

## Appendix E. BALLAST.

QUESTIONS	ENGLAND AND WALES.												SCOTLAND.			IRELAND.			
	CAMBRIAN	FURNESS	GREAT EASTERN	GREAT NORTHERN	GREAT WESTERN	LANCASHIRE AND YORKSHIRE	LONDON, BRIGHTON, AND SOUTH COAST.	LONDON AND NORTH WESTERN	LONDON AND SOUTH WESTERN	MANCHESTER SHEFFIELD AND LINCOLNSHIRE.	MIDLAND.	NORTH EASTERN	SOUTH EASTERN.	CALEDONIAN	GLASGOW AND SOUTH WESTERN.	HIGHLAND.	NORTH BRITISH.	GREAT NORTHERN OF IRELAND.	GREAT SOUTHERN AND WESTERN.
Material adopted for Bottom Ballast	Pitched Stone.	Stone or Slag.	Hard Ballast, topped with good rough gravel.	Broken Stone in some districts. Hard Clay elsewhere.	Stone and Slag, according to locality.	Hand-packed Stones, 9 inches deep, capped with 3 inches of Ashes wherever the stones can be obtained, and where these cannot be obtained, Hard Chalkers capped with Ashes.	Chalk or broken Stone.	Broken Stone, Slag, Chalk, Gravel, as may be most readily and economically obtained.	Dry Lumpy Chalk, slightly broken stone, or Coloured Slag Ballast.	Stone pitching 9 inches thick.	Slag or Stone.	Alter, Stone, or Gravel.	Ballast (unscreamed), rough Ballast or other available material.	Slag, bottom of Ballast 21 inches below rails.	Iron Slag.	Clean hard Gravel or broken stone.		Stone pitching.	Stone.
If Stone—what Mesh?		24 inches.		2 inches.	Smallest, 3 inch cube, largest, 6 inch cube.			Any size up to the depth of the Bottom Ballast.		Hand pitched.	Hand packed, 8 inches deep.	2 inches.		24 inch ring.	Not exceeding 4 inches.		All kinds.	2 inch ring.	2 inch ring.
Depth of Bottom Ballast	12 inches.	12 inches.	12 inches.	12 inches.	12 inches.	12 inches.	12 inches.	From 6 inches to 9 inches.	9 inches.	9 inches.	11 inches.	12 inches.	6 inches to 12 inches.		10 inches.	12 inches.		6 inches.	12 inches.
If Chalkers—whether Screamed or not	Not screamed.			Not screamed.	Screamed.	Not screamed.		Generally screamed.		Selected Engine Ashes.		Not screamed.	Low Chalkers, unscreamed.						
Materials used for Top Ballast	Gravel or refuse from Lead Mines.	Chalkers generally.	Good rough Gravel to pass through a 2 inch ring.	Clean Gravel or hard well burnt Ashes.	Stone, and Slag, and Gravel, according to locality.	Ashes.	Gravel.	Broken Stone, Slag, Chalk, Gravel, as may be most readily and economically obtained.	Gravel or Thames River Ballast and in West of England Stone Ballast, broken to pass through 2 inch ring.	Do not.	Clean sharp Gravel, Ashes, Slag Chippings, or Granite Chippings.	Colt Ballast from Furness, Chalkers.	Sea Beach and Thames River Gravel.	Slag.	Iron Slag.	Clean Gravel or broken Stone, not exceeding 2 inches mesh.	Gravel, broken Stone, and Chalkers.	Gravel.	
Thickness of Top Ballast	12 inches.	7 inches.		8 inches.	6 inches.	9 inches.	12 inches.	9 inches.	9 inches.	6 inches.	6 inches.	6 inches.	9 inches to 12 inches.		5 inches.	6 inches.		1 foot 3 inches to 1 foot 6 inches.	10 inches.
Is the Top Ballast laid above the Top of the Sleeper, and if so, to what extent?	Top of Sleeper in middle. Top of Rail on outside.	Yes, 1 inch.	Finished height to be level with top of Rail.	Yes, 2 inches.	Sometimes about 4 inches on outside, and 11 inches on inside.	No.	About 8 inches above.	No.	Not more above Sleeper.	Yes, 3 inches.	No.	Level with the top of the sleeper.	About 6 inches above the sleeper.	No.	Level with top of Sleeper.	No.		Ballast laid to outside level of rail, and channelled in centre of sleeper.	No.
What advantages are found to result from the use of the material selected for Ballast?	Gravel good. Ashes better. Refuse of Lead Mines best in preserving Sleepers.	Firmness, dryness, and absence of dust.		Better drainage.			Ease of running.		Stone bottom more suitable than Gravel where obtainable, as it facilitates drainage.	Very good drainage and preservation of material.	Good drainage. Absence of dust (such Slag).	Chalk Ballast gives on early running road, a economical, drives easily, is packed easily, and does not set.	Better preservation of the sleepers and rails, and additional steadiness of the Permanent Way.	Found to be reliable, and best to be got.	The road is kept dry and easily packed up with Iron Slag Ballast, and the Ballast lasts a very long time.	Good drainage and firmness of road.		Good drainage of Permanent Way.	

# ENGL

QUESTIONS.	CAMBRIAN.	FURNESS.	GREAT EASTERN.	GREAT NORTHERN.	GREAT WESTERN.
Material adopted for Bottom Ballast .....	Pitched Stone.	Stone or Slag.	Burnt Ballast, topped with good rough gravel.	Broken Stone in stone districts. Burnt Clay elsewhere.	Stone and Slag, according to locality.
If Stone—what Mesh? .....	.....	2½ inches.	.....	2 inches.	Smallest, 3 inch cube; largest, 6 inch cube.
Depth of Bottom Ballast .....	12 inches.	12 inches.	12 inches.	12 inches.	12 inches.
If Cinders—whether Screened or not .....	Not screened.	.....	.....	Not screened.	Screened.
Materials used for Top Ballast .....	Gravel or Refuse from Lead Mines.	Cinders generally.	Good rough Gravel to pass through a 2 inch ring.	Clean Gravel or hard well burnt Ashes.	Stone, and Slag, and Gravel, according to locality.
Thickness of Top Ballast .....	12 inches.	7 inches.	.....	9 inches.	6 inches.
Is the Top Ballast laid above the Top of the Sleeper, and if so, to what extent? .....	Top of Sleeper in middle. Top of Rail on outside.	Yes. 1 inch.	Finished height to be level with top of Rails.	Yes. 2 inches.	Sometimes about 4 inches on outside, and 1½ inches on inside.
What advantages are found to result from the use of the material selected for Ballast? .....	Gravel good. Ashes better. Refuse of Lead Mines best in preserving Sleepers.	Firmness, dryness, and absence of dust.	.....	Better drainage.	.....

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## ENGLAND AND WALES.

GREAT WESTERN.	LANCASHIRE AND YORKSHIRE.	LONDON, BRIGHTON, AND SOUTH COAST.	LONDON AND NORTH WESTERN.	LONDON AND SOUTH WESTERN.	MANCHESTER SHEFFIELD AND LINCOLNSHIRE.	MIDLAND.
Stone and Slag, according to locality.	Hand-packed Stones, 9 inches deep, capped with 3 inches of Ashes wherever the stones can be obtained, and where these cannot be obtained, Hard Clinkers capped with Ashes.	Chalk or broken Stone.	Broken Stone, Slag, Cinders, Gravel, as may be most readily and economically obtained.	Dry Lump Chalk, roughly broken Stone, or Coursed Stony Ballast.	Stone pitching 9 inches thick.	Slag or Stone.
Smallest, 3 inch cube; largest, 6 inch cube.	.....	.....	Any size up to the depth of the Bottom Ballast.	.....	Hand pitched.	Hand-packed, 8 inches deep.
12 inches.	12 inches.	12 inches.	From 6 inches to 9 inches.	9 inches.	9 inches.	11 inches.
Screened.	Not screened.	.....	Generally screened.	.....	Selected Engine Ashes.	.....
Stone, and Slag, and Gravel, according to locality.	Ashes.	Gravel.	Broken Stone, Slag, Cinders, Gravel, as may be most readily and economically obtained.	Gravel or Thames River Ballast and in West of England Stone Ballast, broken to pass through 2 inch ring.	Ditto.	Clean sharp Gravel, Ashes, Slag Chippings, or Granite Chippings.
6 inches.	9 inches.	12 inches.	9 inches.	9 inches.	6 inches.	6 inches.
Sometimes about 4 inches on outside, and 1½ inches on inside.	No	About 3 inches above.	No	Not much above Sleeper.	Yes. 3 inches.	No
.....	Ease of running.	.....	.....	Stone bottom more suitable than Gravel where obtainable, as it facilitates drainage.	Very good drainage and preservation of materials.	Good drainage. Absence of dust (with Slag).

# SCOTLAND.

# IRELAND.

		SCOTLAND.				IRELAND.	
NORTH EASTERN.	SOUTH EASTERN.	CALEDONIAN.	GLASGOW AND SOUTH WESTERN.	HIGHLAND.	NORTH BRITISH.	GREAT NORTHERN OF IRELAND.	GREAT SOUTHERN AND WESTERN.
Ashes, Stone, or Gravel.	Ballast (unscreened), rough Ballast or other available material.	Slag, bottom of Ballast, 21 inches below Rails.	Iron Slag.	Clean hard Gravel or Broken stone.	All kinds.	Stone Pitching.	Stone.
2 inches.	.....	.....	2½ inch ring.	Not exceeding 4 inches.		.....	2 inch ring.
12 inches.	6 inches to 12 inches.	.....	10 inches.	12 inches.		6 inches.	10 inches.
Not screened.	Loco Cinders, unscreened.	.....	.....	.....		Screened.	.....
Coke Ballast from furnaces, Cinders.	Sea Beach and Thames River Gravel.	Slag.	Iron Slag.	Clean Gravel or Broken Metal not exceeding 2 inches mesh.		Gravel, Broken Stone, and Cinders.	Gravel.
6 inches.	6 inches to 12 inches.	.....	5 inches.	6 inches.		1 foot 3 inches to 1 foot 6 inches.	10 inches.
Level with the top of the sleeper.	About 5 inches above the sleepers.	No	Level with top of Sleeper.	No	.....	Ballast laid to underside head of rail, and channelled in centre of sleeper.	No
Cinder Ballast gives an easy running road, is economical, drains easily, is packed easily, and does not set.	Better preservation of the sleepers and keys, and additional steadiness of the Permanent Way.	Found to be suitable, and best to be got.	The road is kept dry and easily packed up with Iron Slag Ballast, and the Ballast lasts a very long time.	Good drainage and firmness of road.	.....	Good drainage of Permanent Way.	.....