. Proper splicing shall be respected.

7- Wash using high pressure water jet.

8- Coat the reinforcing bars with Zinc-Rich antirust.

9- Apply the bonding agent on all the exposed surfaces including bars.

10- Fill the designated area with propriatory make struc- mortar

11- Finish the surface

12-Coat the surface with a protection coat.

1-Delineate the damaged area using percussion methods and mark it.

2- Mark the area to be cut around the damaged area by paint. All lines shall be parallel and/or perpendicular to the reinforcing bars

3- Cut around the delineated area using Electrical hand saw. The depth of cut shall not be less than 2.0 cm but care shall be taken not to damage reinforcing bars.

4- Remove all the concrete in the designated area to a depth not less than 2cm.

5- Clean reinforcing bars using a hand wire brush or mechanical wire brush.

6- Add reinforcement bars as required. Proper splicing shall be respected.

7- Wash using high pressure water jet.

8- Coat the reinforcing bars with Zinc-Rich antirust.

9- Apply the bonding agent on all the exposed surfaces including bars.

10- Fill the designated area with propriatory make struc- mortar

11- Finish the surface

12-Coat the surface with a protection coat.

NOTES

1 – PATCHING SHALL BE USED IN THE FOLLOWING CASES:

a–IT IS TO BE UNDERSTOOD THAT PATCHING TECHNIQUES ARE TO BE USED FOR REPAIR OF MINOR DAMAGES AND TO PREVENT DAMAGES FROM INCREASING CAUSING FURTHER DAMAGES.

b– IF THE STRUCTURE REQUIRING REPAIR IS DAMAGED DUE TO A MINOR ACCIDENT THAT DID NOT BREAK THE STRUCTURE DRASTICALLY.

c– IF THE STRUCTURE SUFFERS FROM CORROSION REQUIRING REPAIR FOR PRESERVING THE STRUCTURE FROM FURTHER DAMAGES.

d–IF THE DAMAGES DID NOT PENETRATE THE STRUCTURE FROM SIDE TO SIDE.

f–IF THE REINFORCEMENT BARS OF THE STRUCTURE ARE STILL IN AN ACCEPTABLE STATE IN THE OPINION OF THE ENGINEER.

g–IN NO WAY PATCHING IS ALLOWED BE USED TO BUILD A MEMBER FROM BOTH SIDES.

NOTES

- Do not scale from the drawing.
- All dimensions are in centimeters.
- All dimensions and levels to be verified on site by the contractor or his sub-contractor & approved by the engineer.
- The drawing should be read in conjunction with other relevant drawings and all relevant sections of specifications.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA

STANDARD DETAILS

CONCRETE & INCIDENTAL REPAIR DETAILS

CONCRETE SHALLOW PATCHING WITH STRUCTURAL MORTAR

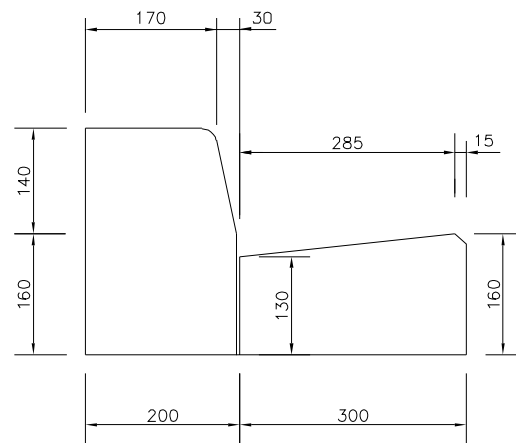
DATE January-2024

SCALE As Shown

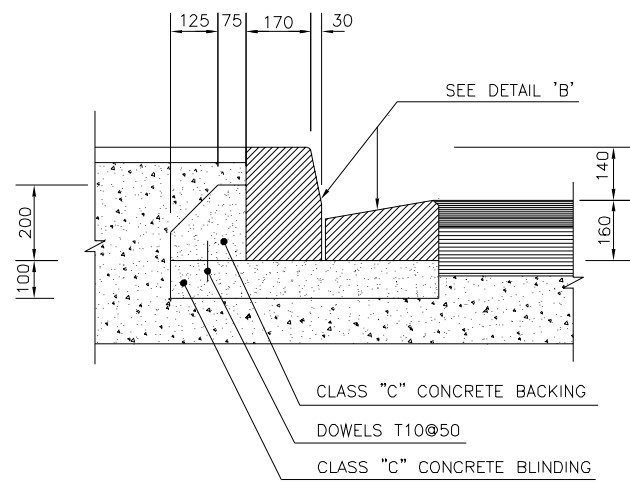
Tender Drawings/Manual

DRAWING No. DET-RM-12

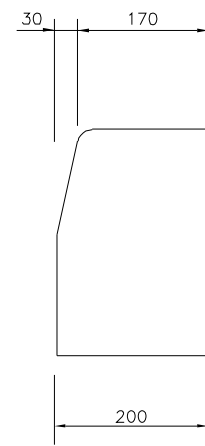
REV 00



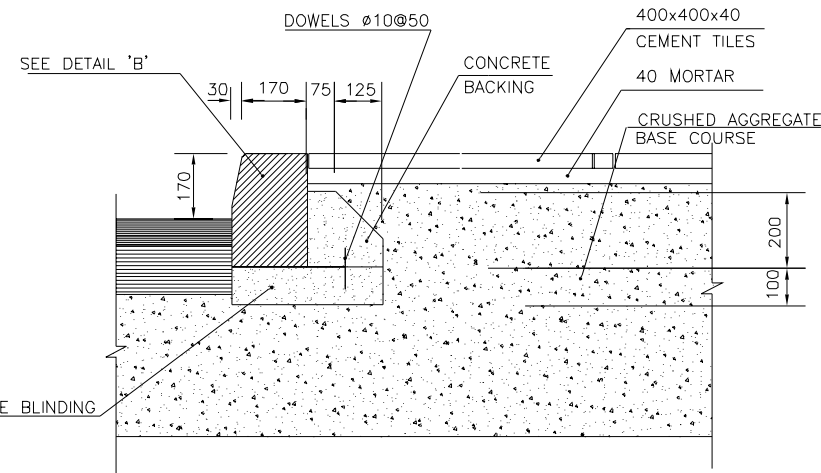
DETAIL 'A'  
SCALE 1/5



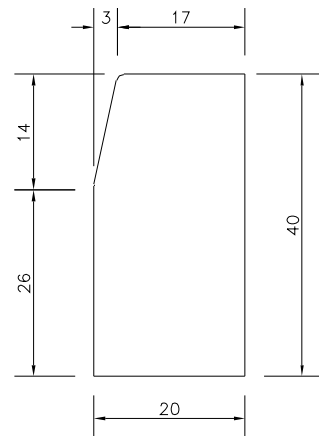
CURB & GUTTER DETAIL  
SCALE 1/10



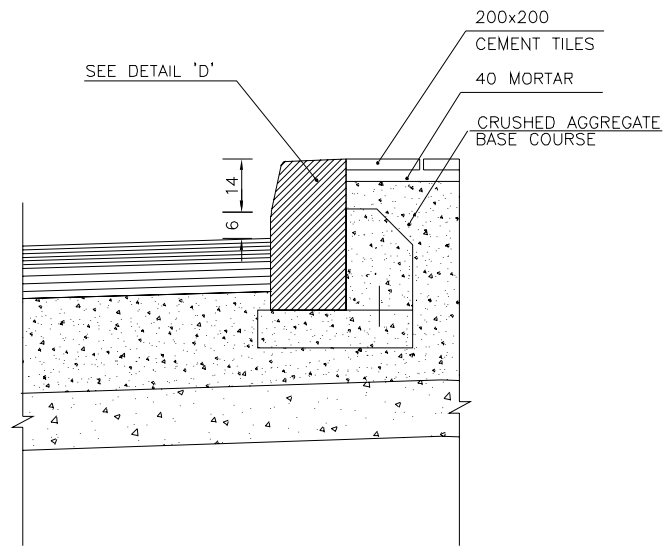
DETAIL 'B'  
SCALE 1/5



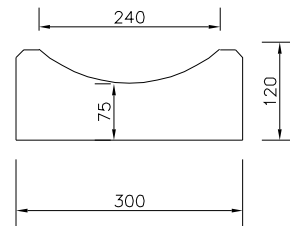
TILED SIDEWALK DETAIL  
&  
UPSTAND CURB DETAIL  
SCALE 1/10



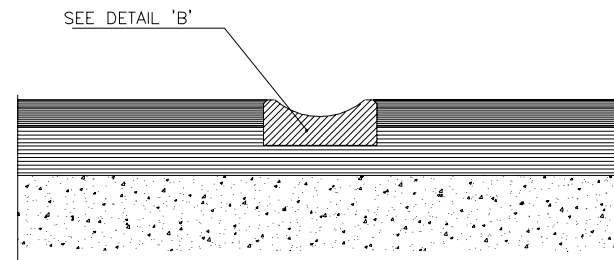
DETAIL 'C'  
scale:1/5



MEDIAN UPSTAND CURB DETAIL AT CROSS-ROADS  
scale:1/10



DETAIL 'D'  
SCALE 1/5



GUTTER DETAIL  
SCALE 1/10

NOTES

- Do not scale from the drawing.
- All dimensions are in millimeters.
- All dimensions and levels to be verified on site by the contractor or his sub-contractor & approved by the engineer.
- The drawing should be read in conjunction with other relevant drawings and all relevant sections of specifications.

SCALE REDUCTION : 1/2

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

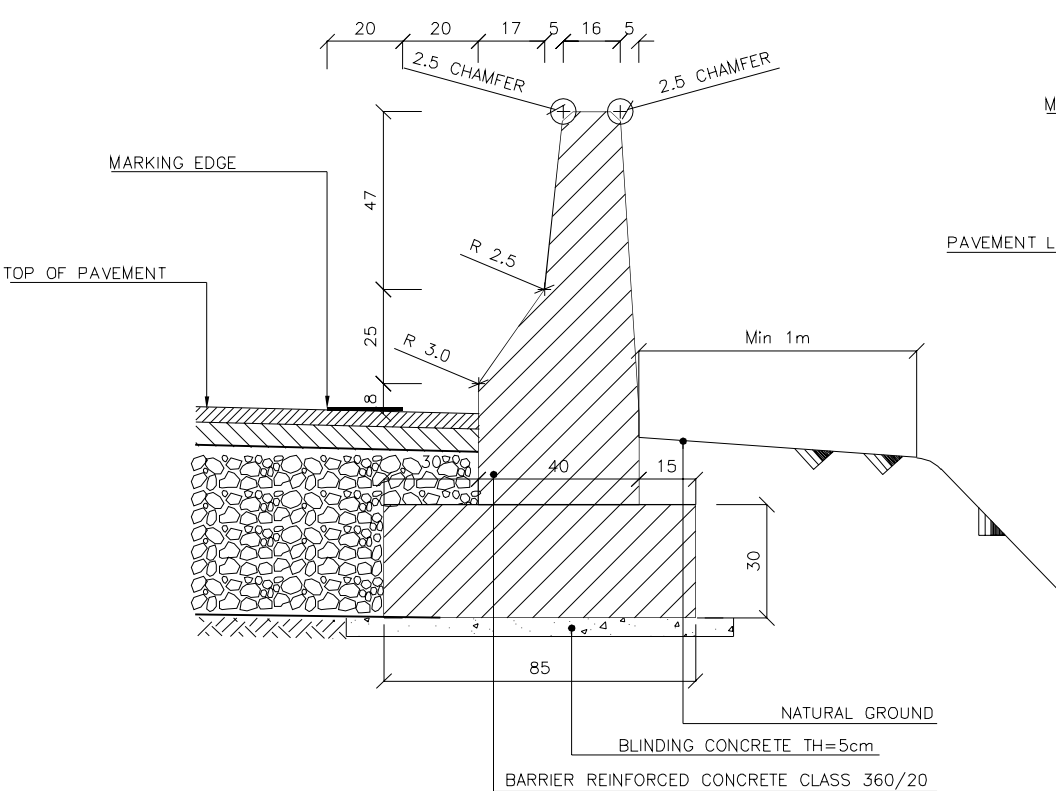
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS	DATE January-2024
CONCRETE & INCIDENTAL REPAIR DETAILS	SCALE As Shown
CURBS & GUTTER DETAILS	Tender Drawings/Manual
	DRAWING No. DET-RM-13
	REV 00

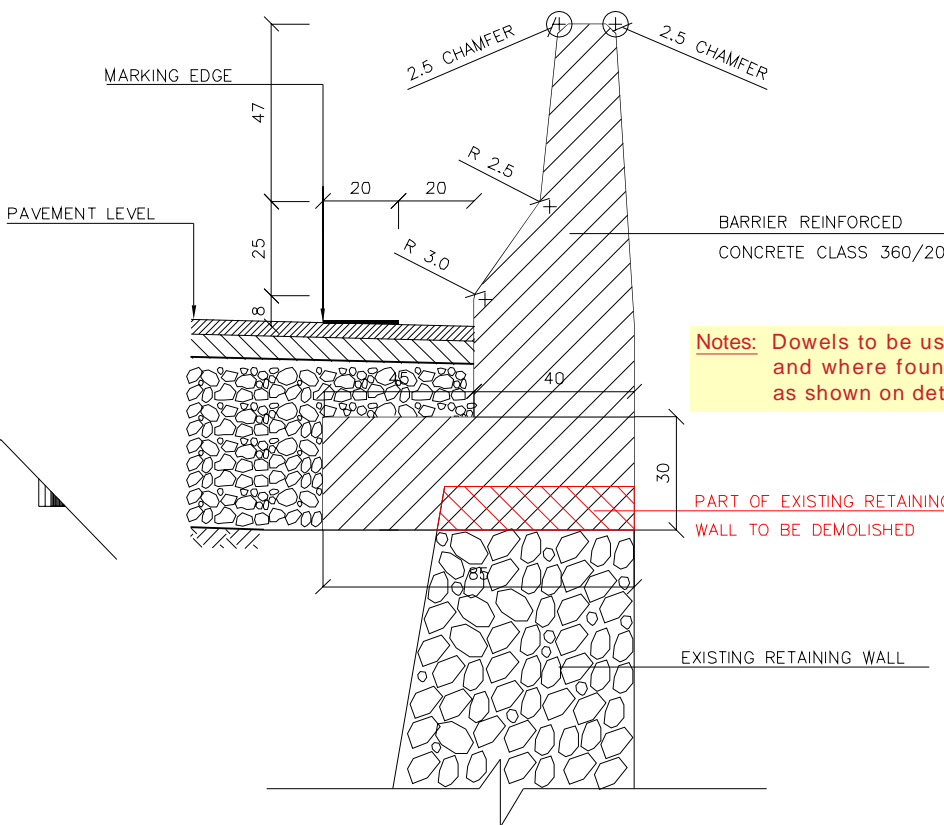


# SINGLE FACE NEW JERSEY BARRIER FREE STANDING OR ON EXISTING WALL

FREE STANDING SINGLE FACE NEW JERSEY BARRIER  
TYPICAL SECTION (FORMWORK)

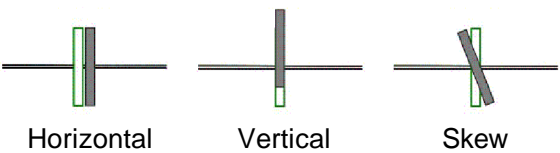


SINGLE FACE NEW JERSEY BARRIER  
ON TOP OF ANY TYPE OF EXISTING RETAINING WALL



Notes: Dowels must be well aligned

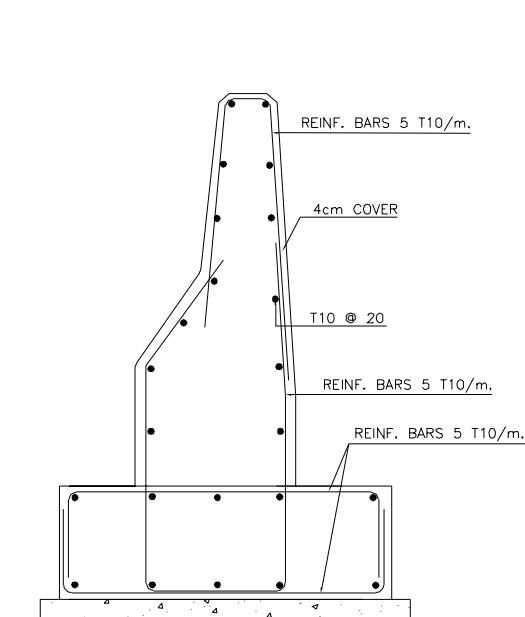
Types of dowel misalignment



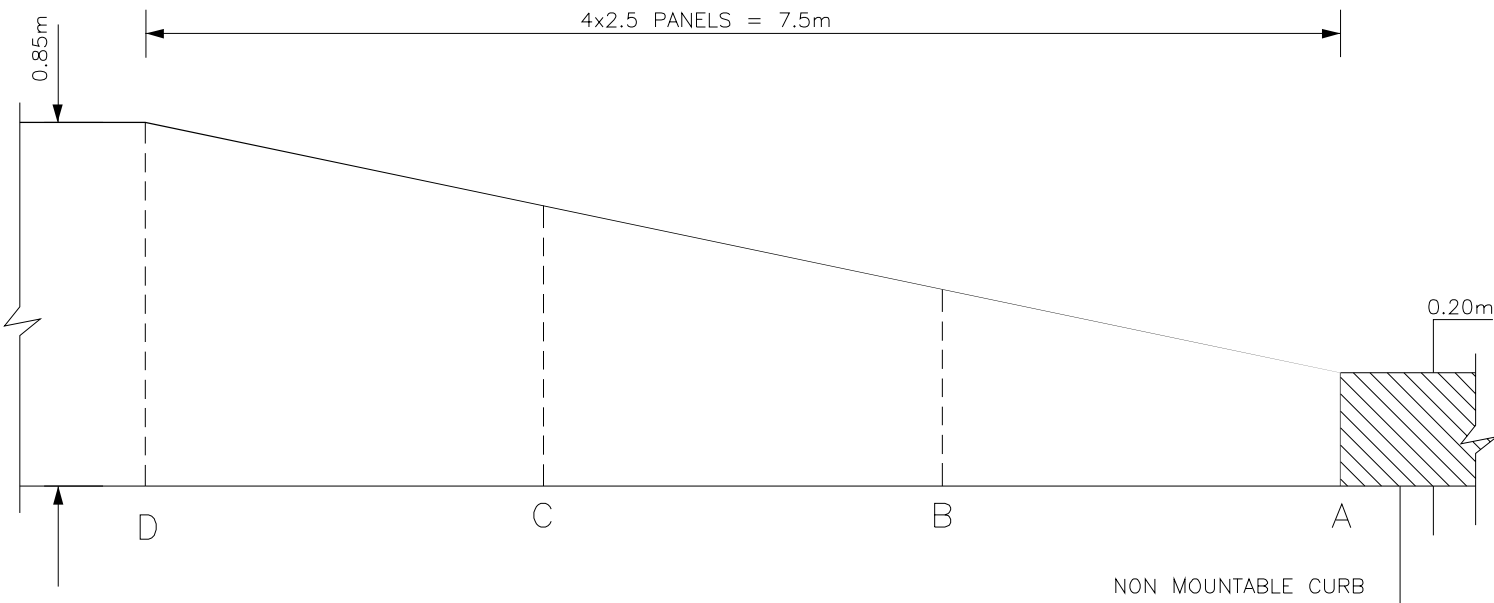
## NOTES

- Unless otherwise mentioned, all dimensions are in centimeters.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Spacing between expansion joints shall not exceed 15m.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barrier as directed by the engineer.
- Drainage slots (12x30cm) to be provided for new safety barriers at 15m intervals or as directed by the engineer, where needed and as directed by the engineer.

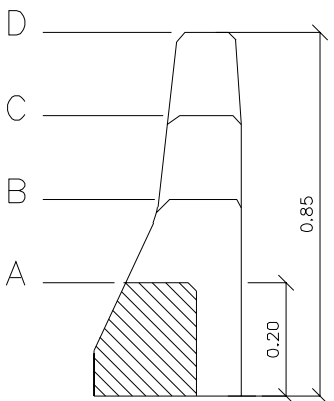
## TERMINAL UNIT DETAIL



REINFORCEMENT DETAILS



ELEVATION



CROSS SECTION

TENDER DRAWINGS/MANUAL					
No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

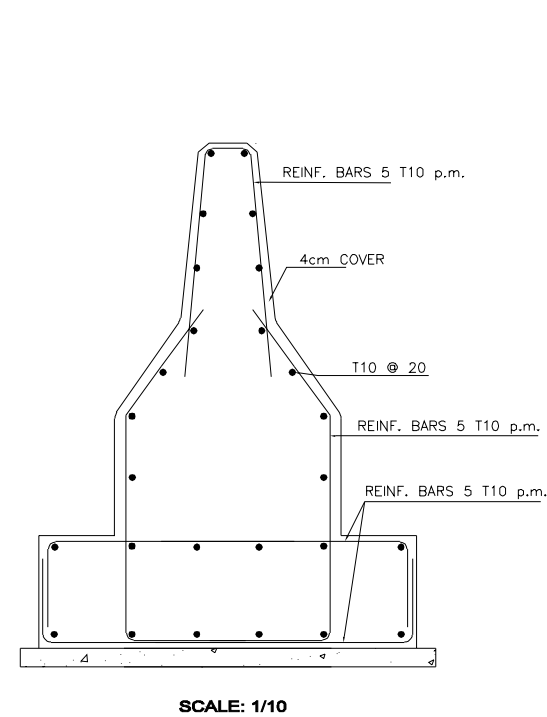
REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

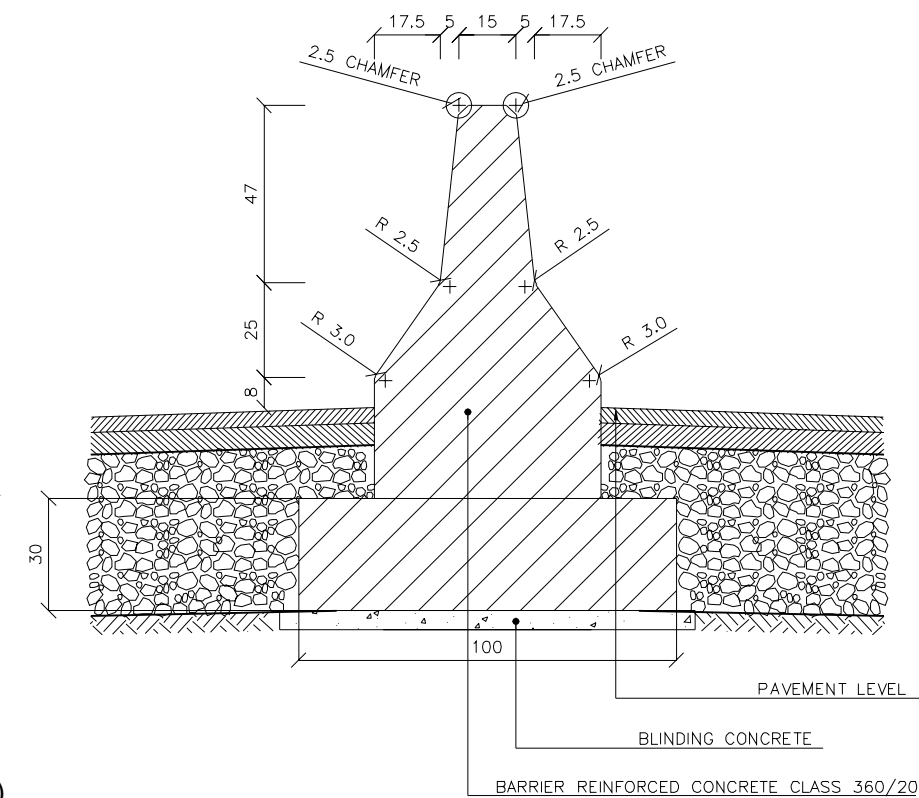
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS CONCRETE & INCIDENTAL REPAIR DETAILS	DATE January-2024
	SCALE As Shown
SAFETY BARRIERS DETAILS CONCRETE SINGLE FACE NEW JERSEY	Tender Drawings/Manual
	DRAWING No. DET-RM-14 REV 00

# DOUBLE FACE NEW JERSEY BARRIER

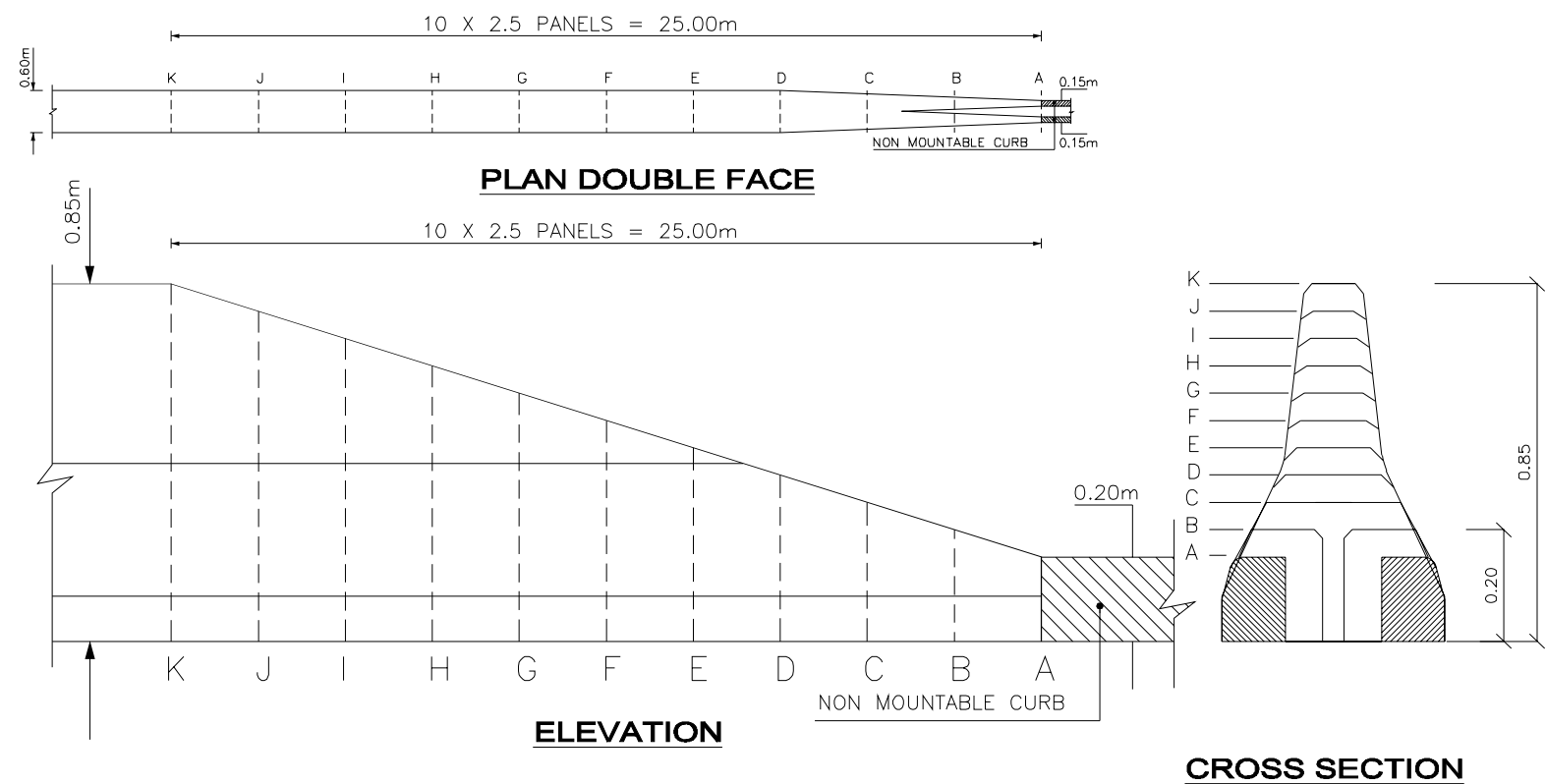


DOUBLE FACE NEW JERSEY BARRIER (N.J.B)  
TYPICAL SECTION (REINFORCEMENT)



DOUBLE FACE NEW JERSEY BARRIER (N.J.B)  
TYPICAL SECTION (FORMWORK)

## TERMINAL UNIT DETAIL

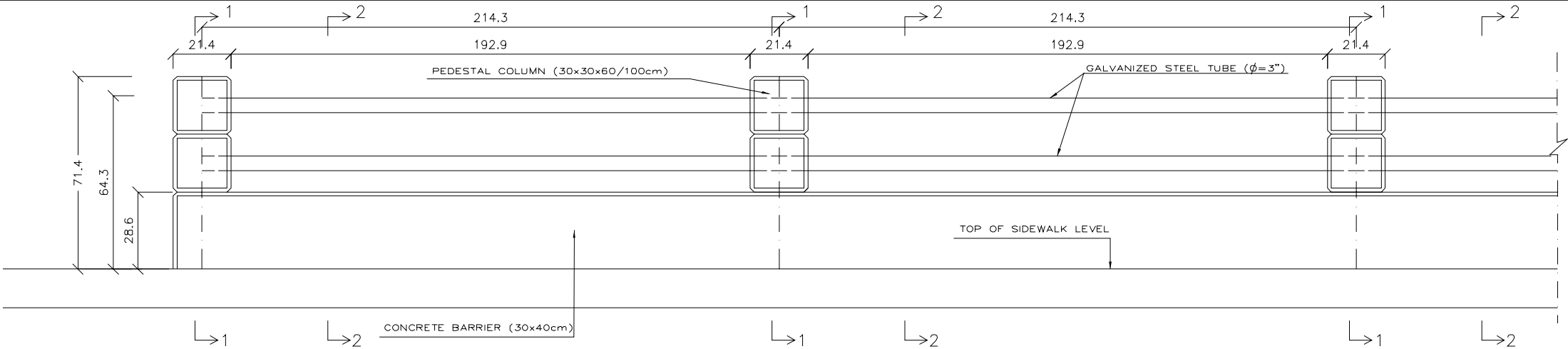


- NOTES**
- Unless otherwise mentioned, all dimensions are in centimeters.
  - Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
  - Spacing between expansion joints shall not exceed 15m.
  - Alignment of new safety barriers shall be parallel to the road alignment.
  - Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
  - Barrier terminal unit to be provided at the edge of new safety barrier as directed by the engineer.
  - Drainage slots (12x30cm) to be provided for new safety barriers at 15m intervals or as directed by the engineer, where needed and as directed by the engineer.

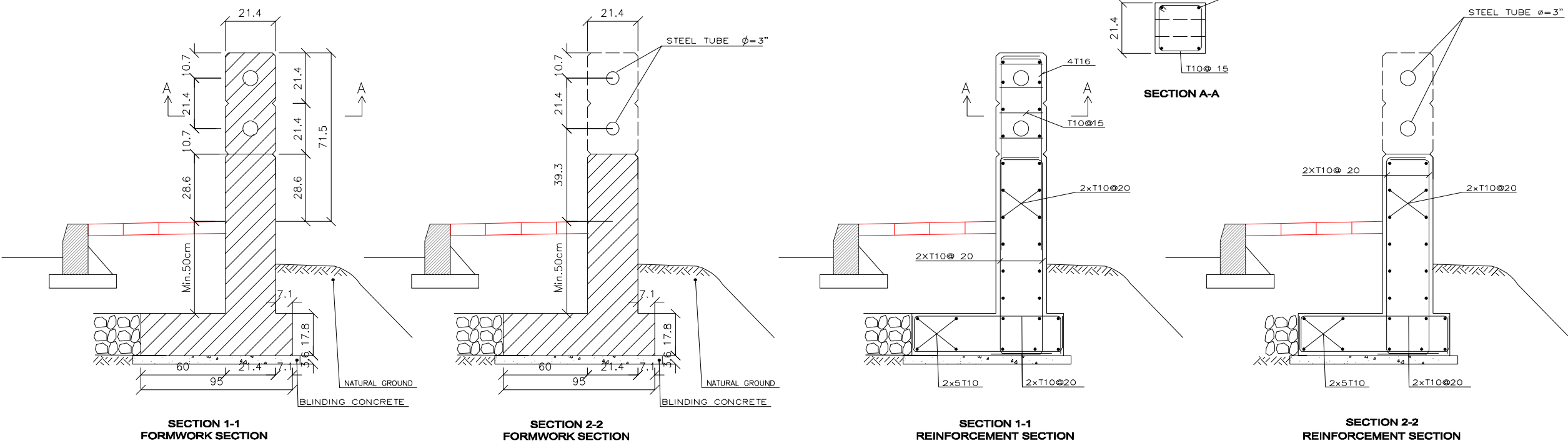
SCALE REDUCTION : 1/2					
TENDER DRAWINGS/MANUAL					
No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER
REPUBLIC OF LEBANON					
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION					
ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA					
STANDARD DETAILS				DATE January-2024	
CONCRETE & INCIDENTAL REPAIR DETAILS				SCALE As Shown	
SAFETY BARRIERS DETAILS				Tender Drawings/Manual	
CONCRETE DOUBLE FACE NEW JERSEY				DRAWING No. DET-RM-15	REV 00



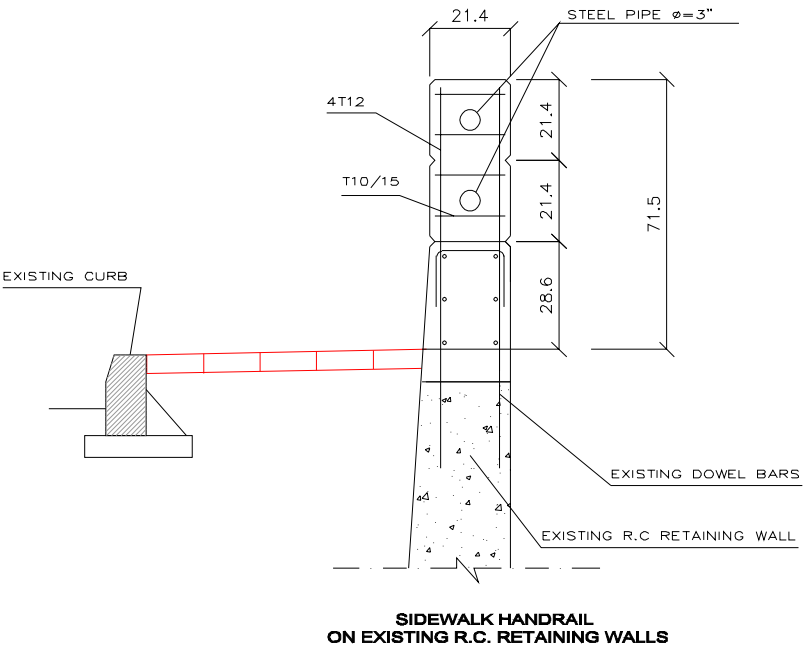
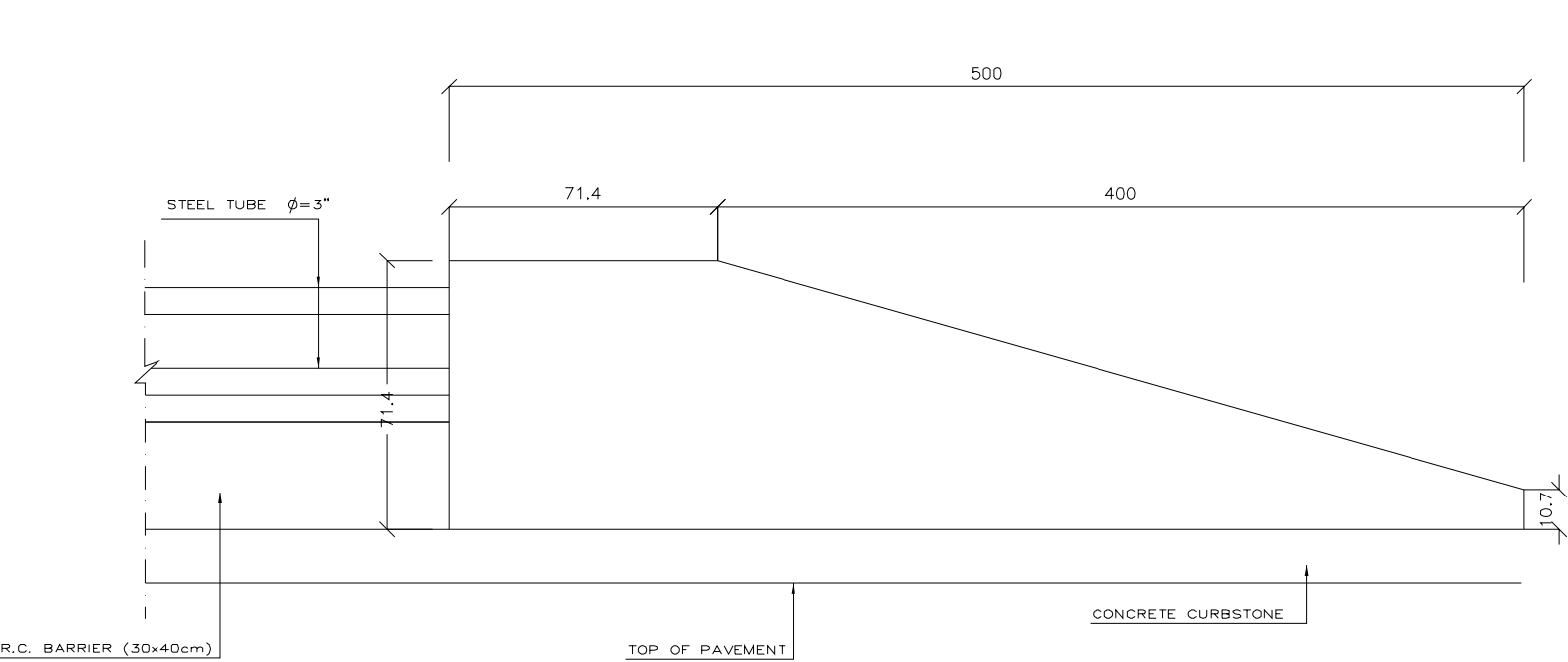
REINFORCED CONCRETE SAFETY BARRIER TYPE SB1



SAFETY BARRIER TYPE SB1  
ELEVATION



TERMINAL UNIT DETAILS



NOTES

- Unless otherwise mentioned, all dimensions are in centimeters.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Spacing between expansion joints shall not exceed 15m.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barrier as directed by the engineer.
- Drainage Outlets Ø 4" to be provided at location of low points for new sidewalks, as much needed and as directed by the engineer.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

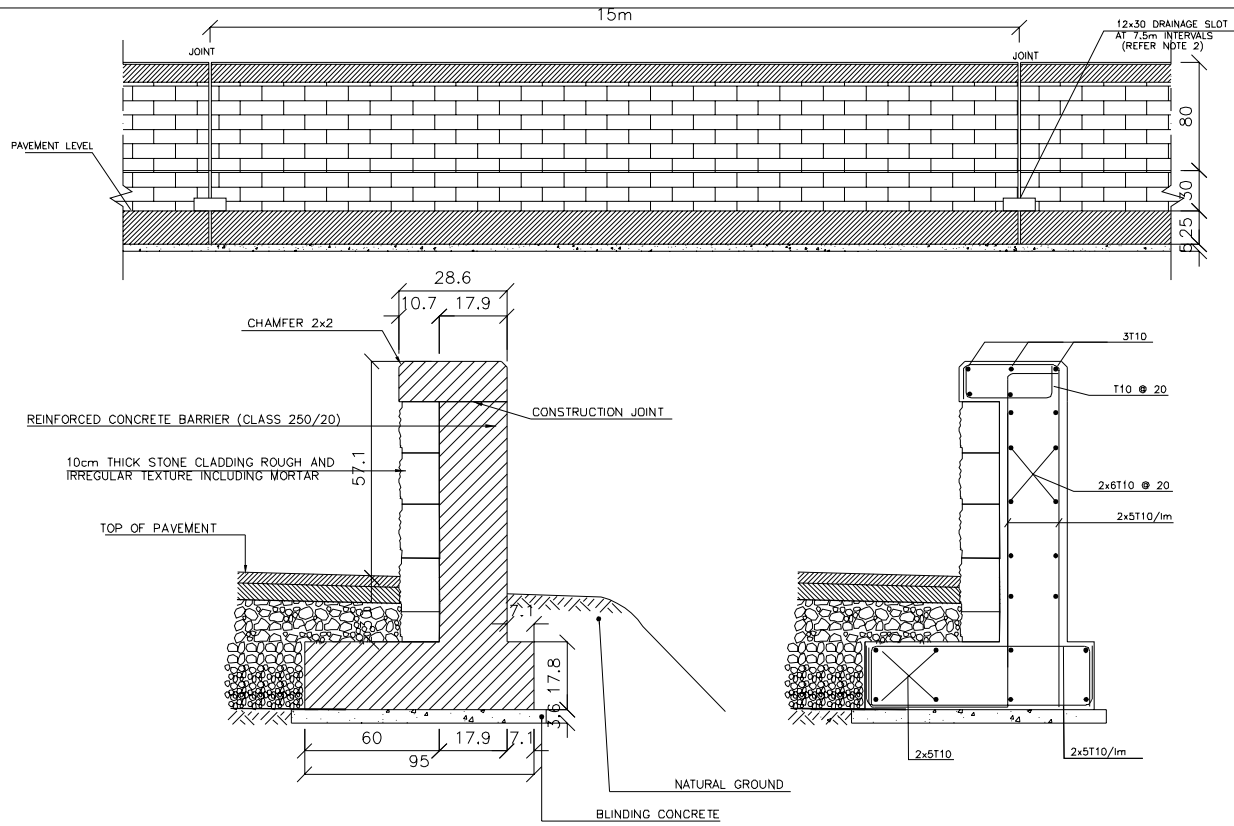
REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS	DATE January-2024
CONCRETE & INCIDENTAL REPAIR DETAILS	SCALE As Shown
SAFETY BARRIERS TYPE 1 (SB1) & TERMINAL UNIT DETAIL	Tender Drawings/Manual
DRAWING No. DET-RM-16	REV 00

REINFORCED CONCRETE SAFETY BARRIER TYPE SB2



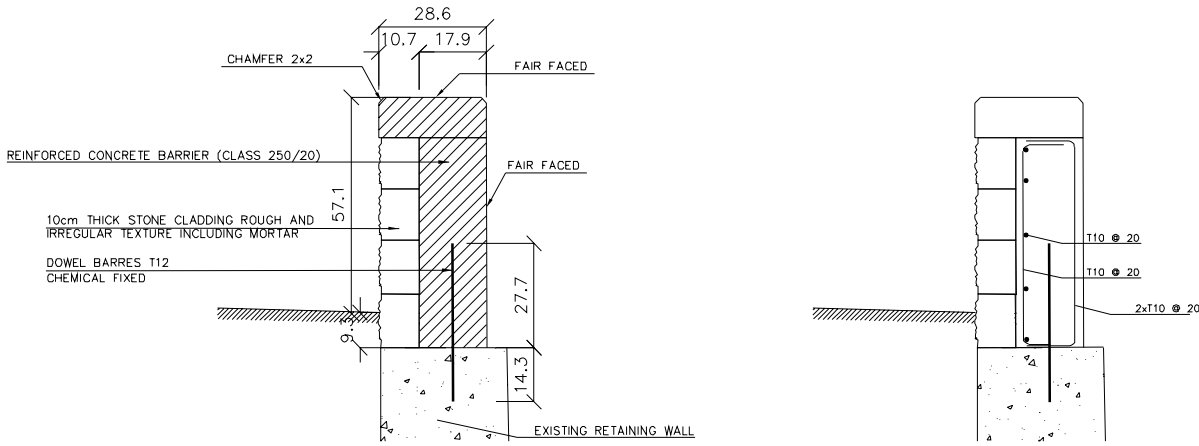
FORMWORK SECTION

N.T.S.

REINFORCEMENT SECTION

N.T.S.

REINFORCED CONCRETE SAFETY BARRIER TYPE SB2d  
ON TOP OF RETAINING WALL



FORMWORK SECTION

N.T.S.

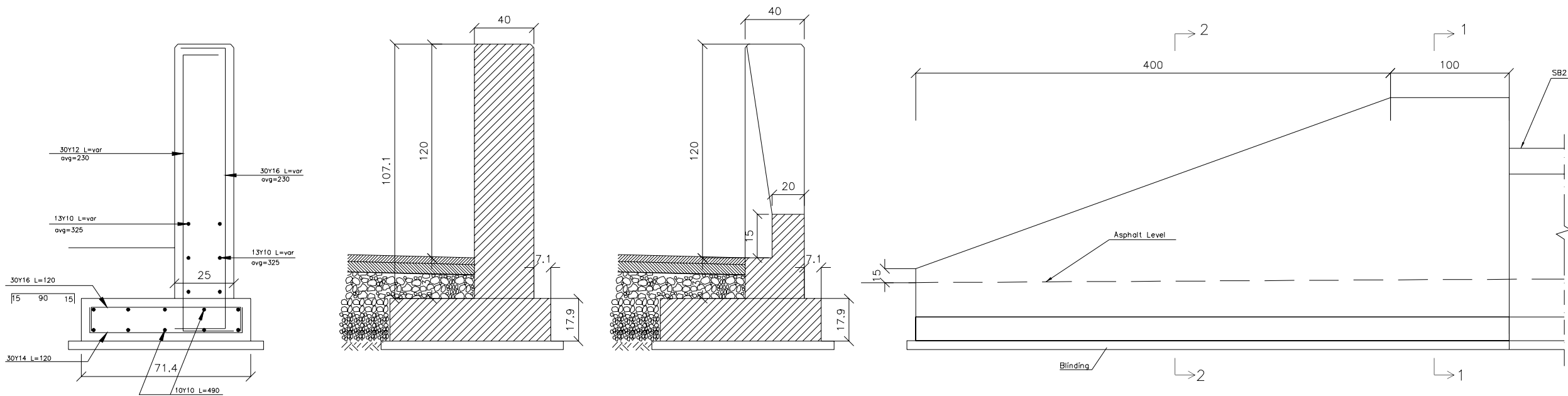
REINFORCEMENT SECTION

N.T.S.

NOTES

- Unless otherwise mentioned, all dimensions are in centimeters.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Spacing between expansion joints shall not exceed 15m.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barrier as directed by the engineer.
- Drainage slots (12x30cm) to be provided for new safety barriers at 15m intervals or as directed by the engineer, where needed and as directed by the engineer.

CONCRETE BARRIER TERMINAL UNIT (CBET)



REINFORCEMENT

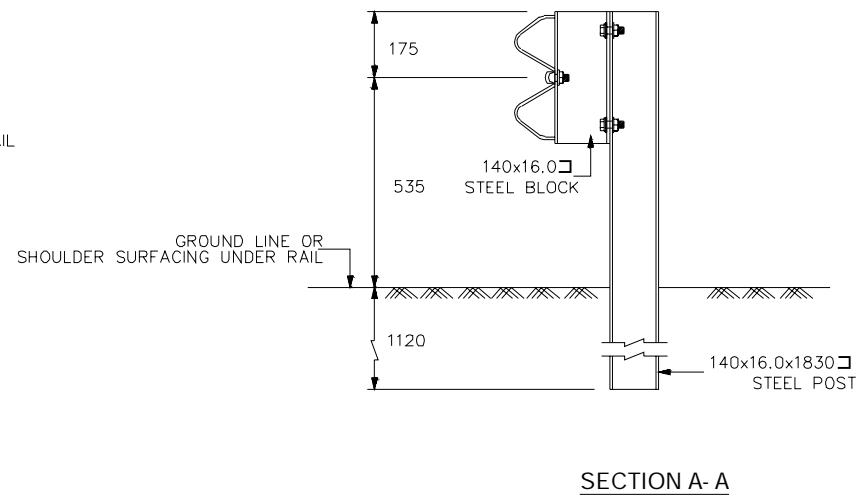
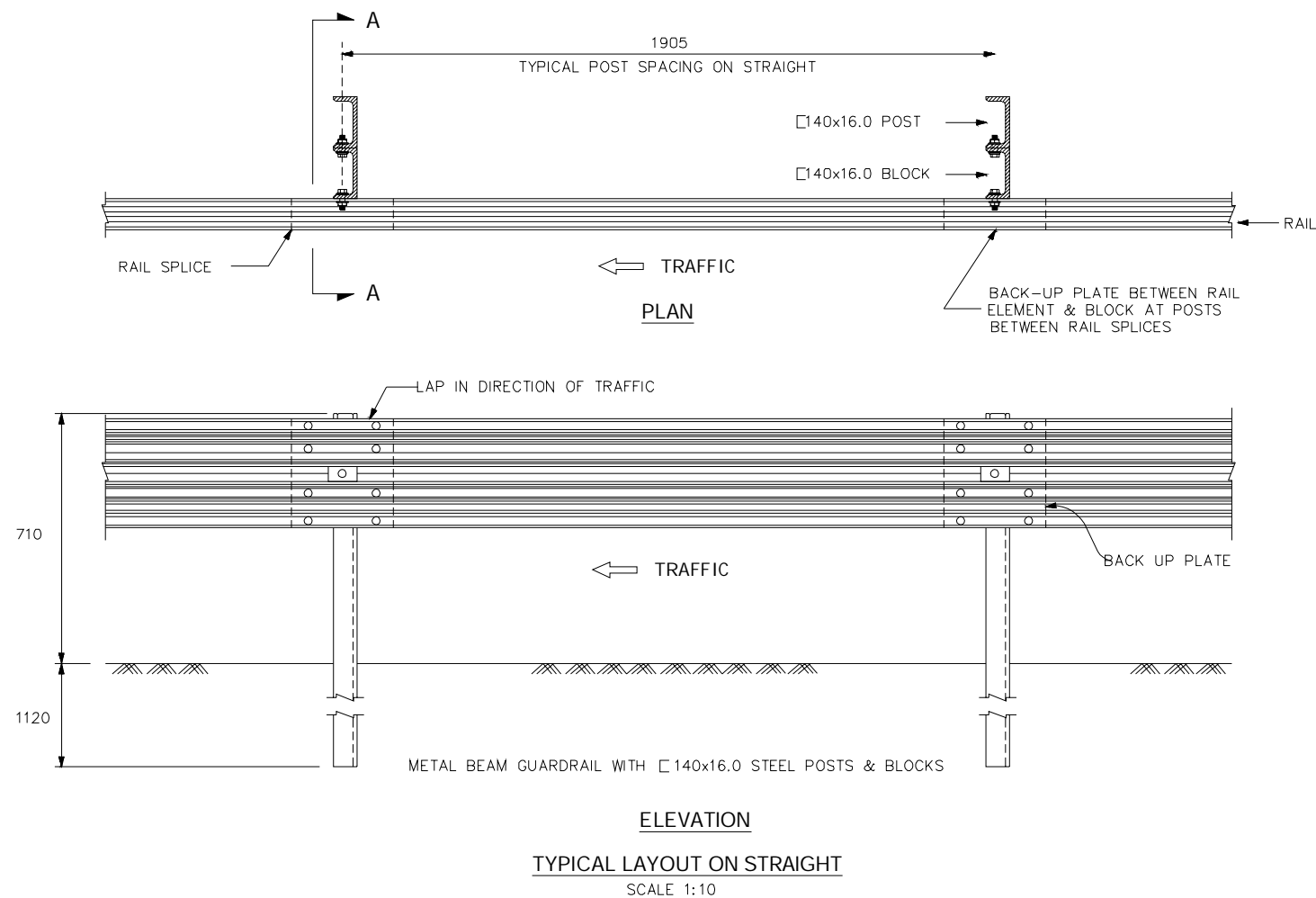
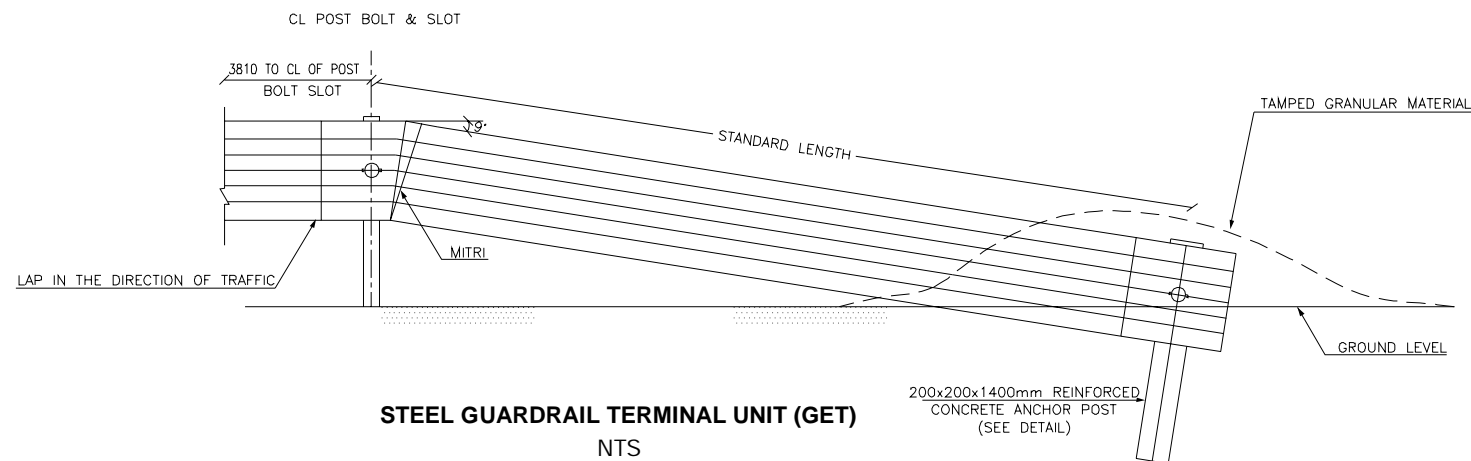
SECTION 1-1

SECTION 2-2

ELEVATION

TENDER DRAWINGS/MANUAL					
No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER
REPUBLIC OF LEBANON					
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION					
ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA					
STANDARD DETAILS				DATE January-2024	
CONCRETE & INCIDENTAL REPAIR DETAILS				SCALE As Shown	
SAFETY BARRIERS TYPE 2 (SB2) & TERMINAL UNIT DETAIL				Tender Drawings/Manual	
DRAWING No. DET-RM-17				REV 00	





#### NOTES

- Unless otherwise mentioned, all dimensions are in millimeters.
- The rail and posts of parapet shall be closed sections presenting no visible seam welds or exposed bolt heads.
- The contractor shall ensure the proper installation of the posts and rails using tools and procedure recommended by the manufacturer.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barriers as directed by the engineer.
- Parabolic flare shall be used, where possible, on main road only

SCALE REDUCTION : 1/2

#### TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

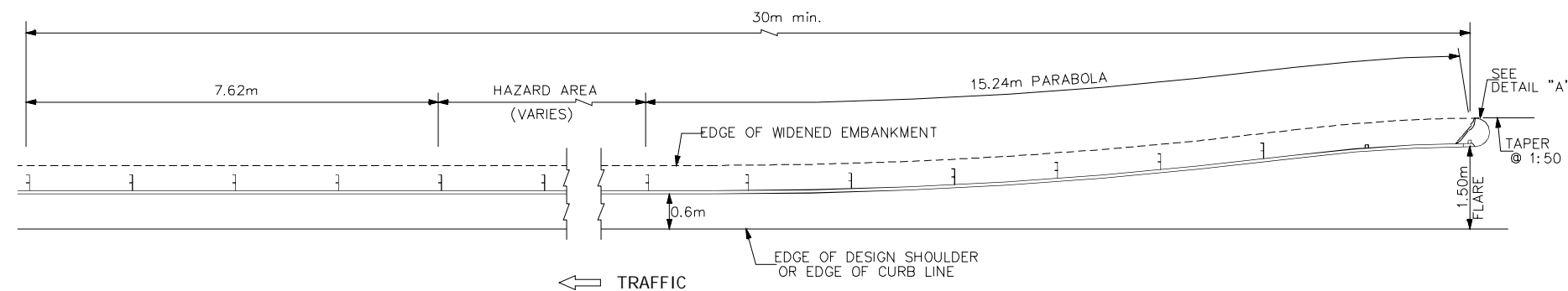
**REPUBLIC OF LEBANON**

**COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION**

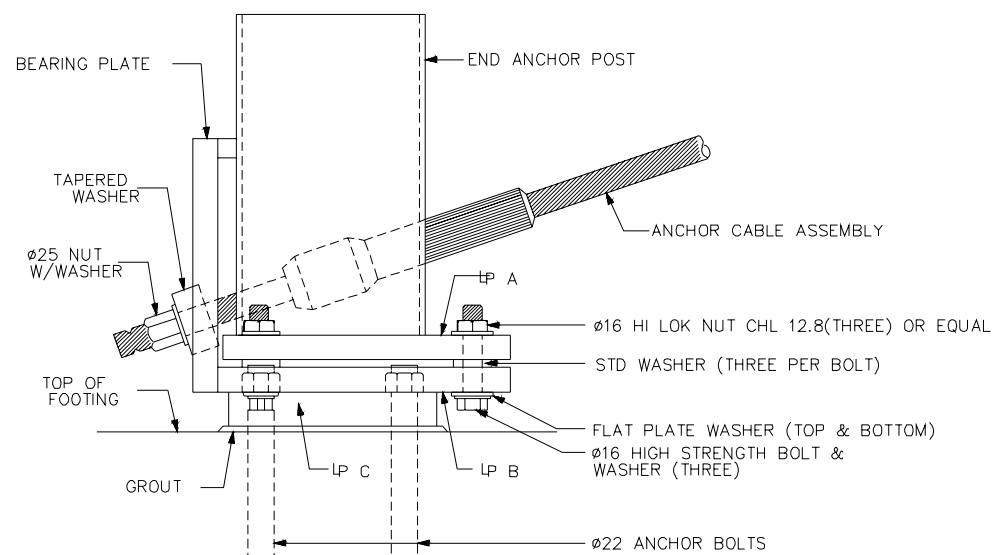
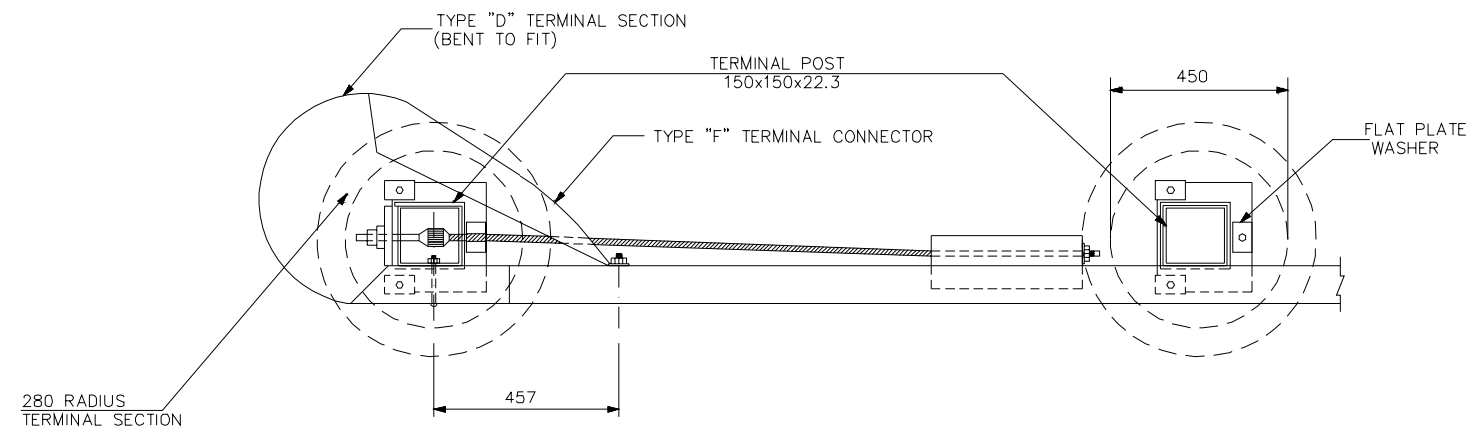
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS  
SAFETY BARRIERS DETAILS  
STEEL GUARDRAIL (SHEET 1 OF 4)

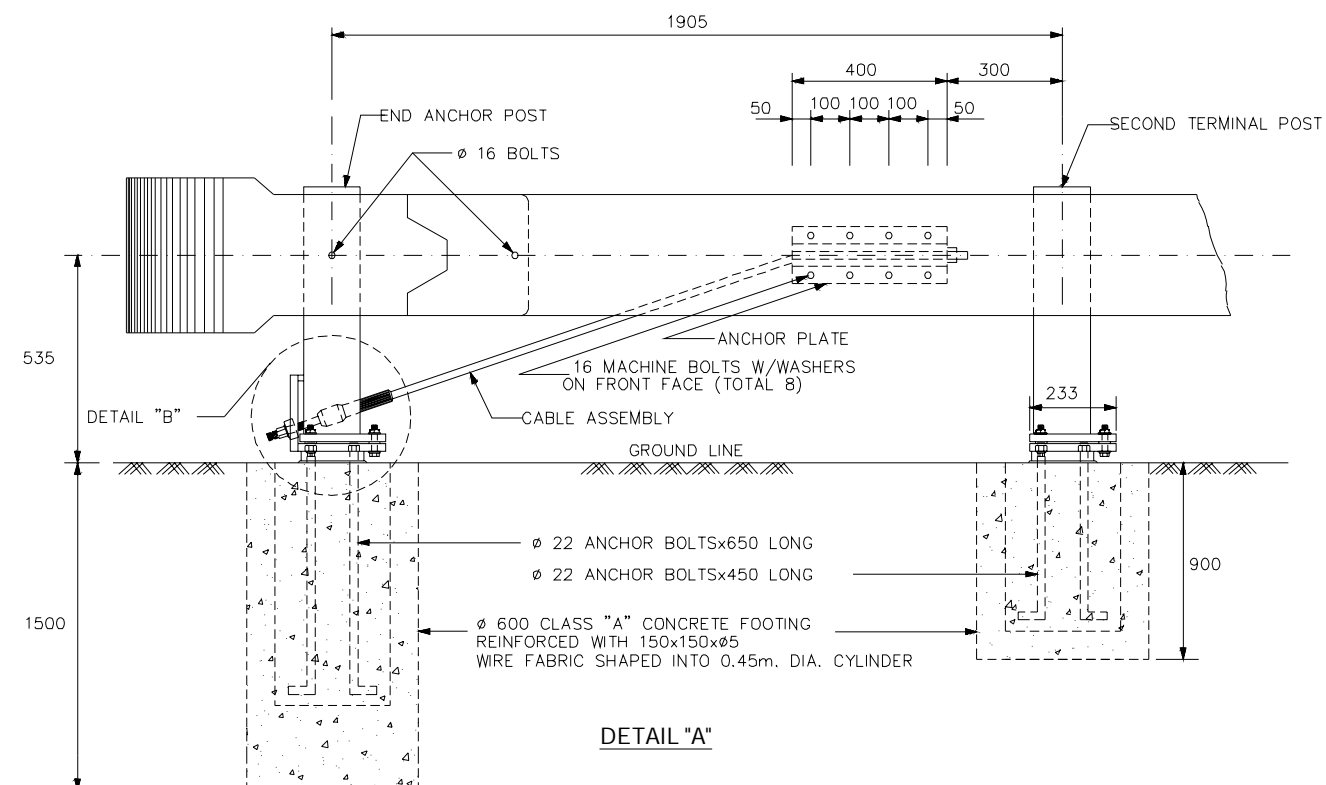
DATE January-2024  
SCALE As Shown  
Tender Drawings/Manual  
DRAWING No. DET-RM-18  
REV 00



**TYPICAL PLACEMENT DETAIL**  
( N . T . S ) (DIMENSIONS IN METERS)



**DETAIL "B"**



**DETAIL "A"**

## NOTES

- Unless otherwise mentioned, all dimensions are in millimeters.
- The rail and posts of parapet shall be closed sections presenting no visible seam welds or exposed bolt heads.
- The contractor shall ensure the proper installation of the posts and rails using tools and procedure recommended by the manufacturer.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barriers as directed by the engineer.
- Parabolic flare shall be used, where possible, on main road only

## TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

## REPUBLIC OF LEBANON

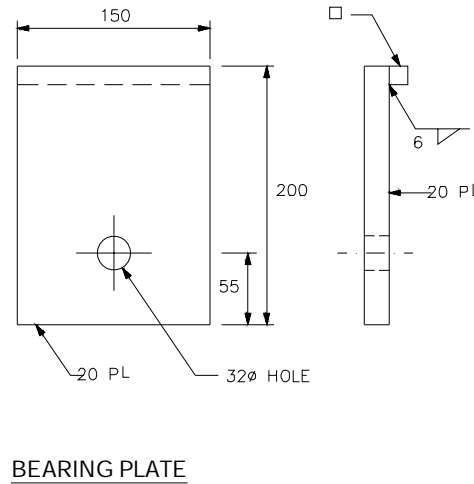
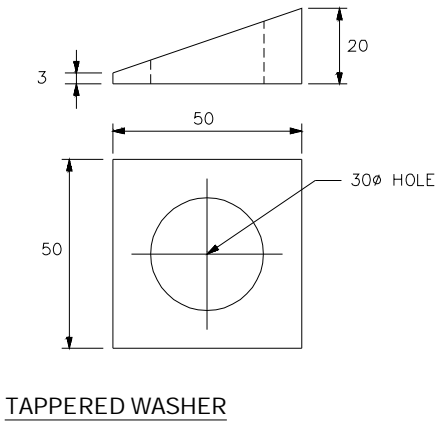
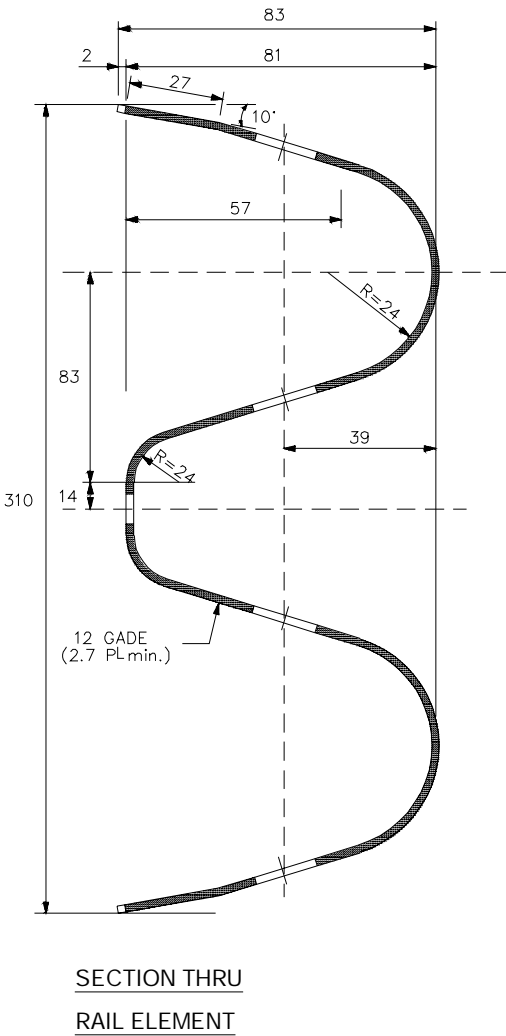
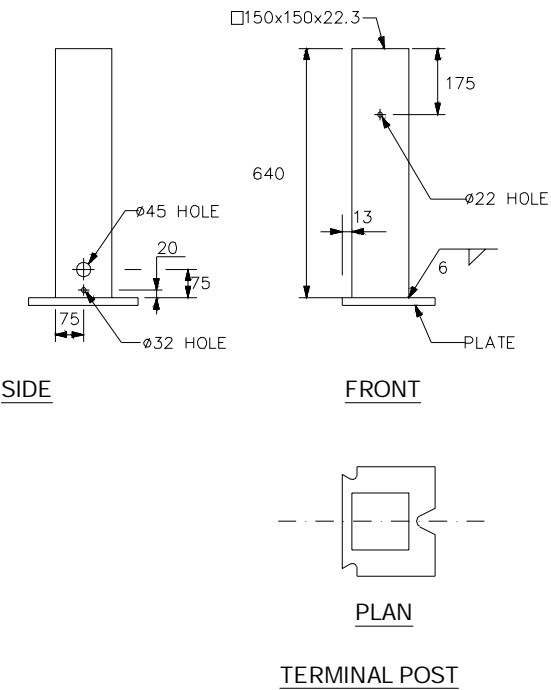
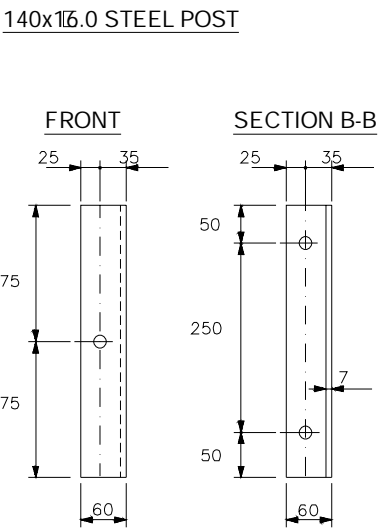
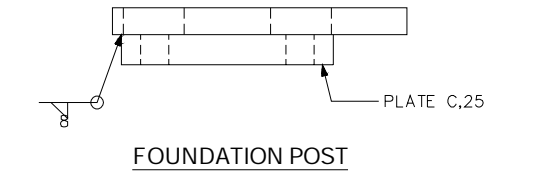
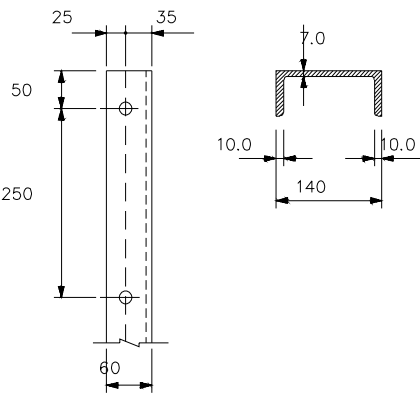
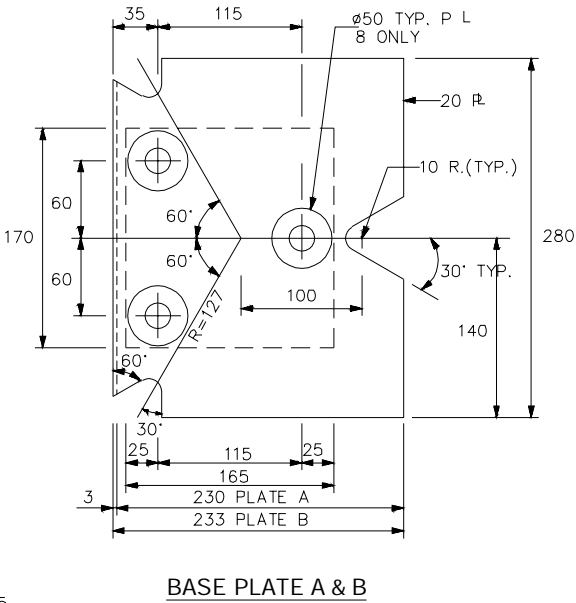
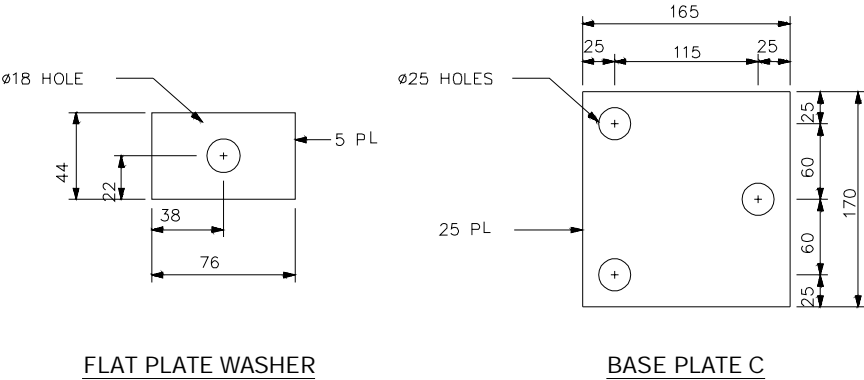
### COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

#### ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA

STANDARD DETAILS	DATE January-2024
PAVEMENT REPAIR DETAILS	SCALE As Shown
SAFETY BARRIERS DETAILS	Tender Drawings/Manual
STEEL GUARDRAIL (SHEET 2 OF 4)	DRAWING No. DET-RM-19 REV 00



RAIL , POST , BLOCK & PLATE DETAILS



NOTES

- Unless otherwise mentioned, all dimensions are in millimeters.
- The rail and posts of parapet shall be closed sections presenting no visible seam welds or exposed bolt heads.
- The contractor shall ensure the proper installation of the posts and rails using tools and procedure recommended by the manufacturer.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barriers as directed by the engineer.
- Parabolic flare shall be used, where possible, on main road only

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

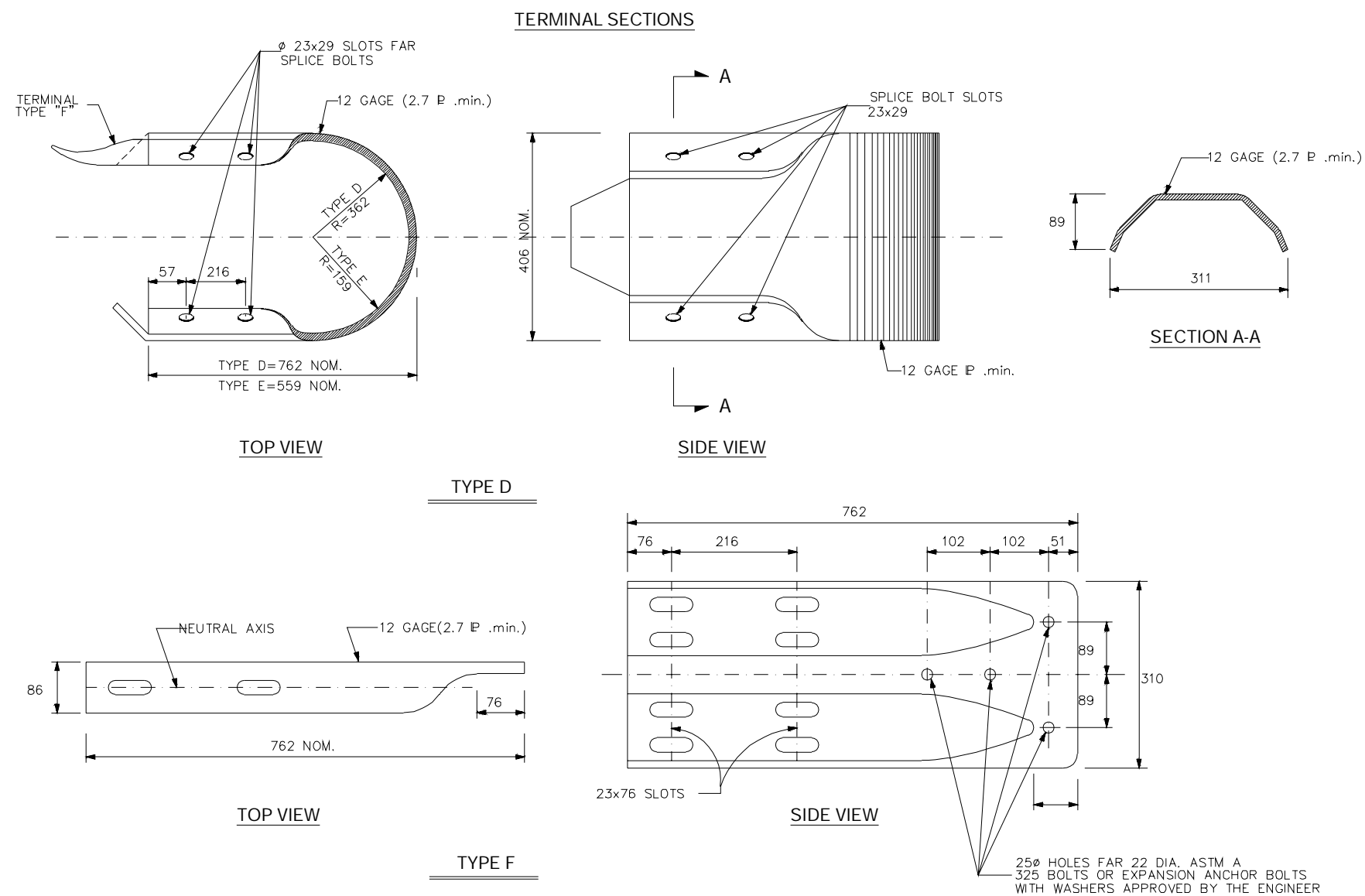
REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
PAVEMENT REPAIR DETAILS  
SAFETY BARRIERS DETAILS  
STEEL GUARDRAIL (SHEET 3 OF 4)

DATE January-2024  
SCALE As Shown  
Tender Drawings/Manual  
DRAWING No. DET-RM-20  
REV 00



**NOTES**

- Unless otherwise mentioned, all dimensions are in millimeters.
- The rail and posts of parapet shall be closed sections presenting no visible seam welds or exposed bolt heads.
- The contractor shall ensure the proper installation of the posts and rails using tools and procedure recommended by the manufacturer.
- Execution contractor has to submit shop drawings related to new safety barriers, showing exact locations & Levels, for engineer approval.
- Alignment of new safety barriers shall be parallel to the road alignment.
- Top Level of new safety barriers shall, at some degrees, compensate any weaving in the existing road profile.
- Barrier terminal unit to be provided at the edge of new safety barriers as directed by the engineer.
- Parabolic flare shall be used, where possible, on main road only

**TENDER DRAWINGS/MANUAL**

No	DATE	REVISION	DESCRIPTION	CHECKED	P. MANAGER

**REPUBLIC OF LEBANON**

**COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION**

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  PAVEMENT REPAIR DETAILS   SAFETY BARRIERS DETAILS STEEL GUARDRAIL (SHEET 4 OF 4)	DATE	January-2024
	SCALE	As Shown
	Tender Drawings/Manual	
	DRAWING No. DET-RM-21	REV 00



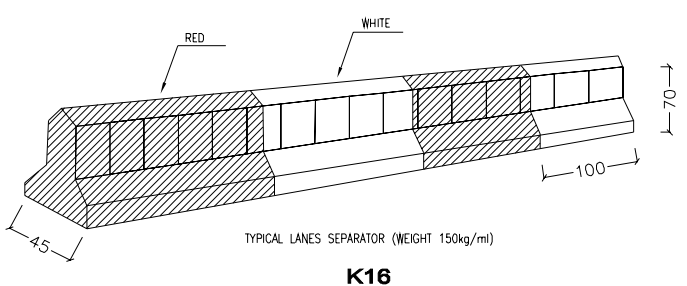
**SUPPORT IS YELLOW AND SYMBOLS, LETTERS AND LISTEL ARE BLACK**



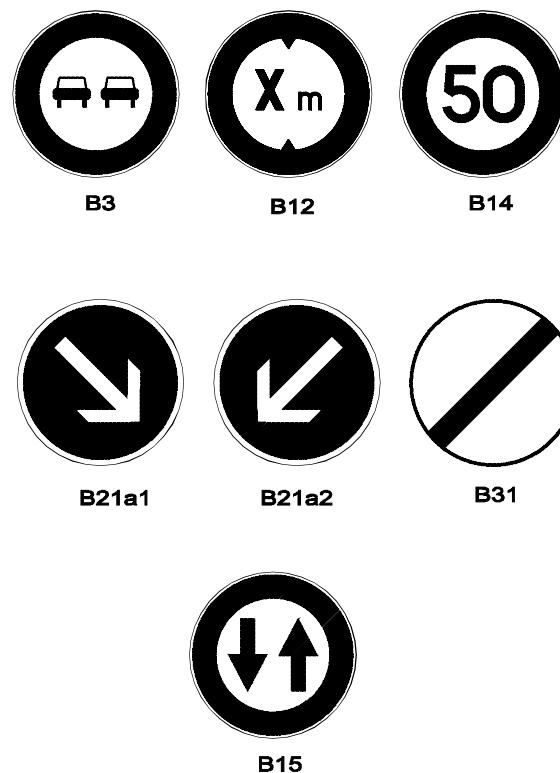
THESE LINES ARE YELLOW AND REFLECTORISING.  
THEY CAN BE ERASED OR REMOVED WITHOUT ANY RESIDUAL TRACE.



## NOTES



**DIAMETER 085m**



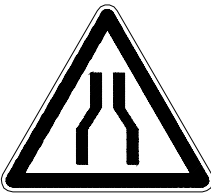
TENDER DRAWINGS/MANUAL						
No.	DATE	REVISION	DESCRIPTION	CHECKED	P. MANAGER	
<div style="text-align: center;"> <h1>REPUBLIC OF LEBANON</h1> <hr/> <h2>COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION</h2> </div>						
<h3>ROAD ROUTINE MAINTENANCE FOR LOT 18 ZAHLE CAZA</h3>						
STANDARD DETAILS				DATE    January-2024		
TRAFFIC SAFETY & CONTROL DEVICES DETAILS				SCALE    As Shown		
SIGNING & MARKING TYPICAL DETAILS TEMPORARY SIGNS (SHEET 1 OF 2)				Tender Drawings/Manual		
				DRAWING No.    REV DET-SA-01        00		

WARNING SIGNS TYPE AK

SIDE 0.70 m



AK2



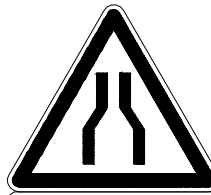
AK3



AK4



AK5

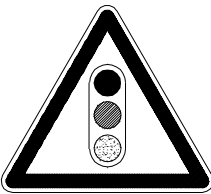


200 m

AK3+KM1



AK14



AK17



AK22



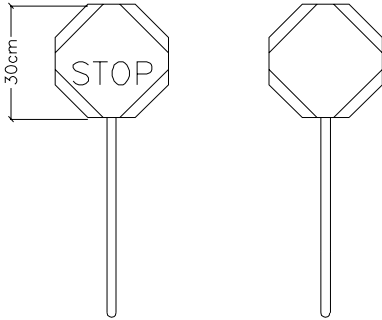
AK14+KM9+KM2  
EXAMPLE



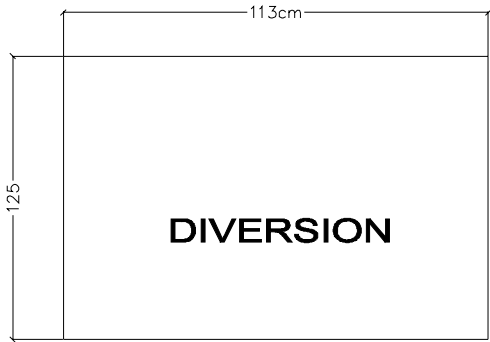
AK5+KM9

BY FLAGMEN

STANDARD SIGNS PADDLE



WARNING SIGNS TYPE KC

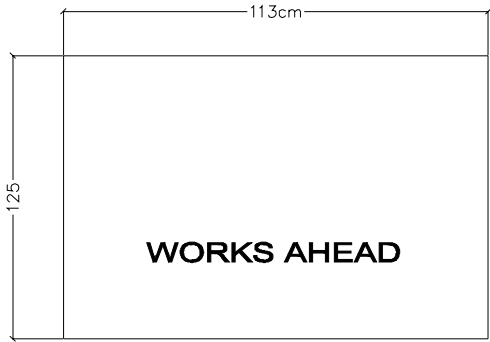


PROVIDE AT 500m ,200m AND 100m LEFT AND RIGHT

DIVERSION SIGN



DEAD END SIGN



PROVIDE AT 500m ,200m AND 100m LEFT AND RIGHT

WORKS AHEAD SIGN

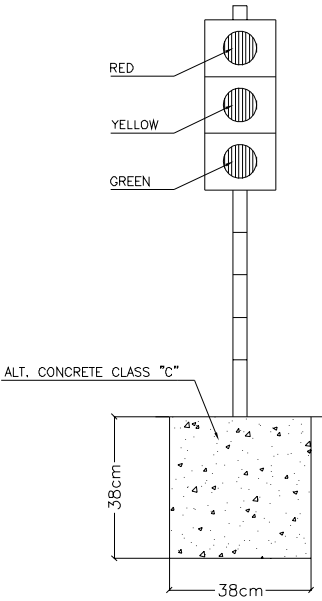
NOTES

- All dimensions are in centimeters unless otherwise indicated.
- Temporary signboards shall be conform with specifications
- The contractor shall prepare and submit the temporary detours drawings for approval by the engineer.

TEMPORARY LIGHTS

TEMPORARY TRAFFIC LIGHTS

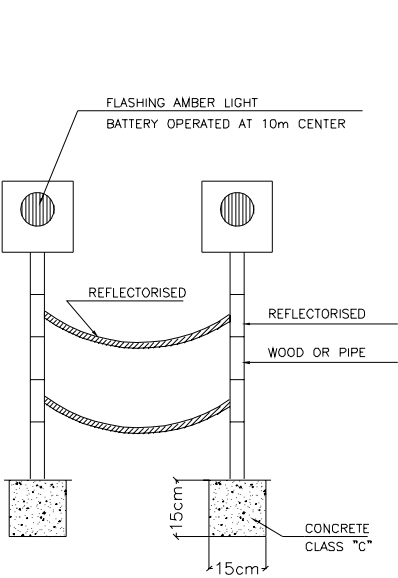
AT START AND AT END OF EVERY DIVERSION OR TEMPORARY WORK BATTERY OPERATED OR BY GENERATOR



TEMPORARY DELINEATORS

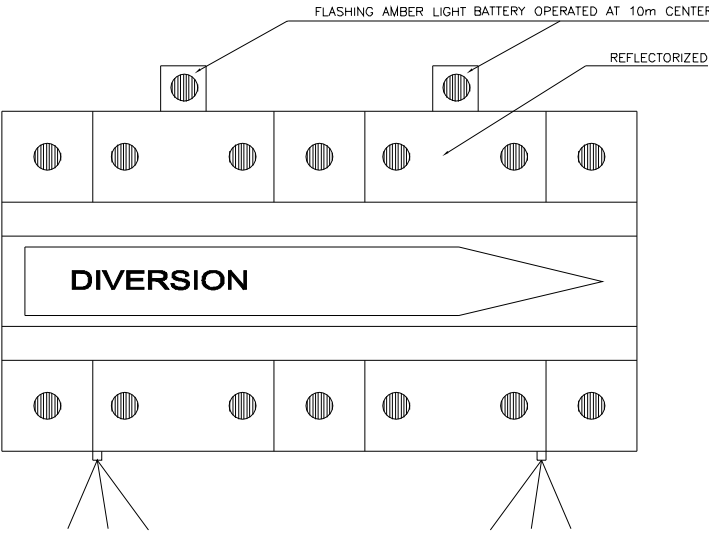
TO BE PLACED ALL THE LENGTH OF ANY DIVERSION OR WHEREVER WORK ADJACENT

TO EXISTING ROAD OCCURS



BARRICADE

AT DIVERSION AT EACH SIDE



TENDER DRAWINGS/MANUAL					
No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

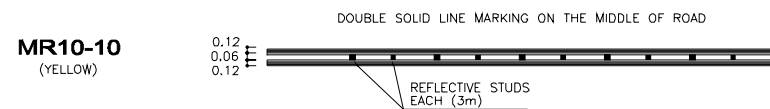
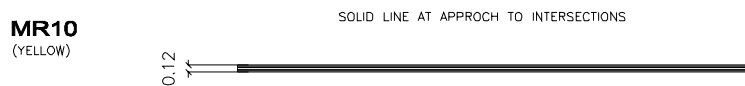
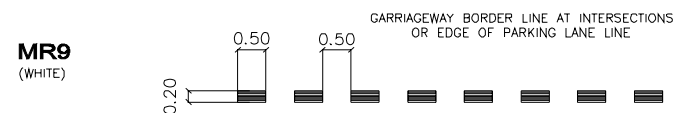
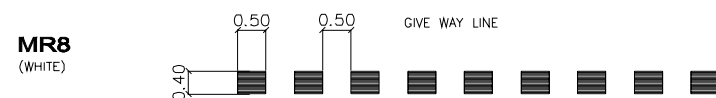
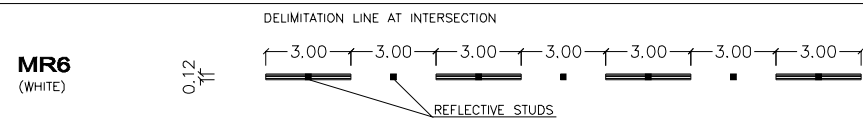
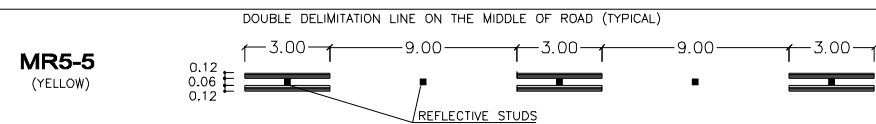
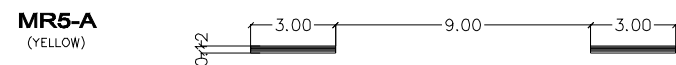
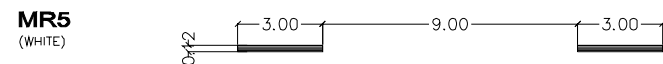
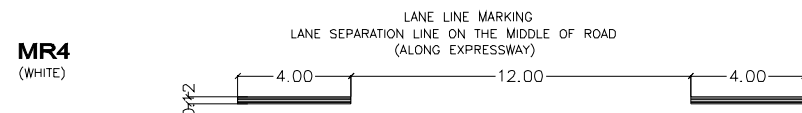
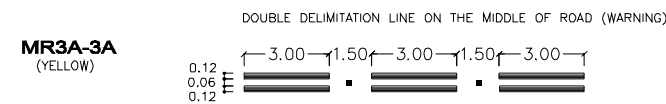
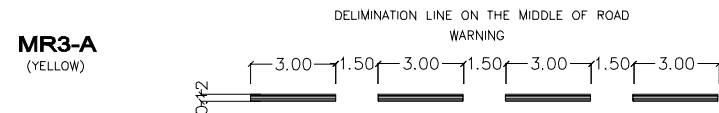
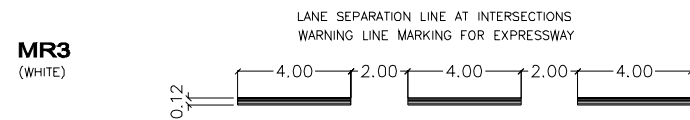
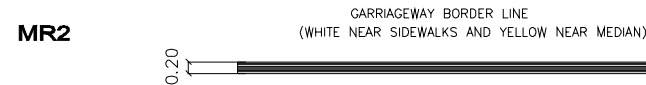
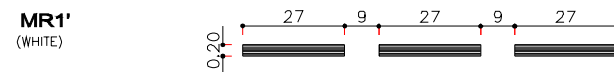
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

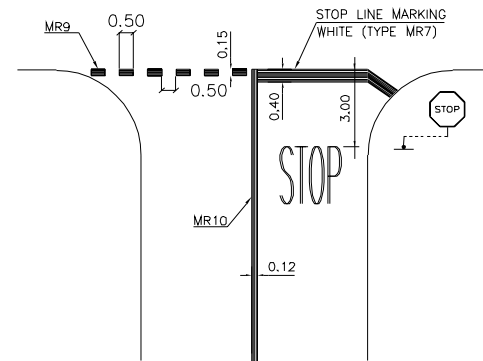
STANDARD DETAILS TRAFFIC SAFETY & CONTROL DEVICES DETAILS SIGNING & MARKING TYPICAL DETAILS TEMPORARY SIGNS (SHEET 2 OF 2)	DATE	January-2024
	SCALE	As Shown
	Tender Drawings/Manual	
	DRAWING No. DET-SA-02	REV 00



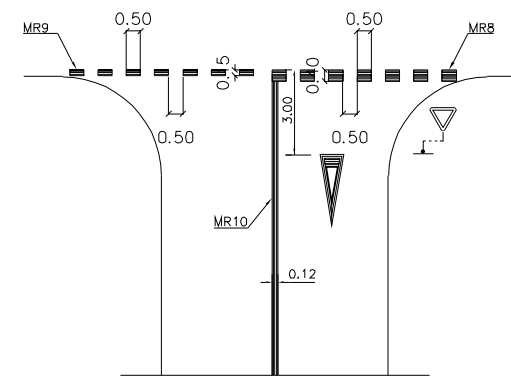
## PAVEMENT MARKERS AND TRAFFIC LINES



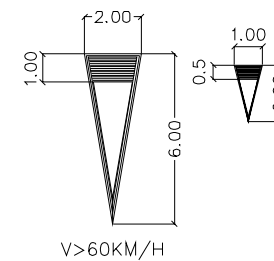
# TRANSVERSAL MARKING



**" T " INTERSECTION**  
**" STOP " LINE AT INTERSECTION**  
SCALE : 1/100

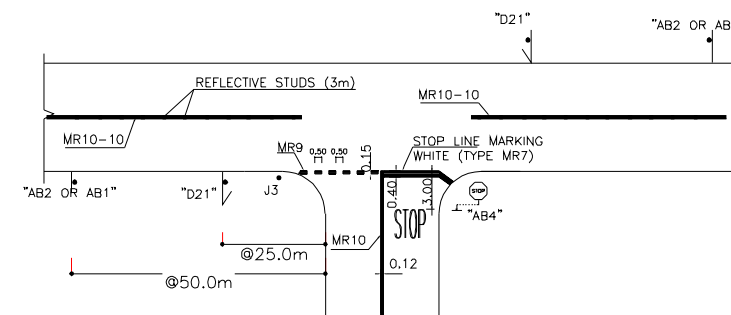
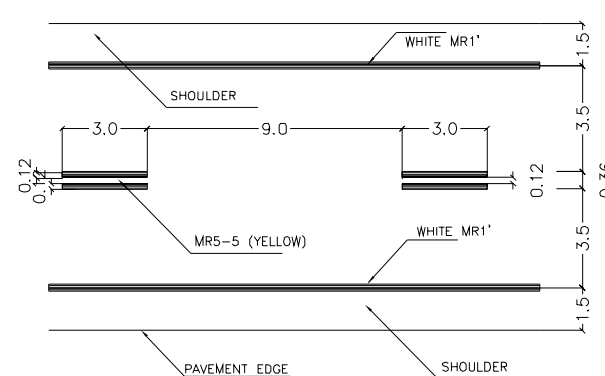


**" T " INTERSECTION**  
**" YIELD " LINE AT INTERSECTION**  
SCALE : 1/100



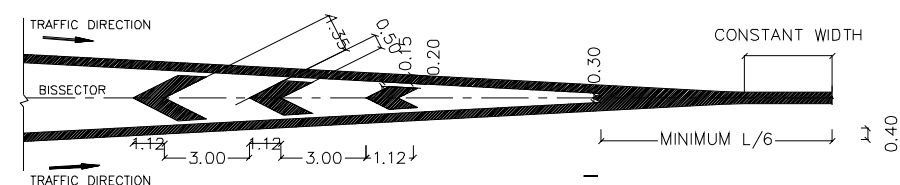
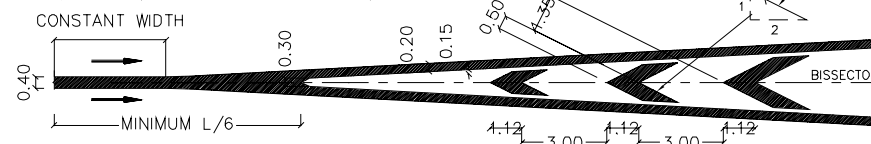
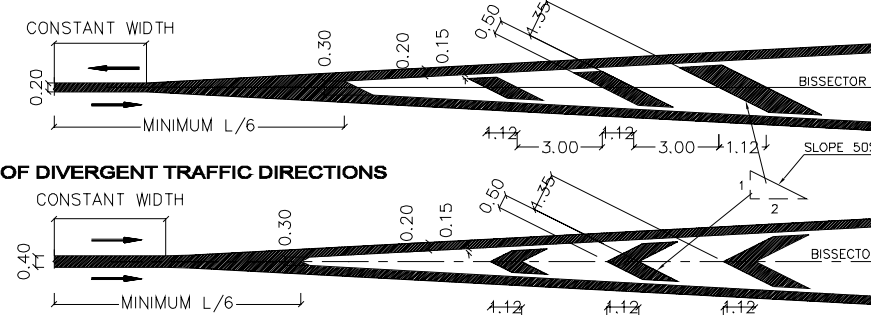
**" YELD " TRIANGLE**

## TYPICAL ROAD MARKING



" T " INTERSECTION  
" STOP " LINE AT INTERSECTION  
1/100

IN CASE OF OPPOSITE TRAFFIC DIRECTIONS  
CROSS HATCH DETAILS



## NOTES

- Unless otherwise mentioned, all dimension are in meters.
- All paint marking shall be thermoplastic type.

SCALE REDUCTION : 1/2

## TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P_MANAGER

**REPUBLIC OF LEBANON**

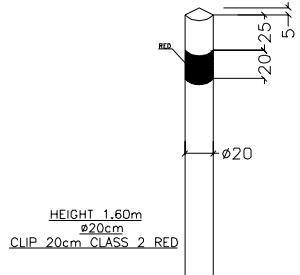
**COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION**

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

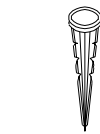
STANDARD DETAILS	DATE	January-2024
TRAFFIC SAFETY & CONTROL DEVICES DETAILS	SCALE	As Shown
SIGNING & MARKING TYPICAL DETAILS	Tender Drawings/Manual	
REGULAR MARKING	DRAWING No. DET-SA-03	REV (00)

MARKER POST

MARKER POST AT INTERSECTION J3  
(WITH REFLECTORISING CLIP)



METALLIC PILE



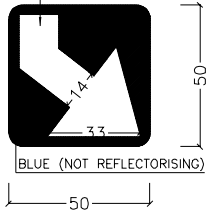
HEIGHT 40cm  
THE FLANGES PREVENT ALL  
ROTATION IN SOIL.

MARKER POST J1  
(WITHOUT REFLECTORISING CLIP)

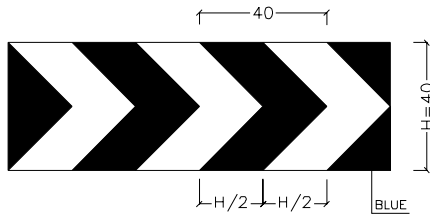


HEIGHT 1.60m  
ø20cm

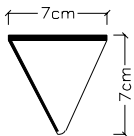
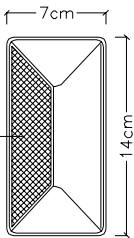
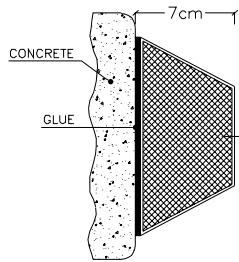
MARKER POST J5  
WHITE (REFLECTORISING)



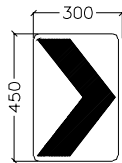
MARKER POST J4



1 - WAY RETROREFLECTIVE MARKER



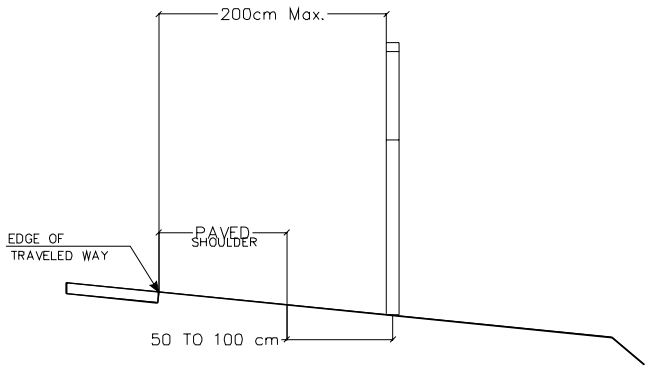
DELINEATORS



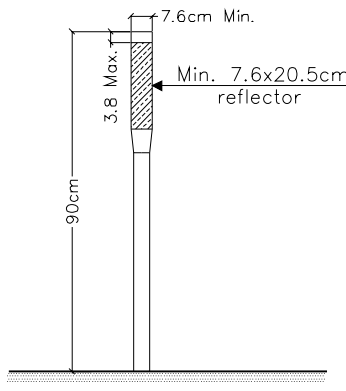
S: DELINEATOR SPACING  
R: RADIUS OF BEND

R(m)	600	300	270	240	210	180	120	90	75	60	50	45	30	15
S(m)	50	28	26.5	23	21	19	17	14.5	13	11	10	9	7.5	6

DELINEATOR SPACING AT HORIZONTAL CURVES

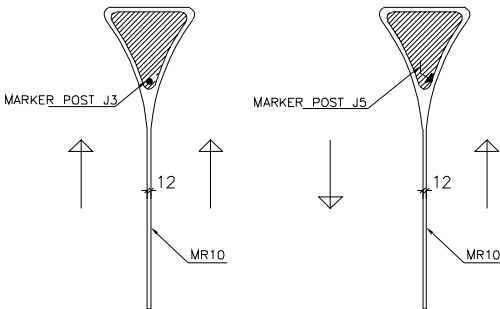


DELINEATOR POSITIONING

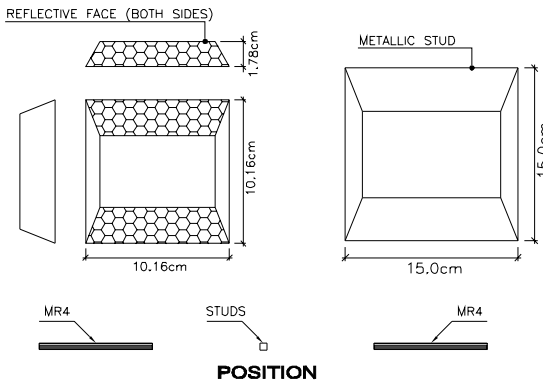


POST MOUNTED DELINEATOR

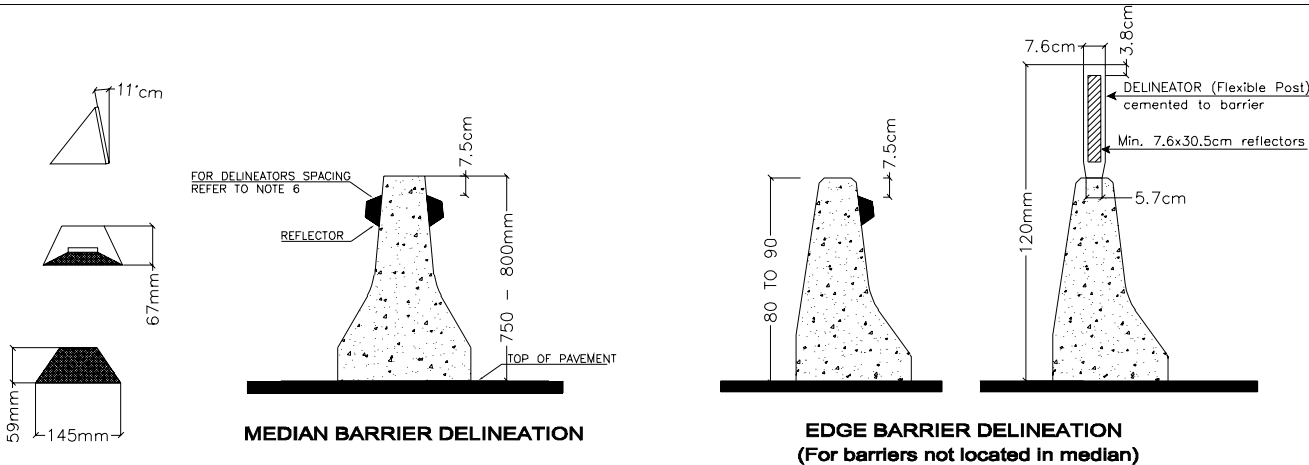
DIRECTIONAL ISLANDS



PAVEMENT STUDS



NEW JERSEY BARRIER REFLECTOR



NOTES

- Unless otherwise mentioned, all dimension are in centimeters.
- All paint marking shall be thermoplastic type.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

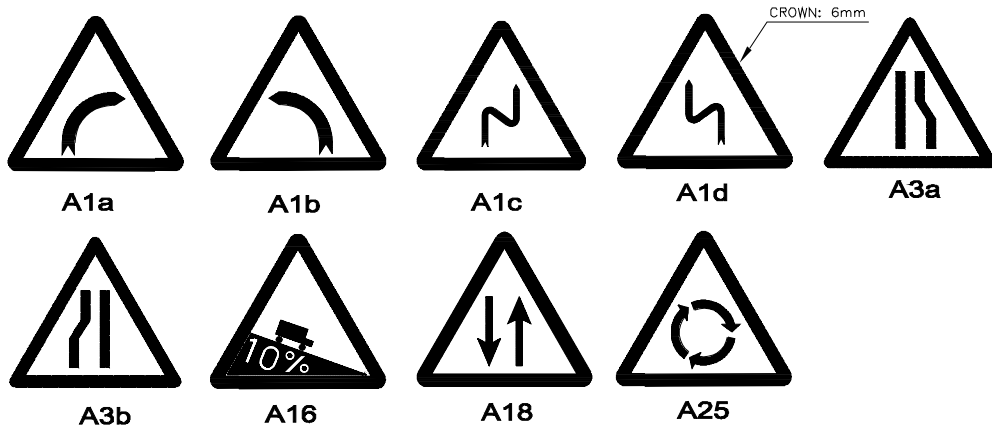
REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

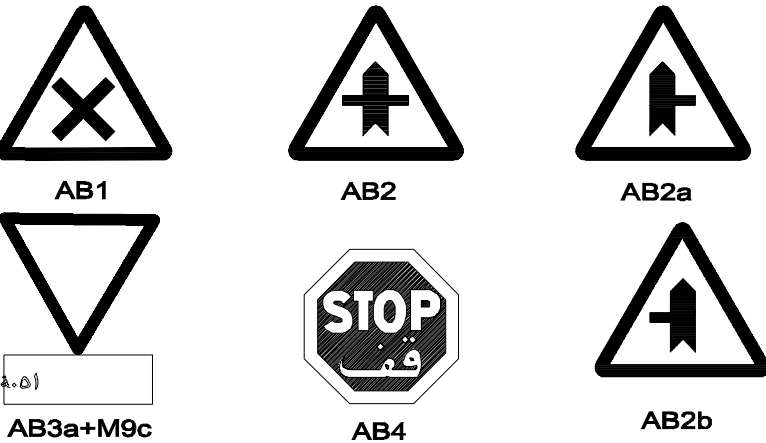
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS	DATE	January-2024
TRAFFIC SAFETY & CONTROL DEVICES DETAILS	SCALE	As Shown
SIGNING & MARKING TYPICAL DETAILS	Tender Drawings/Manual	
SPECIAL MARKING & REFLECTIVE DETAILS	DRAWING No.	DET-SA-04
	REV	00

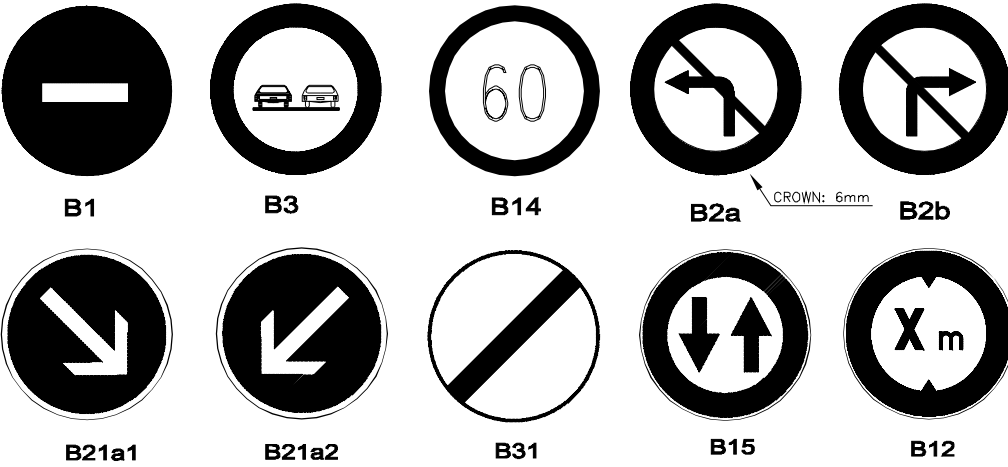
DANGER SIGNBOARDS



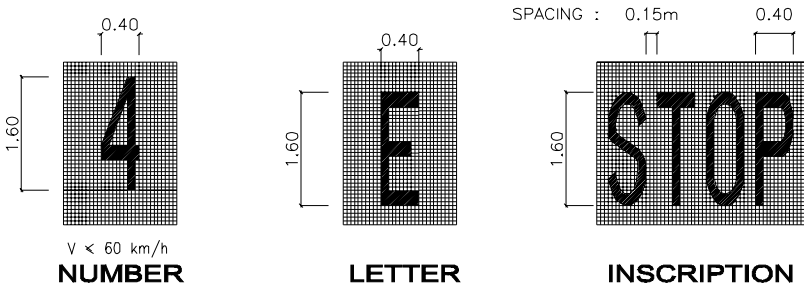
INTERSECTION SIGNBOARDS



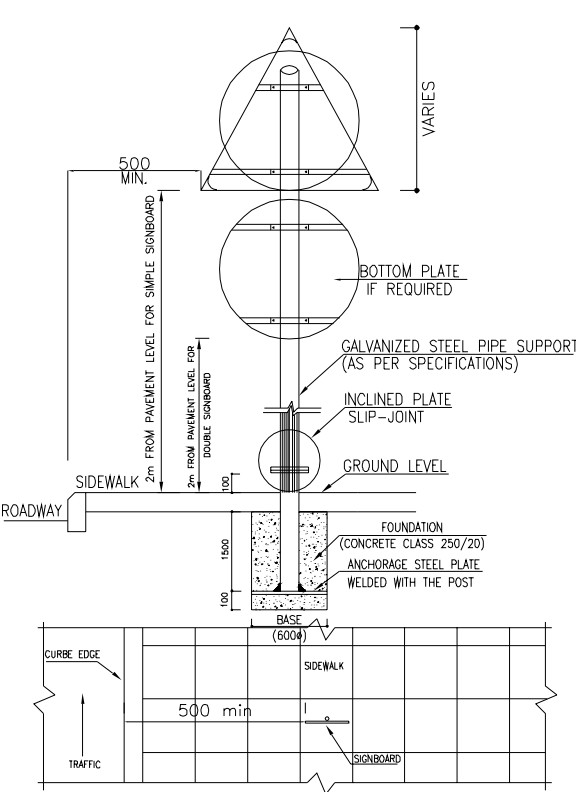
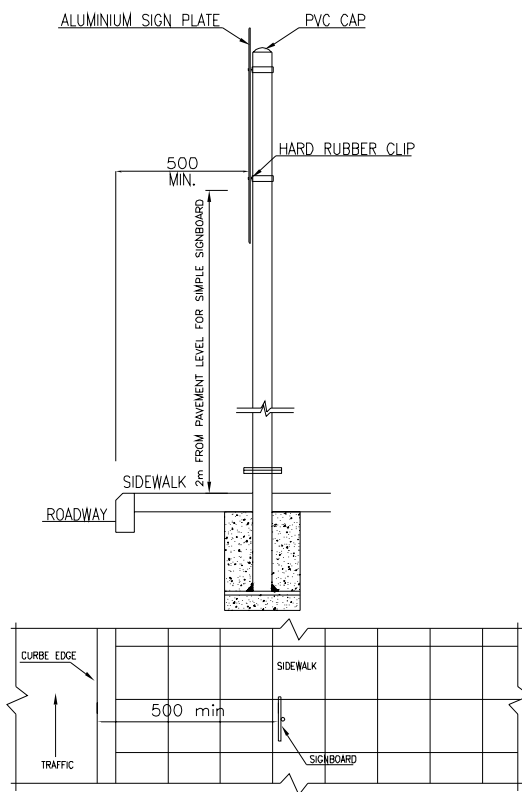
PRESCRIPTION SIGNBOARDS



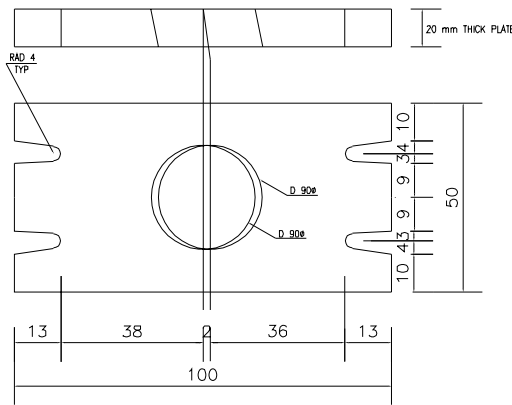
NUMBERS AND LETTERS EXAMPLES



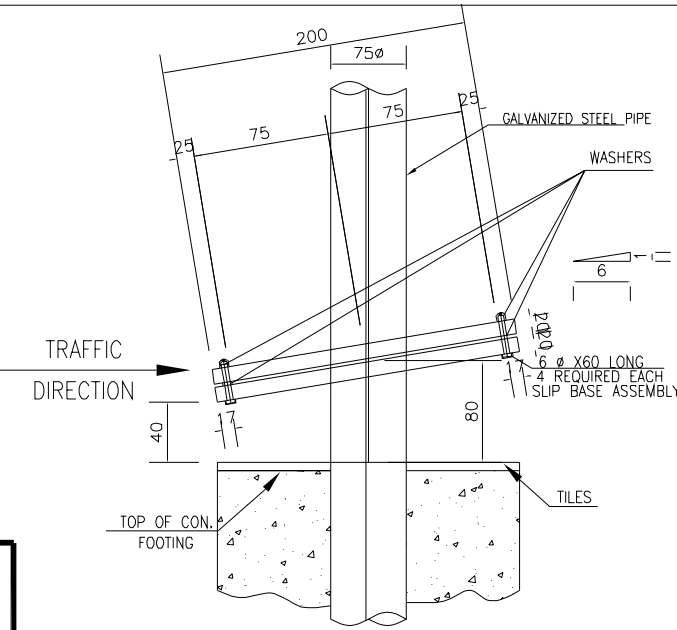
SIGN MOUNTED (SINGLE OR DOUBLE)



SLIP BASE DETAILS

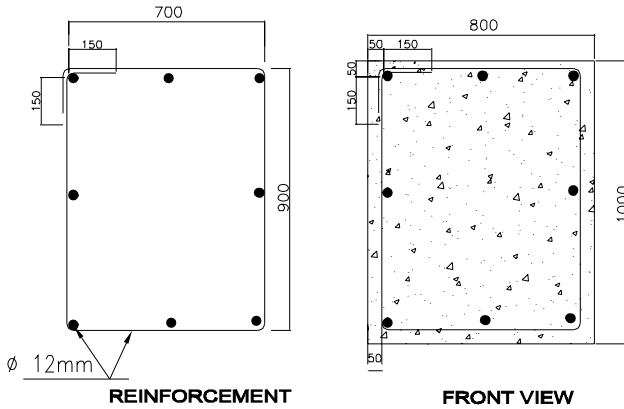


SLIP BASE PLATE DETAIL

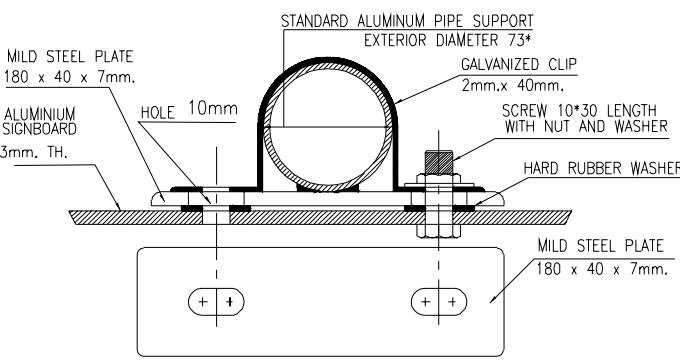


INCLINED SLIP BASE DETAIL

FOOTING REINFORCEMENT



ASSEMBLING FOR FIXATION



NOTES

- The Signboards Used Will Be In Conformity With European Codes
- The Signboards Dimensions In (mm) Are:
  - Triangular
  - Circular
  - Square
  - Octagon
- The White Surface For Signboards Is Reflectorising.
- It Is To Be Insured That The Soil Bearing Capacity Below The Foundation Is 100 KN/m2 Or Higher.
- Factor Of Safety Is To Be 1.50 Against Overturning.
  - 700 (Side)
  - 650 (Diameter)
  - 500 (Side)
  - 600 (Apotheme)
- Steel Reinforcement For Footing Shall Conform To ASTM A615, Grade 60 Or Equivalent.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

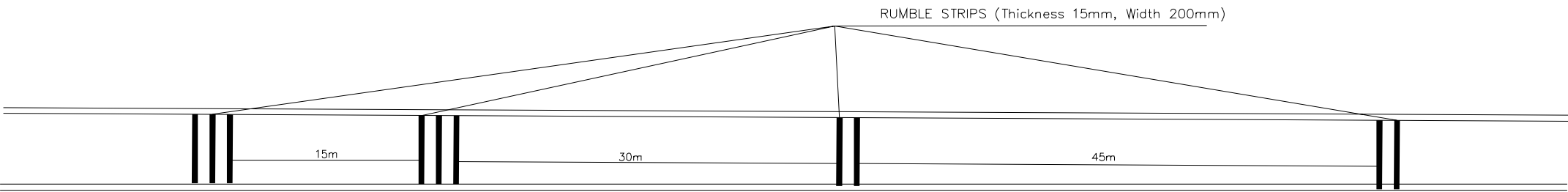
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

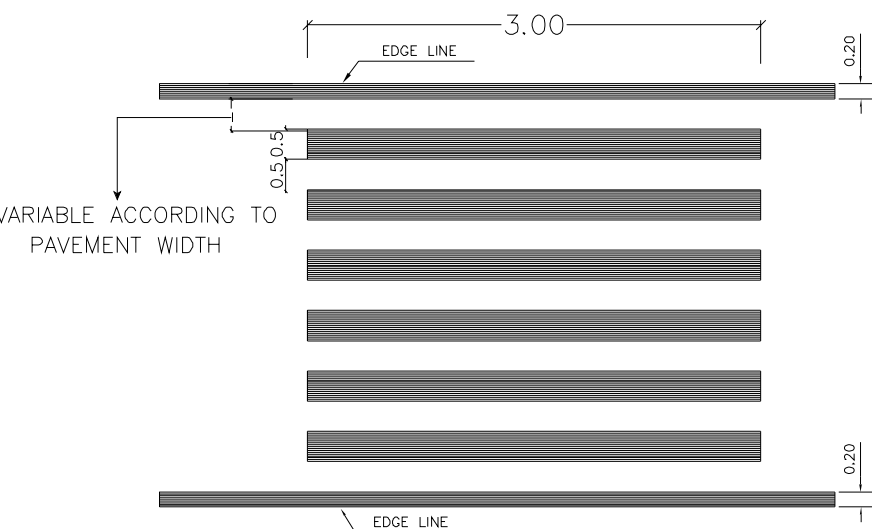
STANDARD DETAILS	DATE January-2024
TRAFFIC SAFETY & CONTROL DEVICES DETAILS	SCALE As Shown
SIGNING & MARKING TYPICAL DETAILS	Tender Drawings/Manual
DRAWING No. DET-SA-05	REV 00



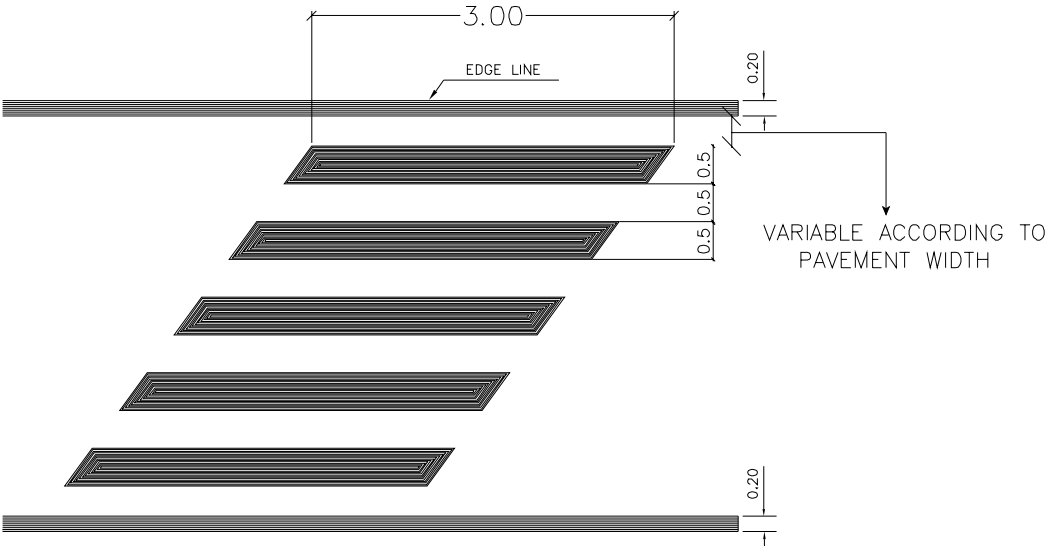
THERMOPLASTIC REFLECTORIZED PAINT FOR RUMBLE STRIPS



PEDESTRIAN CROSSING DETAIL

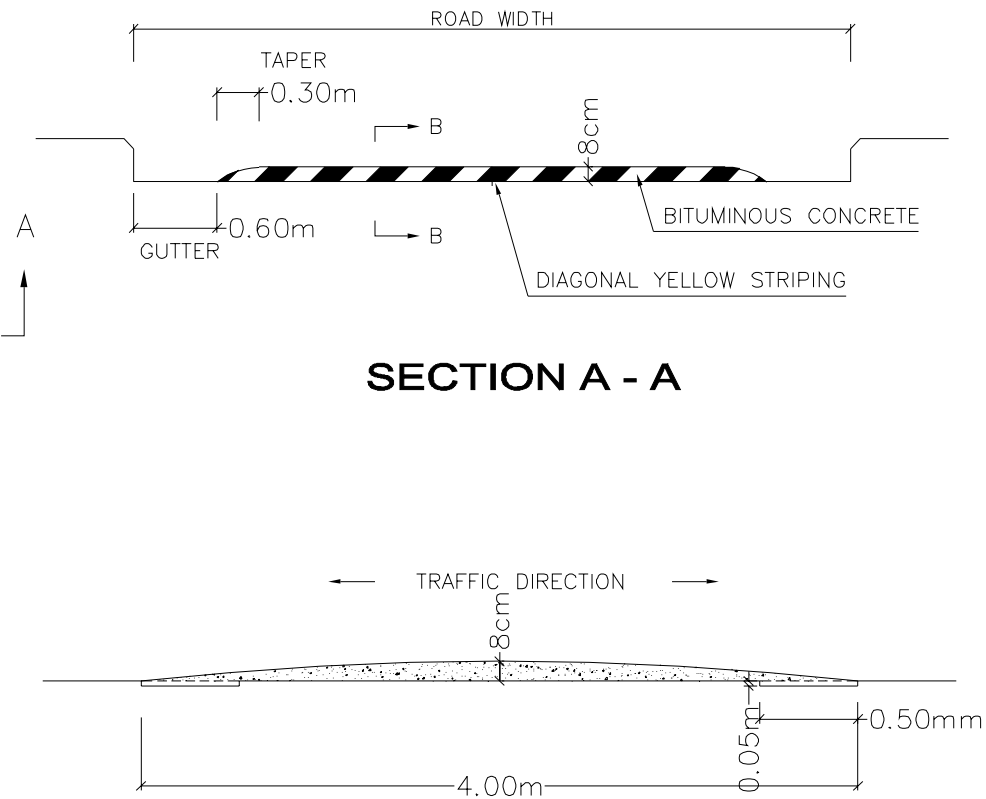
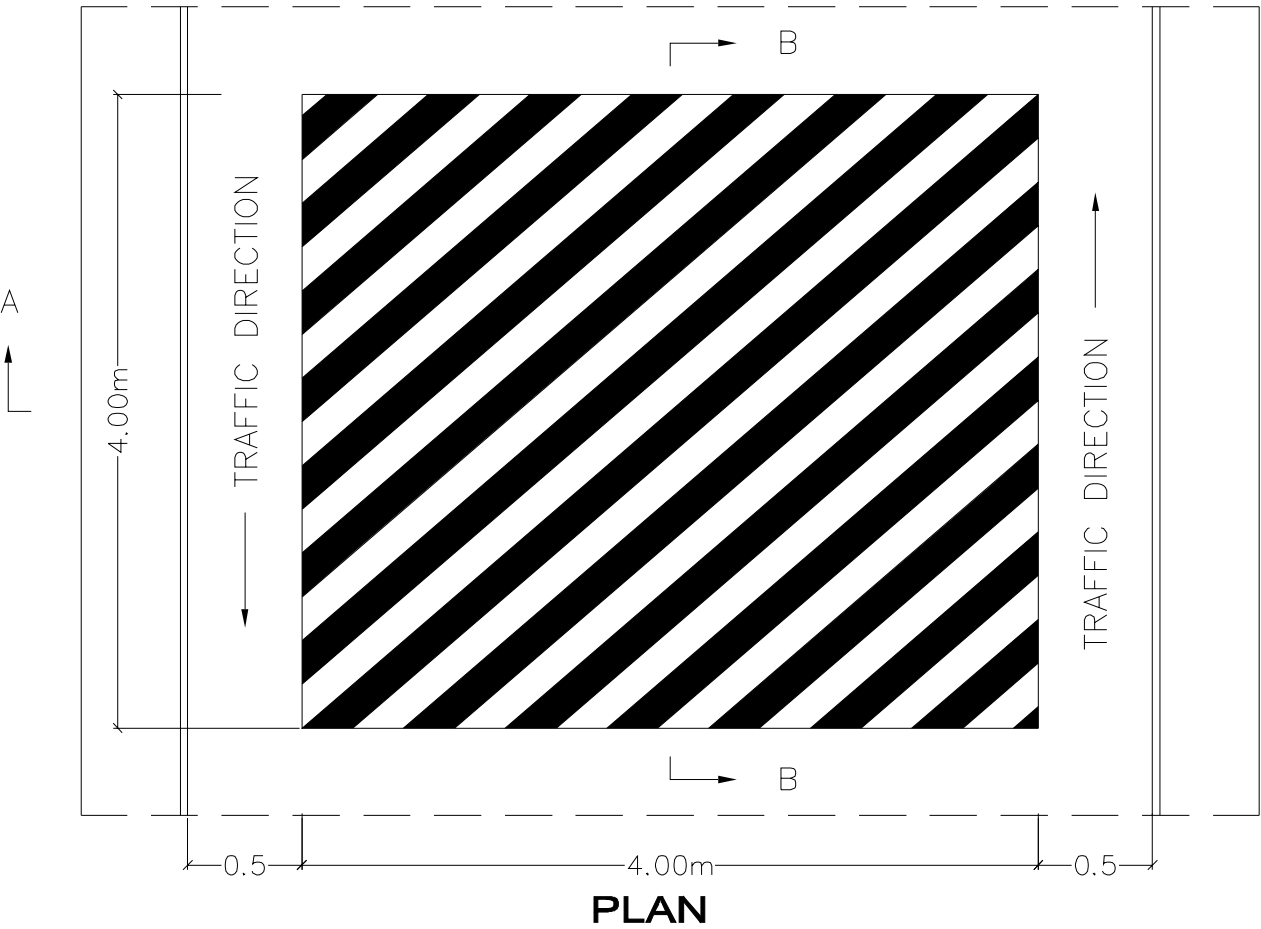


PERPENDICULAR PATH



SKEW PATH

SPEED HUMPS



NOTES

- Unless otherwise mentioned, all dimension are in millimeters.
- Exact location of pedestrian crossing and location/type of speed humps to be determined on site upon engineer approval.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

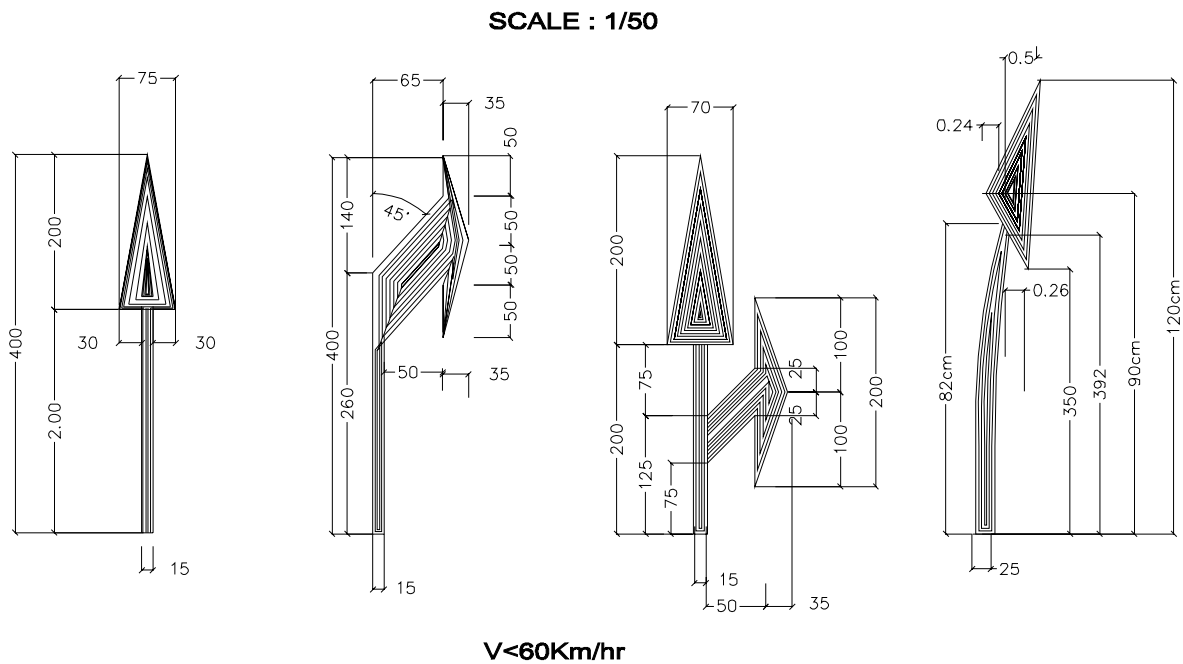
REPUBLIC OF LEBANON





COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

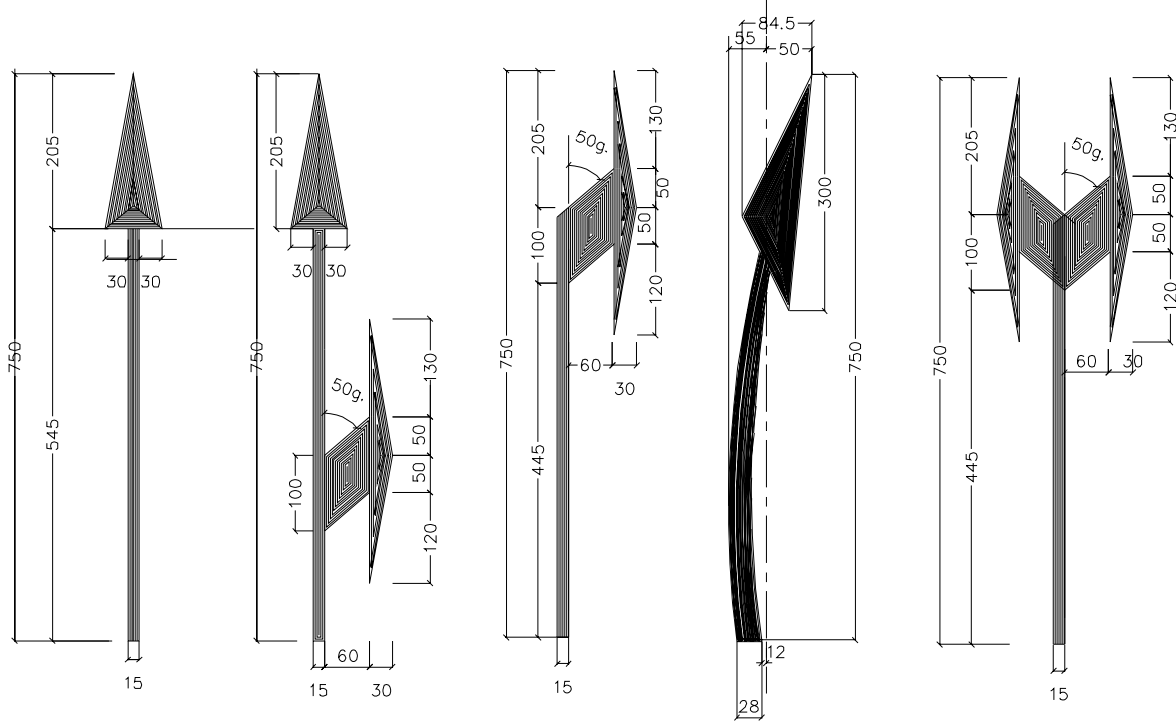
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS	DATE January-2024
TRAFFIC SAFETY & CONTROL DEVICES DETAILS	SCALE As Shown
SIGNING & MARKING TYPICAL DETAILS	Tender Drawings/Manual
PEDESTRIAN CROSSING & SPEED HUMPS	DRAWING No. DET-SA-06 REV 00

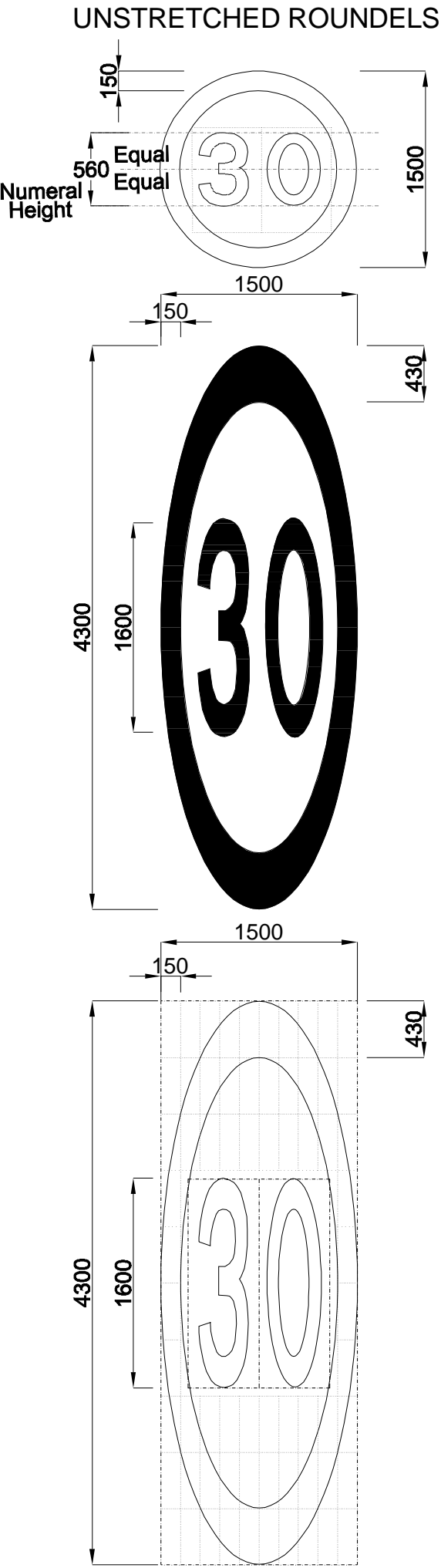
DIRECTIONAL ROAD ARROW MARKINGS



SPEED LIMIT	ARROW AREA (m2)			
				
>60Km/hr	1.59	2.71	1.95	1.55
≤60Km/hr	0.71	1.21	0.87	1.55



ROAD MARKINGS SPEED LIMIT



NOTES

- Unless otherwise mentioned, all dimension are in millimeters.

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

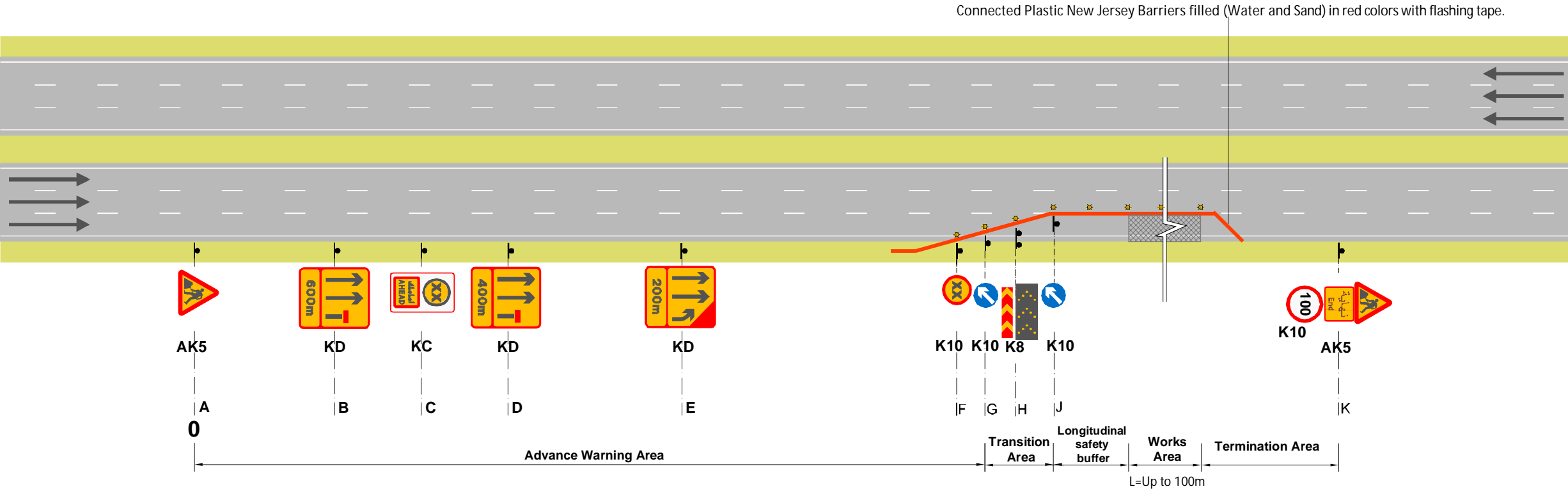
REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS	DATE January-2024
TRAFFIC SAFETY & CONTROL DEVICES DETAILS	SCALE As Shown
SIGNING & MARKING TYPICAL DETAILS	Tender Drawings/Manual
SPEED LIMITS & DIRECTIONAL ROAD ARROW	DRAWING No. DET-SA-07 REV 00

Typical Lane Closure on Highway - Right side



Sign locations

	Advance Warning Area						Transition Area			Termination Area
	A	B	C	D	E	F	G	H	J	K
Permanent Speed Limit										
	0	400	500	600	800	900	1050	1230	1410	100 From End of Works

Advanced warning Area shall be increased a in case of horizontal curves and/or working during night.

Solar Flash Light on sings and every 15m

Permanent Speed Limit	Minimum Longitudinal Safety Buffer Length
	80 m

Permanent Speed Limit	Taper Length (3.65 Lanes)
	360

NOTES

- DO NOT SCALE FROM THE DRAWINGS.
- CONNECTED = PLASTIC NEW JERSEY BARRIERS FILLED (WATER AND SAND) IN RED COLORS WITH FLASHING TAPE.
- THIS TMP ON HIGHWAY IS INDICATIVE.THE CONTRACTOR SHALL PREPARE THE UPDATED TMP BASED ON GROUND CONDITIONS AND SHALL BE APPROVED BY THE CONSULTANT PREVIOUS TO COMMENCEMENT OF WORKS.
- ADVANCED WARNING AREA SHALL BE INCREASE IN CASE OF HORIZONTAL CURVES AND/OR WORKING DURING NIGHT.

Legend:

- PLASTIC NEW JERSEY BARRIERS FILLED (WATER AND SAND)
- SOLAR FLASH LIGHT ON SINGS AND EVERY 15M

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

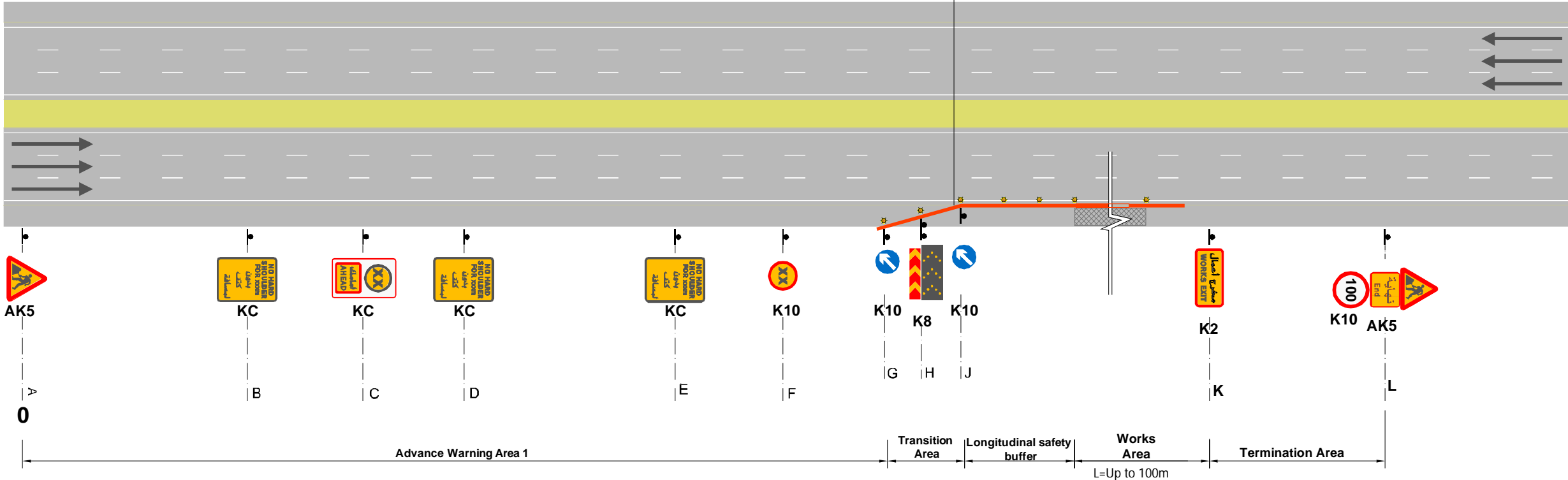
ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  <b>TRAFFIC MANAGEMENT PLAN ON HIGHWAY</b>  TYPICAL LANE CLOSURE RIGHT SIDE (1 OF 3)	DATE January-2024	
	SCALE As Shown	
	Tender Drawings/Manual	
	DRAWING No. DET-SA-08	REV 00















## Typical Lane Closure on Highway - Shoulder

Connected Plastic New Jersey Barriers filled (Water and Sand) in red colors with flashing tape.




## Sign locations

Permanent Speed Limit	Advance Warning Area 1						Transition Area			Termination Area	
	A	B	C	D	E	F	G	H	J	K	L
											
	0	400	500	600	800	900	1000	1055	1110	1200*	100 From End of Works

Advanced warning Area shall be increased a in case of horizontal curves and/or working during night.

\* Dependent on length of works.

☀ Solar Flash Light on sings and every 15m

<b>Permanent Speed Limit</b>	<b>Minimum Longitudinal Safety Buffer Length</b>
	<b>80 m</b>

- ## NOTES
- 
1. DO NOT SCALE FROM THE DRAWINGS.
  2. CONNECTED = PLASTIC NEW JERSEY BARRIERS FILLED (WATER AND SAND) IN RED COLORS WITH FLASHING TAPE.
  3. THIS TMP ON HIGHWAY IS INDICATIVE. THE CONTRACTOR SHALL PREPARE THE UPDATED TMP BASED ON GROUND CONDITIONS AND SHALL BE APPROVED BY THE CONSULTANT PREVIOUS TO COMMENCEMENT OF WORKS.
  4. ADVANCED WARNING AREA SHALL BE INCREASE IN CASE OF HORIZONTAL CURVES AND/OR WORKING DURING NIGHT.

Legend:

— PLASTIC NEW JERSEY  
BARRIERS FILLED (WATER  
AND SAND)

 SOLAR FLASH LIGHT ON  
SINGS AND EVERY 15M

## TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

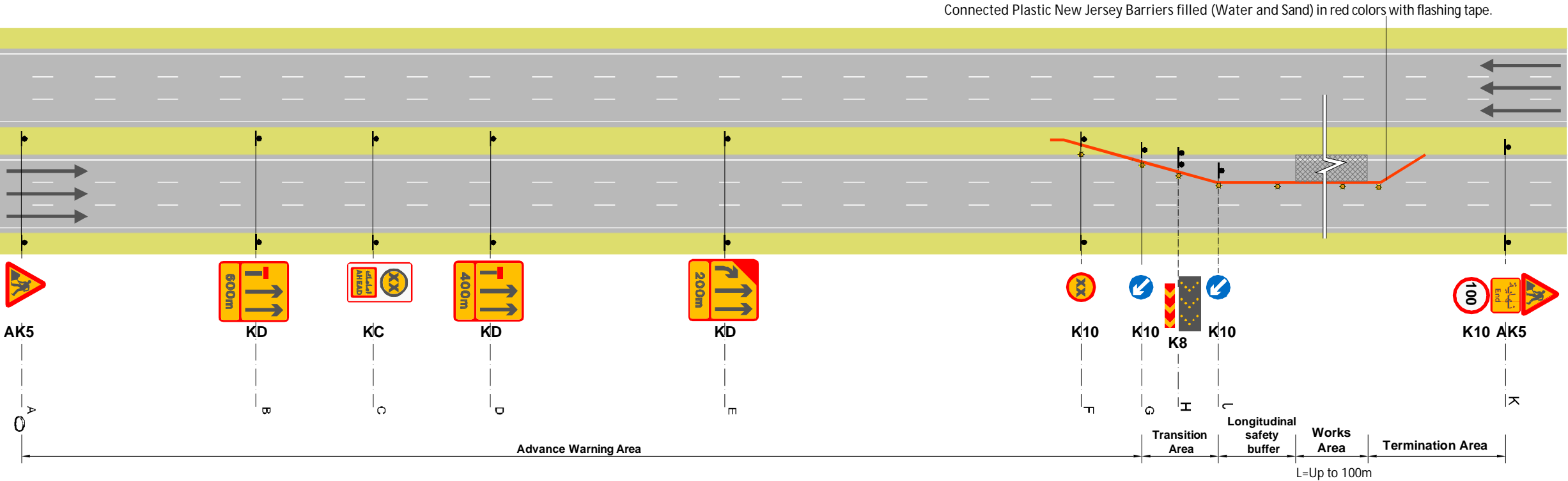
# REPUBLIC OF LEBANON

**COUNCIL FOR DEVELOPMENT  
AND RECONSTRUCTION**

ROAD ROUTINE MAINTENANCE  
FOR LOT 18  
ZAHLE CAZA

<p>STANDARD DETAILS</p> <p><b>TRAFFIC MANAGEMENT PLAN ON HIGHWAY</b></p> <p>TYPICAL LANE CLOSURE SHOULDER (2 OF 3)</p>	DATE	January-2024
	SCALE	As Shown
	Tender Drawings/Manual	
	DRAWING No.	REV
	DET-SA-09	00

Typical Lane Closure on Highway - Left side



Sign locations

Permanent Speed Limit	Advance Warning Area						Transition Area			Termination Area
	A	B	C	D	E	F	G	H	J	K
	0	400	500	600	800	900	1050	1230	1410	100 From End of Works

Advanced warning Area shall be increased a in case of horizontal curves and/or working during night.

Solar Flash Light on sings and every 15m

Permanent Speed Limit	Minimum Longitudinal Safety Buffer Length
	80m

Permanent Speed Limit	Taper Length (3.65 Lanes)
	Single lane
	360

NOTES

- DO NOT SCALE FROM THE DRAWINGS.
- CONNECTED = PLASTIC NEW JERSEY BARRIERS FILLED (WATER AND SAND) IN RED COLORS WITH FLASHING TAPE.
- THIS TMP ON HIGHWAY IS INDICATIVE.THE CONTRACTOR SHALL PREPARE THE UPDATED TMP BASED ON GROUND CONDITIONS AND SHALL BE APPROVED BY THE CONSULTANT PREVIOUS TO COMMENCEMENT OF WORKS.
- ADVANCED WARNING AREA SHALL BE INCREASE IN CASE OF HORIZONTAL CURVES AND/OR WORKING DURING NIGHT.

Legend:

- PLASTIC NEW JERSEY BARRIERS FILLED (WATER AND SAND)
- SOLAR FLASH LIGHT ON SINGS AND EVERY 15M

TENDER DRAWINGS/MANUAL

No	DATE	REVISION	DESCRIPTION	CHECKED	P.MANAGER

REPUBLIC OF LEBANON

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ROAD ROUTINE MAINTANCE  
FOR LOT 18  
ZAHLE CAZA

STANDARD DETAILS  
TRAFFIC MANAGEMENT PLAN ON HIGHWAY

TYPICAL LANE CLOSURE  
LEFT SIDE (3 OF 3)

DATE	January-2024
SCALE	As Shown
Tender Drawings/Manual	
DRAWING No.	DET-SA-10
REV	00