Trade Talks Programme




Foundations, ground floors and drainage

NHBC

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Strip/Trench Foundations - Terminology

- ✓ Strip foundations should be 150mm to 500mm thick (*T*)
- ✓ Trench fill foundations should be greater than 500mm thick (*T*)

- ✓ External walls
- ✓ Separating walls
- ✓ Chimney breasts
- ✓ Piers
- ✓ Internal load bearing walls
- ✓ Sleeper walls (Scotland)

Strip/Trench Foundations

Key issues

- Insufficient foundation depth
- Suitable bearing strata not found
- Insufficient concrete depth

Effects

- Structural performance not achieved
- Foundation Failure
- Defects built-in

Good practice

- Follow the design/details
- Changes in foundation design can only be made by the designer
- Ensure that any minimum foundation depths requirements are achieved
- Use a suitable working practice to indicate the finished concrete level

Setting out Foundations

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Key issues

- Poor workmanship
- Inaccurate setting out of foundation
- Point loading on to foundation

Effects

- Structural performance not achieved
- Disproportionate loads
- Potential foundation failure

Good practice

- Set out accurately
- With foundation excavations both line and level are important
- Ensure that the excavation follows the setting out
- Make suitable checks during and after the excavation activity

Minimum foundation depths – Clay soils

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Key issues

- Lack of Information may cause delays
- Inaccurate foundation depth
- Risk of failure increased

Effects

- Structural performance not achieved
- Desiccation of soil
- Potential foundation failure

Good practice

Modified Plasticity Index	Volume Change Potential	Minimum Depth (m)
40% and greater	High	1.0
20% to less than 40%	Medium	0.9
10% to less than 20%	Low	0.75

Steps in Foundations

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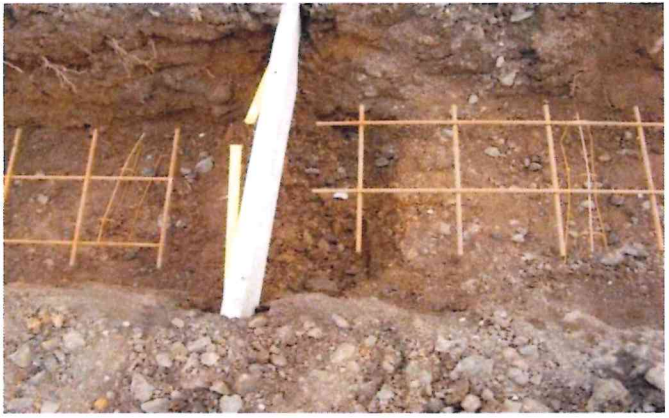
Key issues

- Lack of knowledge of requirements
- Minimum overlap not achieved
- Heightened risk of foundation failure



Effects

- Structural performance not achieved
- Risk of foundation snapping under load
- Potential foundation failure

Good practice

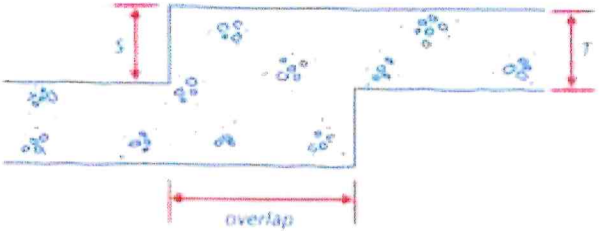
- Foundation bottoms should be horizontal
- Step faces should be as near vertical as possible
- Ensure that the step height does not exceed the foundation thickness
- Remove all formwork before commencing the substructure

Steps in Foundations

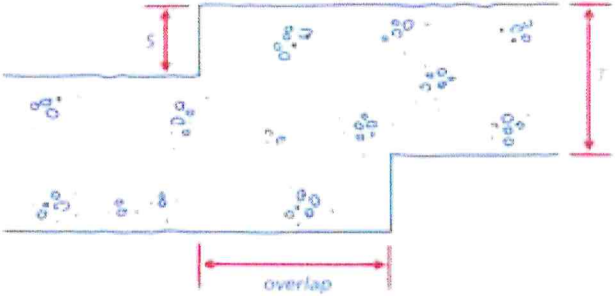
Strip Foundations

- The overlap should be *not less* than:
  - 2 x S, or
  - T (maximum 500mm) or
  - 300mm

  whichever is the largest



Trench Fill Foundations



- The overlap should be *not less* than:
  - 2 x S, or
  - one metre

  whichever is the larger

Services can pass through a strip foundation?

TRUE

FALSE

Services can pass through a strip foundation?

FALSE

Services should not pass through strip foundations but through the masonry above. Adequate lintels should be provided in the masonry.

Building near trees – Clay soils

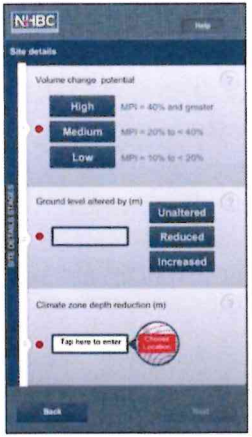
Key issues

- High risk of heave/shrinkage
- Foundation failure
- Lack of suitable design

Effects

- Structural performance not achieved
- Risk of foundation failure due to heave/shrinkage of clay soils
- Disruption of homeowner

Good practice



- Establish the required foundation depth before commencing work
- The NHBC Standards will help to establish the foundation depth
- Foundations in excess of 2.5m deep are required to be engineer designed
- Remove roots from the excavation

Heave precautions

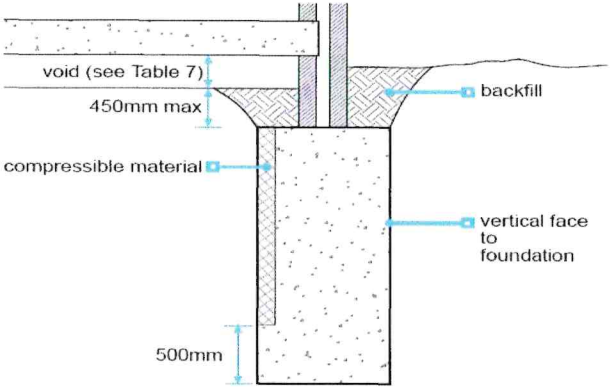
Key issues

- Design not followed
- Precautions required to the inside leaf of the external wall in foundations
- Precautions must be continuous

Effects

- Compressible material suitability or incorrectly positioned impairing heave protection
- Risk of foundation failure

Good practice



- Refer to the NHBC Standards for guidance
- If the design/details are unclear then seek clarification
- Ensure that the compressible material will give the required protection
- Positioning the compressible material 500mm from the bottom is import

Raft foundation

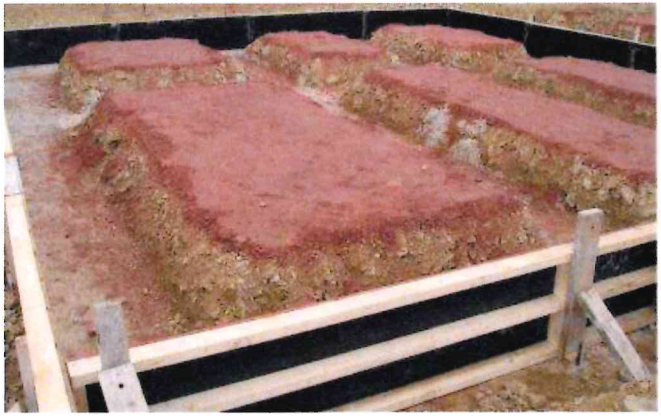
Key issues

- Engineered fill not compacted as per design
- Property at risk of disproportionate settlement

Effects

- High risk of large claim for the developer
- Major disruption to the homeowner

Good practice



- If doubt exists with the formation consistency then inform the engineer
- The engineered infill must be placed and fully compacted in layers
- Building near trees in shrinkable soil can effect the raft design
- Avoid undermining the raft edges with drainage excavations etc.

Vibratory ground improvement/Vibro piles

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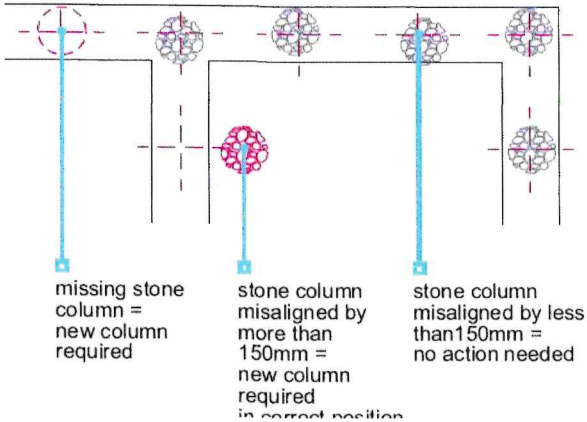
Key issues

- Incorrect position of column
- Ground not suitable for the intended load of the property



Effects

- Incorrect setting out and misaligned stone columns will lead to delays associated with remedial works

Good practice

- The accuracy of the setting out is important
- Ideally check the setting out whilst the VGI plant is still on site
- Look out for misaligned or missing stone column situations
- With shrinkable soils ensure that building near trees is considered

Pile and beam foundation

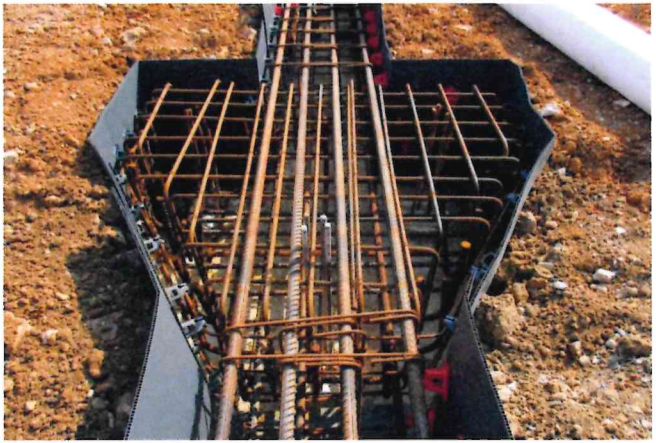
Key issues

- Setting out and application errors
- Work continued without ratification
- Lengthy delays on site

Effects

- Expensive claim if foundation fails
- Trees in shrinkable soils may require heave precautions

Good practice



- The accuracy of the setting out is important
- Look out for misaligned or missing pile situations
- With shrinkable soils ensure that building near trees is considered
- Ensure that any heave precautions are properly installed

Reinforcement and Concrete

Key issues

- Poor workmanship
- Hard spots created using clay bricks
- Risk of steel corrosion due to lack of coverage to reinforcement

Effects

- Unsuitable working practises
- Expensive claim if foundation fails
- Disruption to homeowner

Good practice

- Follow the design/details
- If the details are unclear then seek clarification
- Use the correct cover proprietary spacers
- The use of concrete blinding provides a suitable uniform base

Reinforcement and Concrete

NHBC

Key issues

- Water in excavation
- Cold weather working
- Risk of steel corrosion due to lack of coverage to reinforcement

Effects

- Unsuitable working practises
- Expensive claim if foundation fails
- Strength and durability not as design intended due to wrong concrete mix ordered/used

Good practice

- Follow the design/details
- If the details are unclear then seek clarification
- Use the correct cover proprietary spacers
- The use of concrete blinding provides a suitable uniform base

Substructure

Key issues

- Lack of effective bonding
- Hungry mortar joints
- Very poor workmanship

Effects

- Structural stability compromised
- Risk of vermin entry
- Strength and durability not as design intended due to wrong concrete mix ordered/used

Good practice

- Use the materials specified in the design with reference to:
  - block/brick strength
  - sulphate resisting blocks/bricks
  - mortar strength/sulphate resisting etc.
- Ensure that the setting out (both line and level) is accurate and adhered to
- Ensure mortar beds & joints are fully filled

All trenches within 1m of a foundation must be filled with concrete?

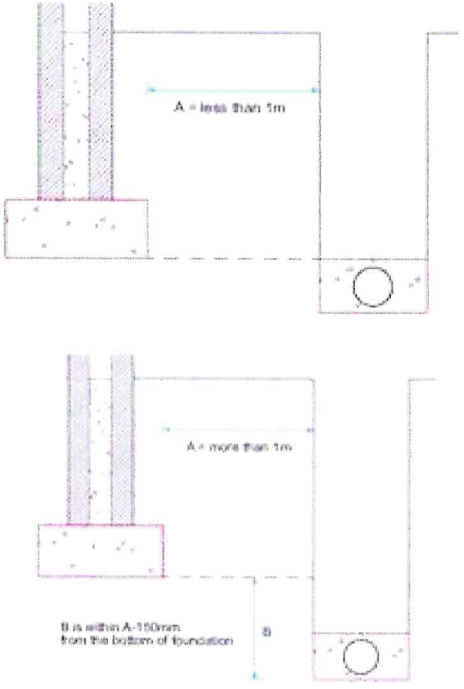
TRUE

FALSE

All trenches within 1m of a foundation must be filled with concrete?

TRUE

Where the bottom of a trench is below foundation level, trench should be filled with concrete to a suitable level.



Drainage – Layout, Y-junction and falls

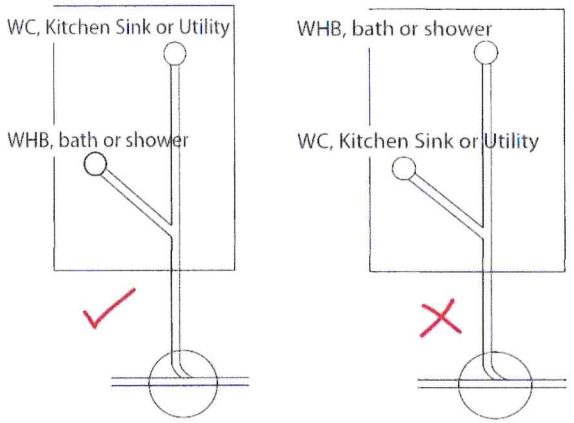
Key issues

- Design not followed
- Incorrect use of Y-junction below the ground floor
- Minimum gradient not achieved

Effects

- Higher risk of blockages
- Delays to the build process
- Dissatisfaction to homeowner

Good practice



- Follow the design layout
- Install manholes at the correct invert level
- Check that minimum gradients are being achieved on all pipe work

Pipe Diameter (mm)	Minimum Gradient
100	1 : 80
150	1 : 150

Drainage – positioning within ground floor

Key issues

- Inaccurate positioning
- Incorrect bedding material
- Temporary caps not used

Effects

- Higher risk of blockages
- Disruptive remedial work
- Potential damage to DPM

Good practice

- Pipe locations require setting out accurately
- Use rest bends and secure into position
- Fit temporary caps for protection
- Drainage layouts must be followed

Drainage – Laying pipework

Key issues

- Pipework not placed on bedding gravel
- Block used to create fall
- Incorrect materials used

Effects

- Unsuitable bedding can damage pipes
- Disruptive and very expensive remedial work required when there are back falls to drainage below groundfloor

Good practice

Normal Pipe Size (mm)		Granular Material for Bedding
Rigid Pipes	Flexible Pipes	Material (complying with BS EN 13242)
100	110	4/10mm Pipe Bedding Gravel
150	160	2/14mm Pipe Bedding Gravel

- Use the correct material for pipe bedding
- Pipes should be firmly supported throughout their length
- Bricks, blocks should not be used as temporary supports

Drainage pipes that are bedded in walls must have a flexible joint located not more than 150mm from face of inner and outer wall?

TRUE

FALSE

Drainage pipes that are bedded in walls must have a flexible joint located not more than 150mm from face of inner and outer wall?

TRUE

Drainage – Allowing for ground movement

NHBC

Key issues

- Pipework not placed on bedding gravel
- Block used to create fall
- Incorrect materials used

Effects

- Unsuitable bedding can damage pipes
- Disruptive and very expensive remedial work required when there are back falls to drainage below groundfloor

Good practice

- Co-ordinate service penetrations with the masonry substructure activity
- The following are acceptable:
  - lintelled opening
  - pipe built in with flexible joints either side of the wall

Drainage – Laying pipework

Key issues

- Pipework not placed on bedding gravel
- Block used to create fall
- Incorrect materials used

Effects

- Unsuitable bedding can damage pipes
- Disruptive and very expensive remedial work required when there are back falls to drainage below groundfloor

Good practice

- Co-ordinate service penetrations with the masonry substructure activity
- The following are acceptable:
  - lintelled opening
  - pipe built in with flexible joints either side of the wall

Ground bearing floor slab

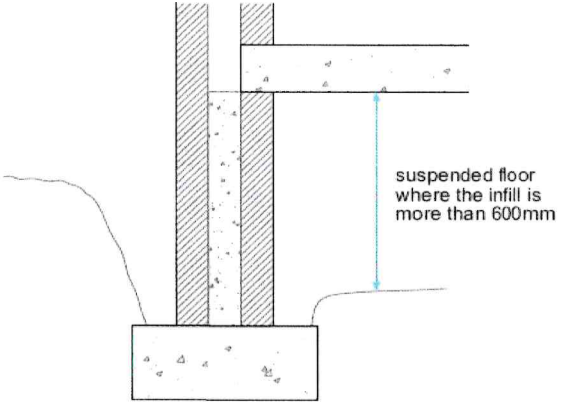
Key issues

- Lack of awareness of fill limits
- Fill exceeding 600mm
- Lack of compaction of engineered fill

Effects

- Failure of the ground floor
- Risk of heave from near by trees
- Disruption to homeowner

Good practice



- Where the void depth exceeds 600mm do not use a GBS solution
- Before filling all topsoil and vegetation should be removed
- Where the infill is less than 600mm the fill requires suitable compaction
- Use sand blinding to protect the DPM

Suspended block and beam

Key issues

- Incorrect bearing of beams
- Beams protruding into the cavity
- Lack of precaution against heave

Effects

- Failure of the ground floor
- Damage drainage
- Disruption to homeowner

Good practice

Volume change potential of sub-soil	Under floor void (mm)*	
High potential	150*	300**
Medium potential	100*	250**
Low potential	50*	200**

- Use smooth blinding material to protect the DPM
- Ensure that there is sufficient DPM material to link with the DPC
- Attention to detail at corners and service penetrations is important

Damp proof membrane

Key issues

- Incorrect bearing of beams
- Beams protruding into the cavity
- Lack of precaution against heave

Effects

- Failure of the ground floor
- Damage drainage
- Disruption to homeowner

Good practice

- Use smooth blinding material to protect the DPM
- Ensure that there is sufficient DPM material to link with the DPC
- Attention to detail at corners and service penetrations is important

Radon Barrier/Gas membrane – Cavity interface

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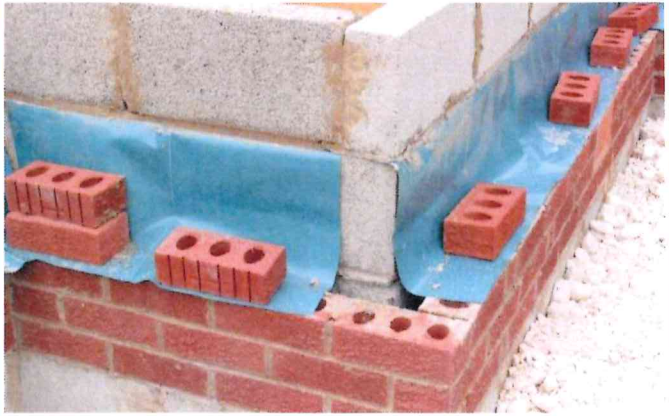
Key issues

- Lack of understanding from worker
- Risk of gases escaping into the cavity
- Design not followed



Effects

- Radon barrier not continuous is a human health risk (**Radon can cause cancer**)

Good practice

- Use the materials specified in the design
- Follow the design/details
- If the details are unclear then seek clarification
- Preformed internal/external corners are available and work well

Radon Barrier/Gas membrane

NHBC

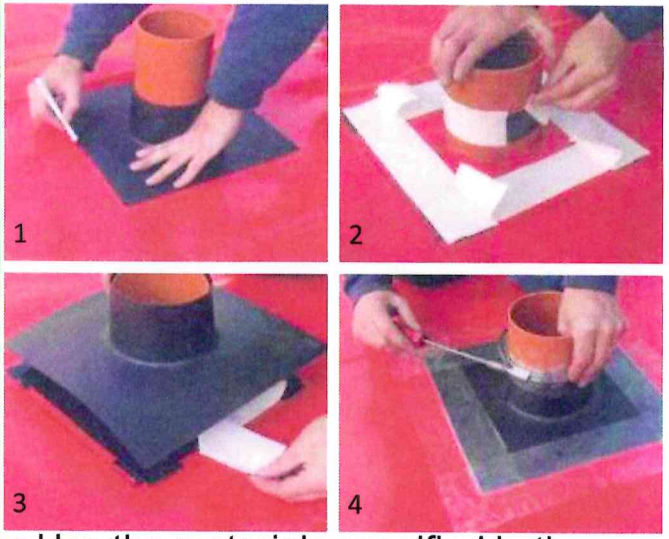
Key issues

- Lack of understanding from worker
- Design not followed
- Gas entering into the property

Effects

- Radon barrier not continuous is a human health risk (**Radon can cause cancer**)
- Risk of asphyxiation/explosion with some gasses (CO2/Methane

Good practice



- Use the materials specified in the design
- Attention to detail at corners and service penetrations is important
- Proprietary products provide effective solutions

Soakaways

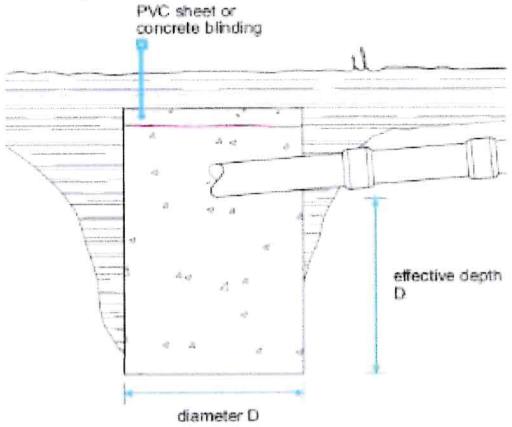
Key issues

- Incorrect soils for the use of a soak away
- Lack of peculation test being undertaken

Effects

- Surface water drain backing up
- Water logging in the garden areas
- Sited too close to footings can cause damage foundations

Good practice



- Carry out any percolation tests in line with the NHBC Standards guidance
- Construct to the size shown in the design details
- Use the materials specified in the design
- Locate at least 5m from foundations

Access and gully chambers

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Key issues

- Unable to gain access to the chamber
- Raised cover may provide trip hazard

Effects

- Access for rodding may become difficult
- Chamber/property may be damaged
- Disatisfaction to homeowner

Good practice

- Use the materials/products specified in the design
- Set out accurately avoiding boundaries/ kerb lines
- Set covers at correct level relative to adjacent finished ground/surface
- Protect covers from damage during the construction phase

Free standing walls

Key issues

- Design not followed
- Inadequate foundation
- Lack of site control

Effects

- Durability issues with poor detailing
- Building near trees may cause instability

Good practice

- Follow the design details
- Avoid ad-hoc construction
- The following are all important if failure is to be avoided:
  - concrete foundation
  - above and below DPC brick suitability
  - damp proof courses
  - capping/coping detail
  - expansion joints

Guarding and Steps to Retaining walls

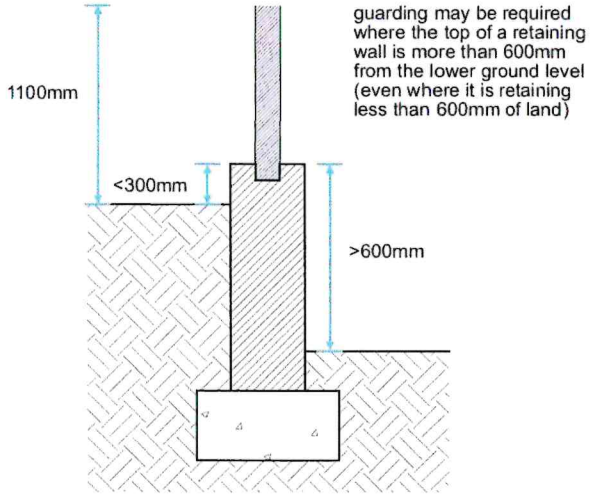
Key issues

- No guarding provided
- Heightened risk of falls

Effects

- Risk of injury
- Potential delays at Pre-handover

Good practice



- Follow the design details
- If the details are unclear then seek clarification
- Ideally clarify all requirements before commencing work
- Guarding should be at least 1100mm high

Paving Levels and Damp Proof Course Height

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Key issues

- External ground levels not 150mm below DPC
- Risk of soaking walls above DPC

Effects

- Moisture ingress above the ground floor
- Dissatisfaction to the homeowner

Good practice

- The paving and ground levels need to take account of the DPC level
- If the DPC level is not clear then seek clarification
- Take extra care with sloping sites
- The projection of the DPC will assist with its identification

Path Provision

Key issues

- Paths to narrow
- Does not meet NHBC Standards
- Does not comply with Building Regs

Effects

- Delays at the Pre-handover
- Difficulties with Wheelie bins
- Dissatisfaction to the homeowner

Good practice

Path widths should not be less than the following	MWH	MOW mm
Within curtilage to main or any entrance designated by Building Regulations	900	900
The removal of refuse to the collection point	750	900
Paths adjoining a home100mm or more from the wall of a home	450	700
All other cases	450	600

Paths and Patios

Key issues

- Poor sub base leading settlement issues
- Poor workmanship associated with setting and cutting

Effects

- Trip hazards formed within the home
- Aesthetically poor
- Dissatisfaction to homeowner

Good practice

- Use a suitable sub-base which should be 100mm thick
- The sub-base should be well consolidated
- 1:4 cement: sand mortar is a suitable bedding mix for paving slabs
- Neat cutting will add to the overall appearance

Ramped Approaches to Principle Entrances (England and Wales)

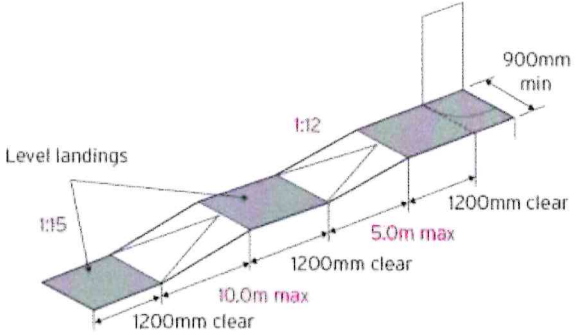
Key issues

- Unsuitable landings
- Maximum gradient exceeded
- Minimum width not achieved

Effects

- Delays at Pre-handover
- Non-compliance with Building Regs
- Disruption to homeowner

Good practice



- Follow the design details
- If details are un clear then seek clarification
- The minimum ramp/path width is 900mm
- The building control body must be consulted on any design changes

Rain Water Ingress at Principle Entrances (England and Wales)

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Key issues

- Potential for water ingress
- Trip hazard
- Potential for standing water to freeze

Effects

- Delays at Pre-handover
- Non-compliance with Building Regs
- Disruption to homeowner

Good practice

- Follow the design details
- Where the details are unclear seek clarification
- Use a drainage slot or channel in all but the most sheltered locations
- Avoid creating a trip hazard between the path/channel and the frame sill

Drives – Surface Variation and Gradient

Key issues

- Poor sub base leading to settlement
- Areas prone to ponding could become hazardous during freezing temperatures

Effects

- Poor visual appearance
- Potential drainage issues

Good practice

- Surface variations should not exceed +/- 10mm with 2m straight edge
- Temporary standing water is not permitted adjacent to entrance doors
- The maximum drive gradient is 1:6
- Where drive gradients are more than 1:10 transition lengths are required

Trade Talk – Questions?

Ground Works

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